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A TEXT-BOOK

OF THE

PRACTICE OF MEDICINE

FOR THE

Use of Students and Practitioners

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BY

R. C. M. PAGE, M.D.,

Author of "A Chart of Physical Signs of Diseases of the Chest," "A Handbook of Physical Diagnosis of Diseases of the Organs of Respiration and Heart;" Professor of General Medicine and Diseases of the Chest in the New York Polyclinic; Visiting Physician to Randall's Island Hospital, St. Elizabeth's Hospital, The Polyclinic Hospital, and the North-Western Dispensary, Department of Diseases of the Heart and Lungs; Member of the New York Academy of Medicine and New York Pathological Society; Honorary Vice-President of the Congress held in Paris, 1891, for the Study of Tuberculosis, etc., etc.

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PREFACE.

To facilitate clinical instruction, and enable both physician and student to obtain in brief the most practical as well as scientific view of the various subjects treated of in a work on medicine, are the chief objects in preparing this volume.

Students in our medical colleges and those who visit New York and other medical centres for the purpose of taking a supplementary course in clinical medicine, as well as the busy practitioner, often find that they have not time sufficient at their command to sift out desired information on any given subject from extensive treatises and systems. While, therefore, such books may be regarded generally as invaluable as monuments of research, it is believed that a somewhat shorter work is both called for and will prove to be a valuable aid. Only the chief points in pathological anatomy, for instance, are given. Should further study in this direction be deemed necessary, there are works specially devoted to this subject. On the other hand, the author has thought it better to go rather more into detail regarding treatment than is customary; not only are drugs mentioned, but in many instances the prescription and dose are given.

R. C. M. PAGE, M.D.

31 West 33d Street, New York,
March, 1892.

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A PRACTICE OF MEDICINE.

CHAPTER I.

THE HEART.

BEFORE considering diseases of the heart, a few preliminary remarks regarding that organ in health may not be out of place. To form an outline of the normal heart on the chest walls, we first find the upper border of the third rib. This is best done, especially in fat people, by feeling for the horizontal ridge on the sternum that marks the union between the manubrium and gladiolus. At this point on either side is the articulation of the second costal cartilage with the sternum. Immediately below is the depression between the second and third ribs, or the second intercostal space, the upper border of the third rib, as well as lower border of the second being distinctly felt. Now draw a line across the sternum along the upper borders of the third costal cartilages, extending half an inch to the right and one inch to the left of the sternum. This is the base line of the heart. A line drawn from the left end of the base line down to the apex, but curving outward and yet within the left nipple, corresponds to the left border of the heart. This border is formed by the left ventricle. The right border of the heart is composed of a right border proper, formed partly by the right auricle and partly by the right ventricle, and a lower border formed chiefly by the right ventricle. To form the whole right border of the heart, draw a line horizontally from the apex to the median line of the sternum, to correspond to the lower border; thence curving upward and slightly outward to the right end of the base line, to form the right border proper.

AREAS OF CARDIAC DULNESS.

Of these there are two, a deep and a superficial. The deep area of dulness corresponds to that portion of the heart covered by lung tissue.

The superficial area is somewhat triangular in shape, and has but little lung tissue over it, only a tongue-like process of the

left lung projecting over the apex of the heart. To mark out this area draw a line from the apex of the heart horizontally, or rather slightly curved upward, along the upper border of the sixth costal cartilage, to the median line of the sternum; thence along the median line of the sternum up to the level of the upper border of the fourth costal cartilage; and thence curving downward and outward, but within the left nipple, to the apex. This area is somewhat triangular in shape, and is formed chiefly by the right ventricle, the left ventricle comprising the apex. This fact is well

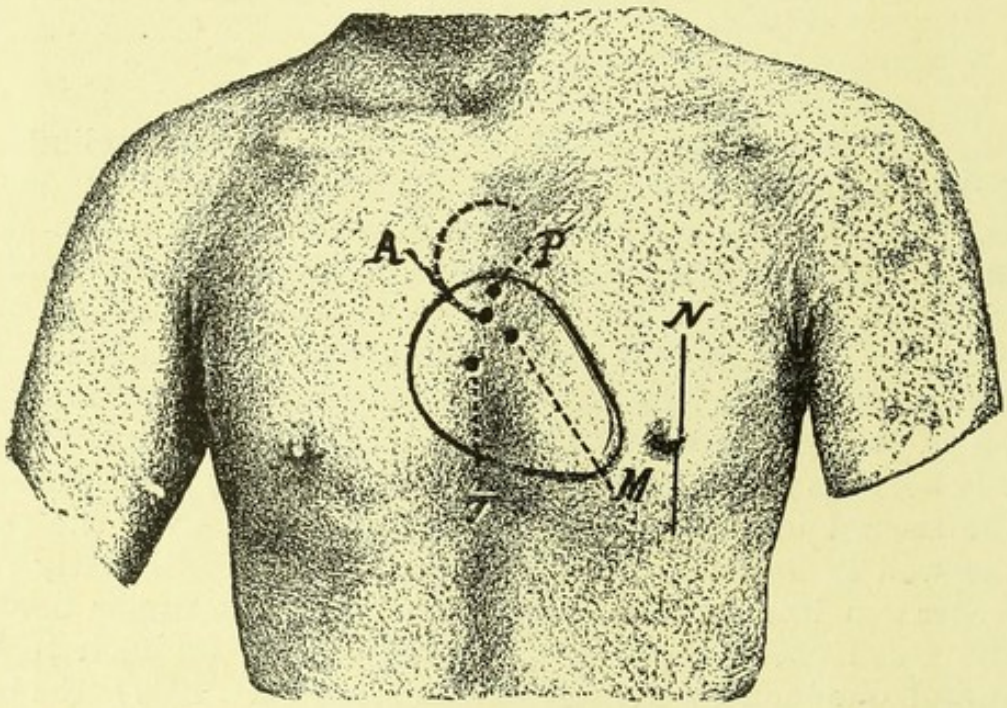


FIG. 1.—DIAGRAM OF OUTLINE OF HEART ON CHEST WALLS. *A*. Aortic or right second interspace; *P*, pulmonary or left second interspace; *T*, tricuspid area over ensiform cartilage; *M*, mitral area or apex; *N*, nipple (papillary-mammillary) line.

worth remembering in connection with the mitral murmurs, as we can then understand why we hear them loudest at the apex.

In general terms, it should be remembered that the right ventricle lies in front of the left, and that the pulmonary artery, about two inches long, arises in front of the aorta and from the left side of the base of the right ventricle, at a point corresponding to the junction of the left third costal cartilage with the sternum. The left auricle lies deeply behind it. The pulmonary artery, ascending outward across the second left intercostal space near the sternum, divides under the arch of the aorta, behind the second left costal cartilage, into a right and left branch, one for each lung. The second left intercostal space is therefore also called the pulmonary (pulmonic) interspace. The aorta, on the other hand, arises behind the pulmonary artery and a little below,

from the base of the left ventricle. It ascends upward and to the right, across the right second intercostal space, so that the latter is termed the aortic interspace in contra-distinction to the pulmonary interspace on the opposite side.

It is easy to understand that, with this arrangement, the ve-

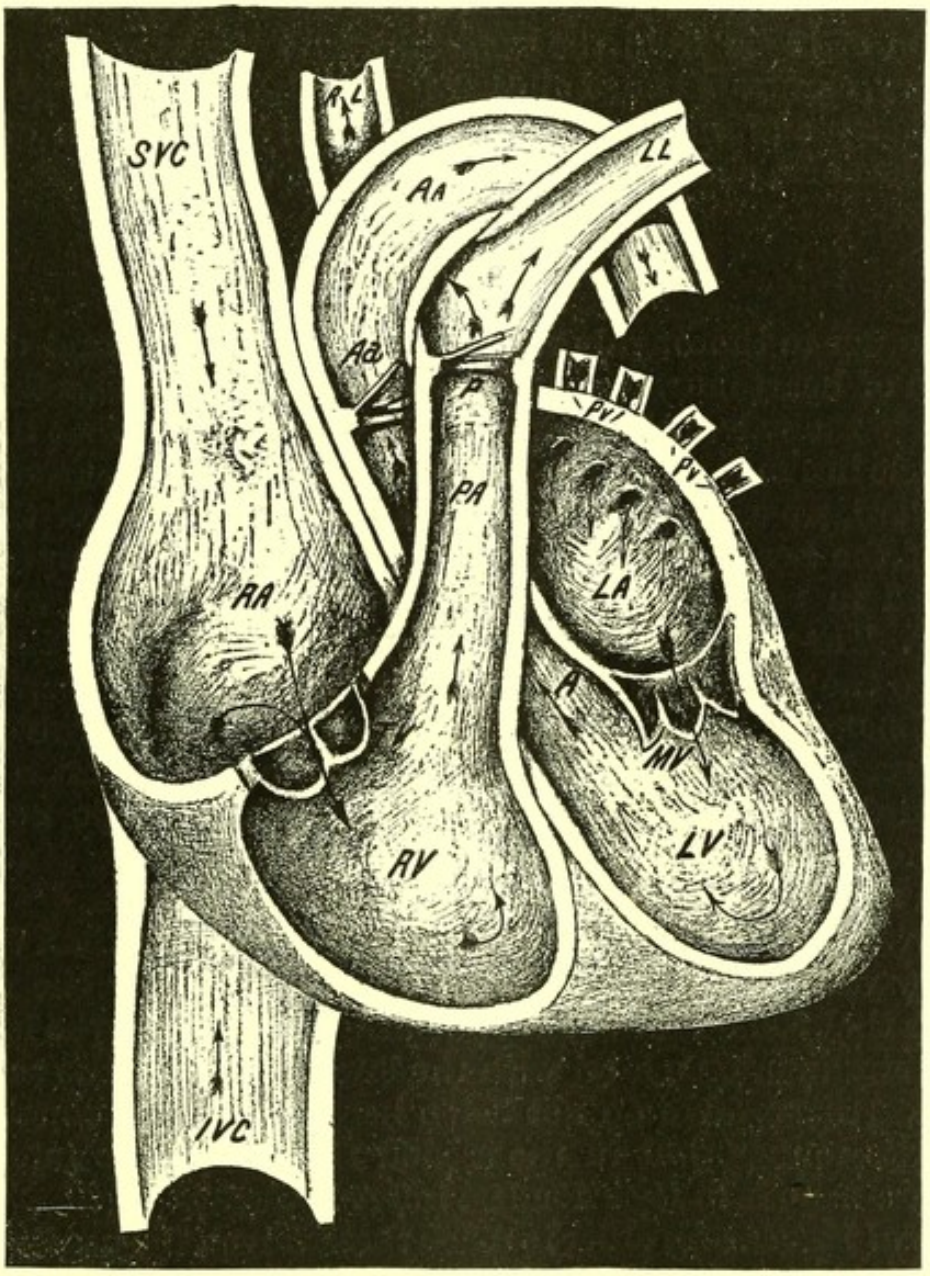


FIG. 2.—SCHEMATIC DIAGRAM OF THE CIRCULATION. *Pv*, Pulmonary veins; *LA*, left auricle; *MV*, mital valves; *LV*, left ventricle; *RV*, right ventricle; *TV*, tricuspid valves; *RA*, right auricle; *SVC*, superior vena cava; *IVC*, inferior vena cava; *PA*, pulmonary artery; *P*, pulmonary valves; *RL*, right lung; *LL*, left lung; *AA*, aorta; *Aa*, aortic valves.

nous blood, entering the right auricle from the two venæ cavæ, going thence downward through the tricuspid valves toward the apex, and thence upward through the pulmonary orifice and along the pulmonary artery into the lungs, travels from right to

left through the heart in front of the arterial blood that follows just the opposite course. In the latter case the arterial blood, brought from the lungs to the left auricle by the plumonary veins, passes through the mitral valve down to the apex and up again through the aortic opening into the aorta from left to right behind the venous circulation. Closure of the mitral and tricuspid valves occurs during ventricular systole, and prevents the regurgitation of blood from the ventricles into the auricles. On the contrary, closure of the semilunar (sigmoid) valves, that guard the pulmonary and aortic orifices, prevents regurgitation of blood from the aorta and pulmonary artery into the ventricles.

Situation of the Valves.

In order to thoroughly understand the location and differentiation of heart murmurs, it is necessary to know exactly where to locate the valves of the heart. If we remember that the right ventricle lies in front of the left, looking at the heart from before backward, we can readily understand that the valves of the right side of the heart, the pulmonary and tricuspid, are superficially situated in regard to the mitral and aortic valves, which lie deeply. The venous valves, or those of the right side of the heart, are also the highest and lowest, as well as the most superficial.

Pulmonary Valves.—The pulmonary (pulmonic) valves, may be pierced by a needle pushed in through the junction of the left third costal cartilage with the sternum. We do not listen here, however, for pulmonary sounds in their loudest intensity, but in the second left or pulmonary interspace.

Aortic Valves.—These are situated more deeply than the pulmonary valves, and a little lower down and nearer the median line, so that the needle should be pushed in through the left edge of the sternum, on a level with the lower border of the third left costal cartilage. We do not listen here, however, through bone, for aortic sounds, but in the second right or aortic interspace, for these sounds in their loudest intensity.

Mitral Valves.—In order to reach these valves, the needle should be pushed in deeply into the thoracic walls, at a point corresponding with the upper border of the fourth costal cartilage and near the left edge of the sternum. But we do not listen here for sounds connected with the mitral orifice, for the right ventricle is in front of it; but we listen at the apex, comprised by the left ventricle, and to this point mitral as well as other left ventricular sounds are conveyed. The mitral valves guard the orifice between the left auricle and left ventricle.

Tricuspid Valves.—These are situated superficially behind the median line of the sternum, between the fourth costo-sternal artic-

ulations and guard the orifice between the right auricle and ventricle. We do not listen here, however, for tricuspid sounds in their maximum intensity, but lower down, over the ensiform

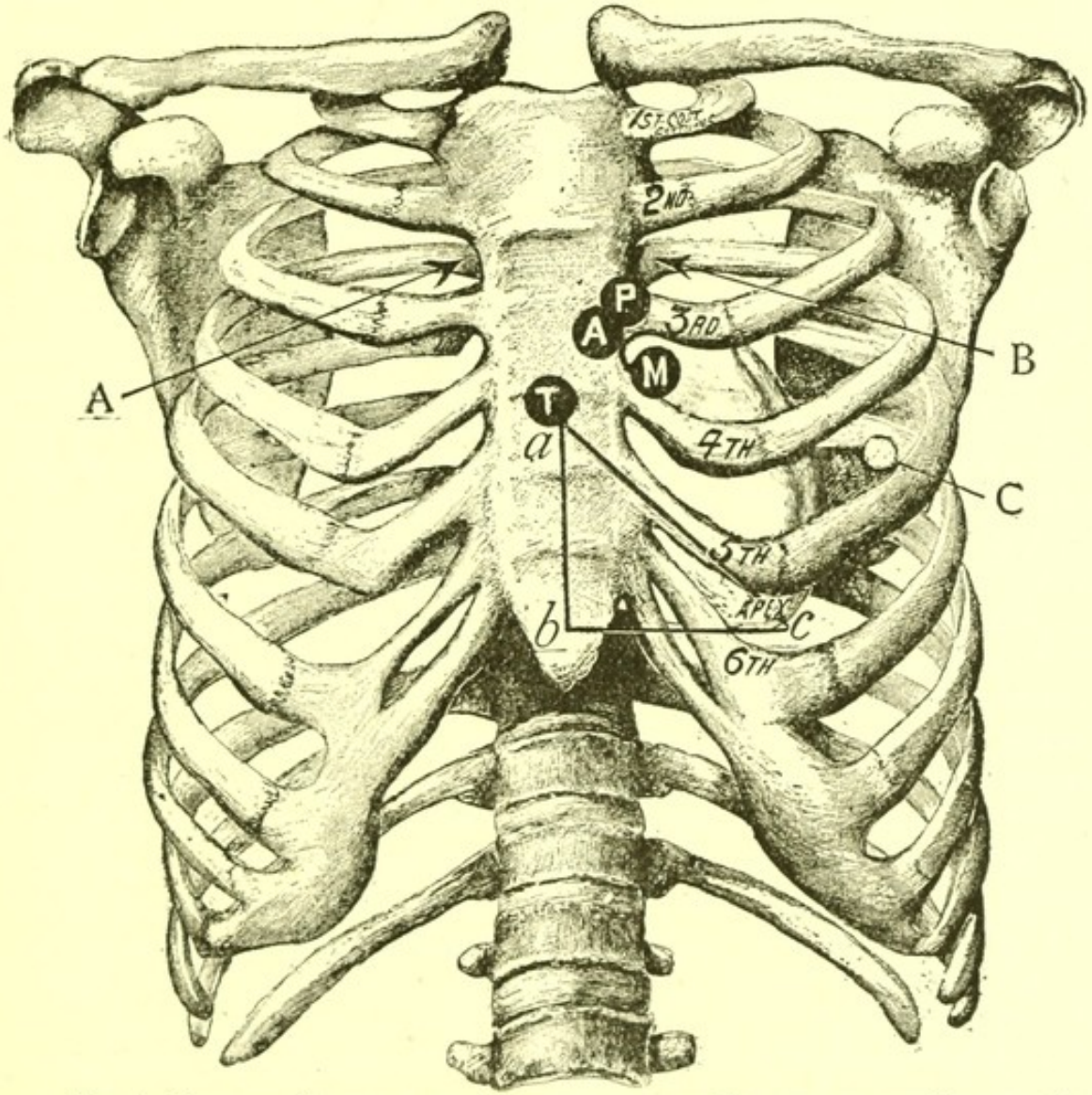


FIG. 3.—DIAGRAM SHOWING THE SITUATION OF THE VALVES OF THE HEART. *P*, Pulmonary valves; *B*, arrow pointing to the pulmonary or second left interspace; *A*, aortic valves; *A*, arrow pointing to the aortic or second right interspace; *M*, mitral valves; *T*, tricuspid valves. The triangle *abc* is the superficial area of cardiac dulness.

cartilage, where the lower border of the right ventricle crosses that cartilage.

A circle of one inch in diameter includes parts of all the valves of the healthy heart, but they are not situated in the same plane; those of the right side of the heart being in front of the left.

SOUNDS OF THE HEART.

There are two sounds of the heart—first and second.

The first sound is also called the apex or inferior sound, being heard loudest at the apex or inferior portion of the heart. It is also called the systolic sound, as it occurs during systole.

The second sound, being diastolic and heard best at the base of the heart, is also called the basic, superior, or diastolic sound.

These two sounds of the heart—first and second—are variously imitated by authors. Some liken the first sound to the syllable *lub* or *rub*, but it seems to me that *ŭb* is better, since it is very difficult to pronounce the syllable *lub* or *rub* without imitating a short presystolic murmur. The second sound, shorter and higher pitched than the first, is represented by nearly all writers as the syllable *ŭp*—in the word *cŭp*, for instance. My belief, however, is that this second sound is better represented by the short syllable *tă*—as seen at the end of the word *delta*, for instance.

The first sound occurs at the same time with the closure of the mitral and tricuspid valves, impulse of the heart, and systole of the ventricles. The second sound occurs with diastole of the ventricles, and is produced by the closure of the semilunar (also called sigmoid) valves that guard the orifices of the aorta and pulmonary artery.

A complete revolution or circuit of the heart's actions consists of the first sound, first period of silence, second sound, and then the second period of silence.

According to Walshe, a revolution may be regarded abstractly as ten-eighths of an inch long. In that case the first sound would be four-eighths (half-inch), first rest one-eighth, the second sound two-eighths (quarter-inch), and the second rest three-eighths of an inch long, and may be represented at the apex by *ŭb-dă*, and at the base by *ŭp-tă*. According to others, these sounds are represented by *ub-dăb* and *up-tŭp*, respectively.

Acute Endocarditis.

Etiology and Pathology.—Acute endocarditis is acute inflammation of the endocardium or lining membrane of the heart.

Occurring after birth, it affects the left side of the heart, but, during fœtal life, the right. The reason for this appears to be that after the child is born the left side of the heart has more work to do than the right, while exactly the contrary holds good during fœtal life. The greater the strain thrown upon a portion of an organ the greater its liabilty to disease. According to Richardson, however, the poison giving rise to the endocarditis is generated in the lungs and directly transmitted to the left heart in all its virulence. But by the time that it has made the circuit and arrived at the right side, this virulence is lost. The reverse of this would be true for fœtal endocarditis.

Endocarditis often occurs in the course of acute articular rheumatism in the proportion of from thirty to fifty per cent of cases according to different authors. The younger the patient, the

more liable is the attack of articular rheumatism to be complicated with endocarditis.

Endocarditis may also occur during an attack of diphtheria, scarlet fever, typhoid fever, small-pox, measles, syphilis, lead-poisoning, gout, erysipelas, Bright's disease of the kidneys, pleurisy, pneumonia, and other diseases, or it may be due to pyæmia or surgical injury, or finally it may occur independently. In the latter case, it is termed idiopathic endocarditis. Such cases are, however, very rare. In some cases acute endocarditis is developed from a previously existing chronic endocarditis.

The endocarditis is in some instances of the ulcerative form. In such cases embolic abscesses would be likely to be produced by the septic material carried along in the general circulation instead of simple embolism as sometimes happens in the kidneys, spleen, and brain.

Endocarditis may result in one of three ways. In the first place it is most likely to lead to valvular lesion, as will be fully described. Or secondly, instead of valvular lesion, there may be a lesion situated somewhere within the ventricle—an intra-ventricular lesion, sufficient to cause a systolic murmur, but not in the least interfering with the valves. Of course such intra-ventricular lesion may also coexist with valvular lesion. Possibly, and extremely fortunately for the patient, the endocarditis may terminate in resolution.

Symptoms.—These are very obscure. Patients die of some disease, and endocarditis is found at the autopsy without having been suspected. As a rule, however, palpitation is present, the pulse becoming frequent and irregular. Paroxysms of dyspnœa may occur, or else the respirations are increased in frequency. Pain or a sense of weight or constriction is felt in the cardiac region. If fever is present at the onset of the disease, it is usually increased and the temperature may go up to 103° F., for instance. Embolism of the brain, spleen, or kidneys may occur, but this is very rare in the benign form of endocarditis. More frequently it occurs in the malignant and ulcerative forms. The symptoms in general, in these forms, are also more marked, there being more palpitation, pain, and dyspnœa. In these forms, owing to the constitutional infection, hemorrhages may occur into the skin, mucous membranes, and the retina. Non-purulent articular swellings often occur secondarily. In some cases central symptoms are marked, and there may even be stupor and delirium.

Physical Signs.—These are not well marked or particularly distinctive. On inspection the cardiac impulse may be observed to be somewhat tumultuous and the area larger than normal. On palpation the impulse is felt to be more forcible than normal and often irregular. Percussion gives negative results unless the

heart should from some cause become rapidly dilated, and then the cardiac area would be increased in size accordingly. On auscultation, various murmurs may be heard. All of them are probably functional except that heard at the apex. This apex murmur is systolic in time, but it does not necessarily denote that insufficiency has occurred. It is usually due to roughening of the lining membrane and, as Flint states, it is simply an intra-ventricular murmur.

Diagnosis.—If a patient affected with rheumatism or some other disease is found upon examination to have no cardiac murmur, but subsequently a blowing systolic murmur is developed at the apex with the symptoms of pain, palpitation, and dyspnœa with rise of temperature, as already described, it is fair to infer that endocarditis has occurred.

Pericarditis might be mistaken for endocarditis. But in pericarditis the friction sounds are superficial and rasping, sawing, or churning in quality, limited to the cardiac area, and noticeably increased on pressure or by causing the patient to lean forward. Moreover, they are not constantly in the same relation to the heart sounds as regards the time of their occurrence. Endocardial murmurs, on the contrary, are more deeply situated, soft and blowing in quality, may be diffused beyond the precordial space, and are not increased by pressure or changing the position of the patient. They also bear a constant relation to the heart sounds in time of occurrence. In pericarditis, after effusion takes place, the disappearance of the murmurs and enlarged area of precordial dulness renders the diagnosis easy.

Prognosis.—In the great majority of cases, simple endocarditis is not the immediate cause of death. But the danger from resulting valvular lesions always renders endocarditis a serious disease. According to Loomis, valvular lesion results in twenty-five per cent of cases of acute endocarditis. The occurrence of embolism, as evidenced by sudden enlargement of the spleen, or cerebral symptoms, is always unfavorable. The prognosis in ulcerative endocarditis is generally unfavorable.

Treatment.—Absolute rest is of the first importance in the treatment of acute endocarditis, in order that as little work shall be required of the heart as possible. Mental excitement is therefore to be avoided, as well as physical exertion, and stimulants are contra indicated unless typhoid symptoms occur. The nutrition, however, should be of a high order without being stimulating, such as milk or some of its preparations with or without beef tea, Valentine's meat juice, and the like. In case of rheumatism, alkaline remedies given sufficiently to keep the urine alkaline are said to lessen the tendency to endocarditis (p. 440). The chest should be carefully protected by means of flannel, so that it may

not be exposed during an examination or at any time, and the room should be kept at a uniform temperature of 70° F. to 75° F. Pain and dyspnœa may require small doses of opium. External counter-irritation is of little or no use. Blisters are thought to do harm rather than good, though a mustard plaster might be tried. Some authors recommend the application of ice by means of the rubber bag, but I have had no experience with it.

Valvular Disease of the Heart.

(*Chronic Endocarditis.*)

Valvular lesions commonly give rise to enlargement of the heart. We have said that they result from one or more previous attacks of endocarditis. In many cases, however, there is no history of acute endocardtis. The lesion is then due to an endocarditis that is chronic to begin with, and the valves may become contracted, thickened, adhered, perforated, or calcified. Syphilis, gout, abuse of alcohol and tobacco, and occupations requiring excessive muscular effort, as heavy lifting, all tend to produce a chronic endocarditis. Chronic nephritis, hereditary influence, old age, and any cause for artero-sclerosis, including chronic lead-poisoning, may give rise to chronic endocarditis and valvular lesion. I have known one case of rapidly developed and fatal aortic insufficiency that was clearly traceable to heavy lifting, the patient being a robust coal-heaver about thirty-two years of age. We have said that endocarditis occurring after birth attacked the left side of the heart, but that during fœtal life the right side was affected. We conclude, therefore, that infants with valvular lesion of the tricuspid and pulmonary valves were born with them, though attention may not have been called to the fact for several years afterward.

Relative (secondary) tricuspid insufficiency, however, occurs in persons after they are born. This form is due not to inflammation, but to enlargement (dilated hypertrophy) of the right ventricle, as in general emphysema, and mitral regurgitation or obstruction. In these cases the tricuspid valves fail to close the orifice on account of their being mechanically separated too widely.

Order of Frequency of Valvular Lesions.—All observers agree that mitral regurgitation is the most common. Regarding mitral obstruction, authors disagree. Dr. Walshe places it last in the valvular lesions of the left heart, but undoubtedly it is often present with reguritation. The following is the order of frequency according to Walshe:

(1) Mitral regurgitation; (2) aortic obstruction; (3) aortic regurgitation; (4) mitral obstruction; (5) tricuspid regurgitation

(including relative); (6) pulmonary obstruction; (7) pulmonary regurgitation (very rare); and (8) tricuspid obstruction (scarcely known). From a large number of cases observed, the author is disposed to place mitral obstruction second, and the others following in the order given.

Order of Frequency of Combination.—Valvular lesions, instead of existing singly, may be, and often are, combined. According to Walshe, they are as follows: (1) Mitral regurgitation and aortic obstruction, both giving rise to systolic murmurs; (2) aortic obstruction and regurgitation; (3) mitral regurgitation and aortic regurgitation; (4) mitral regurgitation, aortic obstruction and regurgitation; (5) mitral regurgitation and obstruction, and so on. I am quite certain that mitral regurgitation and obstruction exist more frequently in combination than the order mentioned. But it will be observed that obstruction and regurgitation may, and do, exist at the same orifice. This is perfectly true, for, while the orifice is constricted, the valves may be prevented from closing by adhesion.

As already mentioned, in a general way, valvular lesions usually produce enlargement of the heart. It may now be further stated that each valvular lesion is followed by an enlargement peculiar to itself. This fact is of the greatest importance in making a diagnosis, and should never be lost sight of by the examiner. In speaking of enlargement, not only is dilatation alone or hypertrophy alone meant, but both dilated hypertrophy or hypertrophous dilatation.

Now as to whether dilatation occurs first or hypertrophy, authors again disagree. It seems reasonable that both should proceed together, until the time arrives when hypertrophy ceases. Then uncompensated dilatation alone remains. That is the tendency if the patient lives long enough, and does not die meantime of some complication or fatal intercurrent disease.

The particular enlargements following various lesions respectively will be considered with each case of valvular disease.

Cardiac Murmurs.

Cardiac murmurs are adventitious sounds heard in connection with the heart in addition to, or in the place of, those sounds that exist in health. When due to organic disease, they are termed organic murmurs. When due to anæmia or perverted cardiac action, they are said to be inorganic, or simply functional. Either of these two classes of murmurs may originate without or within the heart, the former being termed pericardial (exocardial), the latter endocardial, murmurs. They may also exist together or separately.

Endocardial Murmurs.

Valvular lesions not only give rise to enlargement of the heart, but are also generally accompanied by permanent murmurs. Their location, areas of conduction and transmission, rhythm and time of occurrence, in relation to the heart sounds, are points greatly facilitating a correct diagnosis. The properties, or elements, of murmur sounds, such as quality, pitch, intensity, and duration, are also of some importance, particularly the quality, but these are secondary to other considerations, as will be seen. The loudness or feebleness of a murmur does not indicate the amount or gravity of the lesion giving rise to it. This is better told by the change in size and form of the heart produced, and other considerations to be noted. The fact that a murmur is heard about the heart is no sign of itself that the heart is diseased, since there are many murmurs that are independent of actual cardiac disease, however closely they may imitate true organic cardiac murmurs. It is the business of the examiner to distinguish between them, and this can usually be done by careful and intelligent observation.

There are other considerations, therefore, far more important than the mere fact of the presence of a murmur in connection with the examination of the heart.

Points of Maximum Intensity.

Individual murmurs usually have certain points of maximum intensity; that it so say, points where they are heard louder than anywhere else. For instance, mitral murmurs are heard loudest at the apex, tricuspid murmurs over the ensiform cartilage, aortic murmurs over the aortic interspace (second right), and pulmonary murmurs over the pulmonary interspace (second left). Exceptionally to this the aortic regurgitant murmur is usually heard loudest about mid-sternum.

It sometimes happens that a murmur is so loud as to be heard all over the chest, or body even, whereas that which is usually the loudest murmur may be, or become, so feeble as to be heard with difficulty, if at all, at its point of maximum intensity. Besides points of maximum intensity, murmurs have respectively certain areas of convection, conduction, and transmission, provided they are of the average intensity.

Murmurs Heard Loudest at the Apex. Mitral Murmurs.

There are five murmurs heard only or loudest at the apex, and consequently referable to the mitral orifice and left ventricle. Four of these murmurs are systolic in time, and one presystolic

or diastolic as Gutmann terms it. The four systolic murmurs are the mitral regurgitant, intra-ventricular, dynamic, and cardio-respiratory. Of these the mitral regurgitant and intra-ventricular murmurs are organic, the dynamic and cardio-respiratory being inorganic or functional. The presystolic (diastolic) murmur is also organic and is due to mitral obstruction. To sum up, therefore, we observe five apex murmurs referable to the left ventricle. Of these there are three organic and two functional. Compare the following table:

- Mitral or apex murmurs.
  - Systolic,
    - Mitral regurgitant.
    - Intra-ventricular.
    - Dynamic
      - Neurotic origin.
      - Due to anæmia.
    - Cardio-respiratory.
  - Diastolic (Presystolic).... Mitral obstructive.

Mitral Regurgitation.

Mitral regurgitation (reflux, insufficiency) occurs the most frequently of all valvular lesions. It leads to enlargement of the left auricle, the left ventricle, and lastly of the right ventricle. The blood regurgitating back into the left auricle, during systole, gives it more work to do, and it consequently becomes dilated and hypertrophied. In like manner the blood forced back on the lungs places additional strain on the right ventricle in its act of driving the blood through the lungs, thereby causing its enlargement. The way in which the left ventricle becomes enlarged is not so clear. According to Vierordt, of Leipsic, the left ventricle first becomes dilated from having blood under abnormally high pressure, and increased in quantity, driven into it during its diastole by the enlarged left auricle. The left ventricle then becomes hypertrophied in order to dispose of this extra quantity of blood, partly forward into the aorta, and partly backward into the left auricle.

The fact that the left ventricle does become enlarged in this disease is of the greatest importance in making out a diagnosis between mitral regurgitant and the intra-ventricular murmur. In the latter case there is usually no enlargement.

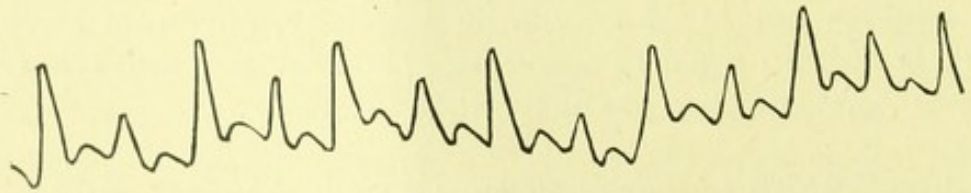


Fig. 4.—Diagram of Sphygmographic Tracing of Pulse in Mitral Regurgitation (Walshe). (From the Author's "Physical Diagnosis.")

The second sound of the heart is often accentuated over the pulmonary interspace and is louder than that heard over the

aortic, owing to regurgitation at the mitral orifice. The radial pulse is often irregular in size, being sometimes large, at others small, and nearly always compressible.

Physical Signs.—On inspection the apex beat is usually visible owing to increased force, and displaced downward and outside of the mammillary line from the enlargement. In thin persons, left systolic auricular impulse may sometimes be observed in the pulmonary interspace if the impulse be communicated to the auricle from the ventricle. In other cases a diastolic or rather a presystolic impulse will be noticed if it be due to hypertrophy of the auricle. Sometimes this auricular impulse very closely resembles aneurismal pulsation. Presystolic left auricular impulse is also observed sometimes in mitral obstruction, so that it is not positively diagnostic of either regurgitation or obstruction. As the disease progresses, jugular pulsation may be noticed, due to relative (secondary) tricuspid insufficiency from enlargement of the right ventricle.

On palpation, the heart's impulse will usually be felt to be increased in force, and the apex carried downward and outward, owing to enlargement of the left ventricle. Purring thrill in the fourth interspace, near or on the nipple line, and systolic in time, is not infrequent. It is not a constant phenomenon and disappears when the heart becomes feeble. In some cases it may be made to return by walking rapidly, excitement, or perhaps stimulants.

On percussion both areas of dulness are found to be enlarged, especially the superficial area.

On auscultation the distinctive characteristic of mitral regurgitation is heard loudest at the apex, and that is a blowing systolic murmur. The second sound is also accentuated over the pulmonary interspace and to a lesser degree over the aortic.

The mitral regurgitant (indirect, insufficient, reflux, systolic) murmur is usually blowing in quality, and occurs with or takes the place of the first sound of the heart. It is therefore systolic in time, and occurs with the apex beat. It is heard loudest at the apex, but is also often heard posteriorly at a point about half way between the inferior angle of the scapula and the vertebral column, opposite the seventh or eighth dorsal vertebra. We hear it at this point, not so much by its transmission along the ribs, but because we are listening directly over the mitral valves which are pushed back and nearer by the enlarged right ventricle which lies in front of the left. We also sometimes hear this murmur along the left lateral base of the chest, unless the right ventricle pushes it away or the murmur has become very feeble.

Sometimes this murmur is musical; that is, whistling, roaring, and such like. This has no special significance. It only indicates

the presence of vibrating spicula of inflammatory vegetations projecting from the inner wall of the ventricle or orifice, or else, according to Walshe, of rigid, vibratile edges that bound a narrow, chink-like opening.

Diagnosis.—Pleuro-cardial, or pleuritic friction sounds near by, may be kept up by the heart's impulse even while the patient holds the breath, but they are distinguished usually by their quality and the area to which they are limited. Such sounds, when not kept up by the heart's impulse, of course cease when the patient holds the breath.

Pericardial (exocardial) friction sounds are superficial, rubbing, churning, grazing, or creaking in quality, and are not transmitted beyond the limits of the heart. They have no fixed relation in time to heart sounds, and change with position of the patient leaning forward or backward, or by pressure with the stethoscope.

Intra-ventricular or mitral systolic non-regurgitant (Flint) murmurs are usually so feeble that they are heard only at the apex. As the lesion giving rise to them does not interfere with the circulation of the blood or action of the valves, there is no enlargement of the heart. The diagnosis is therefore usually easy to make. In cardiac aneurism, however, the heart does become enlarged, and in such cases it might be difficult, if not impossible, to make a diagnosis by means of the physical signs alone.

Dynamic murmurs are due to some perverted action of the heart, and are observed among choreic subjects, or else among those who are very anæmic. These murmurs are always systolic, but are readily distinguished, however. When due to nervous derangement from any cause, they are exceedingly inconstant. And when caused by anæmia, the patient shows the signs of anæmia so plainly that a mistake could hardly be made. In neither case is the heart necessarily enlarged. Moreover these dynamic murmurs at the apex are generally so feeble that they cannot be heard anywhere except at that point.

Cardio-respiratory murmurs are always systolic. They are caused by the heart's impulse forcing air out of some vesicles or cavities near by at the end of a full inspiration, or the respiratory murmur itself may imitate a heart murmur during systole. In order to exclude them the patient should hold the breath after a full expiration, and these imitation murmurs cease at once. In fact it is always a good rule, during auscultation of the heart, to have the patient hold the breath, so as to make sure of excluding such murmurs.

Mitral Obstruction.

Mitral obstruction (stenosis, constriction) is not only traceable to previous rheumatic endocarditis or other disease, but it is claimed by some to be sometimes idiopathic or congenital, in which cases it affects chiefly women and children. Mitral lesions of any variety are apt to occur among the young, aortic lesions after middle life.

Mitral obstruction causes enlargement of the left auricle and right ventricle. The enlargement consists in dilated hypertrophy here as elsewhere, unless otherwise specified. The left auricle becomes enlarged from the effort of that compartment of the heart to drive blood through the obstructed, or constricted, mitral orifice. The right ventricle also becomes enlarged from the fact that it has to drive blood through the lungs, whence it is prevented leaving by the obstruction at the mitral orifice. The fact that the left ventricle is not enlarged in mitral obstruction is of the greatest importance in making a diagnosis. On the contrary, the left ventricle is, if anything, somewhat diminished in size, or atrophied, from want of work due to lack of blood driven into it through the stenosed mitral orifice.

The second sound of the heart is also usually accentuated in the pulmonary interspace, owing to enlargement of the right ventricle, and weakened in the aortic interspace from atrophy of the left ventricle. Moreover, in about one-third of all cases of mitral obstruction, the second sound is reduplicated at the base, from the fact that the pulmonary valves close not only more forcibly, but earlier, than the aortic valves, owing to increased tension in the pulmonary artery and force in the right ventricle from enlargement. The radial pulse is sometimes, though not necessarily, affected. It is generally regular, much more so, of course, than in mitral regurgitation.

Physical Signs.—On inspection, we usually notice the apex beat, if visible at all, within the nipple (mammillary, papillary) line, as the left ventricle is not enlarged. It may be pushed out a little, however, by the enlarged right ventricle. Immediately preceding the apex beat, there may be also observed, in thin persons, a left auricular impulse, as already remarked. This impulse is systolic if reference is had to contraction of the auricle; that is to say, it is a left auricular systolic impulse. But in relation to the ventricle it is presystolic. In some cases this impulse is mistaken for aneurismal impulse. In suspected cases, great care should be taken in order to ascertain, if possible, the presence of mitral disease. The so-called pigeon-breast is frequently associated with mitral obstruction in children. The flattening is

most marked in the lower precordial region on the left side. Perhaps it is due to want of development of the left ventricle as well as lack of nutrition in general from want of proper function of the left ventricle. As the case progresses, relative, or secondary, insufficiency of the tricuspid valves occurs with consequent jugular pulsation, followed usually by dropsy commencing in the feet.

On palpation, the most distinctive sign is the presystolic thrill often felt about the left fourth intercostal space. This thrill, like the mitral regurgitant, goes and comes, however. The auricular impulse, already mentioned, is sometimes felt in persons with very thin chest walls.

On percussion, the area of dulness over the left auricle and right ventricle is enlarged, but over the left ventricle it is somewhat diminished, so that the superficial area of dulness is not so much enlarged as in mitral regurgitation.

On auscultation, a blubbering, presystolic (diastolic) murmur is usually heard. It sounds like vibrating the flaccid lips by forcible expiration through them while loosely closed (Flint), or vibrating the letter *r* with the tongue. It is loudest at the apex, and is generally limited to that region, though it may be conveyed up to the fourth interspace by the blood current, and in some rare cases is so loud as to be heard posteriorly, but diffused, instead of being limited to some particular point. The second sound is generally heard accentuated over the pulmonary interspace.

The mitral obstructive (direct, stenotic, constrictive, presystolic, diastolic) murmur is usually blubbering in quality, and unless it does blubber it is generally absent altogether, for this is the organic heart murmur that appears and disappears. All other organic heart murmurs are permanent. The reason why it is blubbering in quality has been fully explained by Flint. It is like throwing the flaccid lips into vibration by forcibly expelling the breath while the mouth is gently closed, which, as Flint truly states, "represents not only the characteristic quality of the murmur, but the mode of its production." This murmur appears and disappears, however, and how are we to account for it? There are those who claim that some of these mitral presystolic (diastolic) murmurs are really due to anæmia, and cases like the following are cited, to prove their position. A child of ten years, say, has a mitral presystolic murmur, and is very anæmic. It is taken to some hospital or treated at home. The attending physician finds undoubted anæmia, and along with nutritious diet he also prescribes iron in some form. When first seen, there was a loud presystolic (diastolic) mitral murmur, to all appearances due to mitral obstruction. But after several

weeks' treatment the child is much improved in general health, and on auscultation, perhaps, no murmur is heard. On palpitation, the presystolic (diastolic) thrill is gone. Was it simply an anæmic murmur? No. The child had mitral stenosis, and has it still. It is true that the general health is much improved, and the murmur and thrill have both disappeared either because the heart's action has become very weak from dilatation or else the child has been at rest, lying down, for some time. The murmur and thrill are both noticeably absent in the mornings while the patient is asleep, after having rested all night. Even in these cases, however, if the child be awakened suddenly and made to sit up, or walk about the room briskly, the murmur and thrill both often return. They are certain to do so unless the heart has become very much enfeebled by the dilatation and thinning of the cardiac walls.

The mitral obstructive murmur is never due to anæmia or any other functional or inorganic cause. It is always an organic murmur, due generally to mitral obstruction, but sometimes, and rarely, to aortic regurgitation which produces a relative, or secondary, mitral obstruction. Some authors go so far as to say that there really is no such thing as a mitral obstructive murmur, but that it is always really a regurgitant murmur. If, however, the mitral obstructive murmur is really regurgitant, due to prolonged contraction of the ventricle, then in aortic obstruction there ought also to be a presystolic aortic obstructive murmur, which is not the case. As already remarked, the mitral obstructive murmur is sometimes so loud that it may be heard all over the back, but at no particular point. It is not heard, for instance, at a point half way between the inferior angle of the scapula and the vertebral column, as in case of mitral regurgitation, because the sound is carried by the blood current down to the apex of the heart and away from the ear. It is not held at that point, therefore, long enough to be heard there. It is not transmitted along the left lateral base of the chest so as to be heard in that region, simply because the right ventricle, becoming enlarged, wedges the left ventricle off from the chest walls.

Diagnosis.—From mitral regurgitant murmur which is systolic in time, blowing in quality, often heard posteriorly and along the left side, and attended with enlargement of the left ventricle with corresponding displacement of the apex downward and outward, the mitral obstructive murmur is distinguished by being presystolic (diastolic) in time, blubbering in quality, limited to the apex chiefly, and not attended with enlargement of the left ventricle. The mitral obstructive murmur is never heard at any particular point in the back, but may be loud enough to be diffused all over the back or chest, especially in some children who

have very thin chest walls. Should thrill be present, it is presystolic (diastolic) in time in mitral obstruction, but systolic in mitral regurgitation. Aortic regurgitant murmur may be conveyed to the apex, but it is not blubbering in quality, is more purely diastolic in time than the mitral obstructive murmur, and is attended with enlargement of the left ventricle. Regarding pericardial friction sounds, the same rules hold good as in the case of mitral regurgitation.

Mitral Regurgitation and Obstruction.

These two lesions not infrequently exist at the same time. A patient with mitral obstruction only may in time develop mitral regurgitation also, or else the latter may precede the former. Rarely are both developed exactly at the same time.

When this combination does exist, however, there is generally but one murmur to be heard (the mitral regurgitant), the obstructive murmur ceasing as soon as the heretofore free edges of the valves have become fixed so that they do not vibrate, or excessive dilatation and weakening of the left auricle. In some cases, however, both murmurs are present, and heard in their respective areas, as already described. The left auricle and both ventricles become enlarged, and the second sound is more or less accentuated in the pulmonary interspace.

Tricuspid Regurgitation.

Tricuspid regurgitation (reflux, insufficiency) is commonly secondary or relative to dilated hypertrophy (enlargement) of the right ventricle as is caused by mitral regurgitation or obstruction, or general vesicular emphysema. In such cases the tricuspid valves become so widely separated mechanically that they fail to meet, and regurgitation follows, with jugular pulsation and cardiac dropsy.

In rare cases is tricuspid regurgitation due to inflammation, endocarditis of the right heart occurring, as already stated, only during fœtal life, and children born with tricuspid regurgitation generally die early.

Tricuspid regurgitation leads to enlargement of the right ventricle. It is usually attended with jugular pulsation, as already stated, and the tricuspid regurgitant murmur. This murmur is systolic in time and blowing in quality, but so soft and feeble that often it cannot be heard at all, and then it is limited to a small area over the ensiform cartilage.

Physical Signs.—On inspection, the area of cardiac impulse is noticed to be increased with epigastric pulsation due to enlarge-

ment of the right ventricle. Pulsation of the jugular veins is also noticed, and the patient is more or less cyanosed.

On palpation, the apex is generally felt to be displaced downward and outward on account of the enlargement of the left ventricle in cases of mitral regurgitation, to which the tricuspid insufficiency is secondary. In other cases there will be no such displacement and the impulse will be feeble. Epigastric impulse, from enlarged right ventricle and pulsation in the jugular veins can also frequently be felt. In some cases there is systolic pulsation imparted to the liver either from the dilated inferior vena cava or from veins within the liver itself. The character of the radial pulse is not affected by the tricuspid lesion, but it will be if mitral lesion coexists, especially mitral regurgitation.

On percussion we find the area of cardiac dulness increased to the right and upward, though this depends on the mitral lesion, if present.

On auscultation, the soft blowing tricuspid regurgitant murmur, systolic in time, is heard over the ensiform cartilage. Being very feeble and indistinct, as a rule, it is not transmitted elsewhere.

Diagnosis.—Mitral regurgitant murmur, systolic in time, is heard loudest at the apex and transmitted to the left. Tricuspid regurgitant murmur, also systolic in time, is heard only over the ensiform cartilage, and is accompanied by jugular pulsation, cyanosis, and cardiac dropsy. It is a very grave affection. Aortic and pulmonary murmurs, though transmitted down the sternum, are heard loudest about the base of the heart, and are unaccompanied by jugular and epigastric pulsation and other signs of tricuspid insufficiency.

Tricuspid obstruction is such a rare affection that practically it may be thrown out altogether. Even when it is present, there is no murmur, and it is only by post-mortem examination that such condition is found to have existed at all.

Murmurs Heard Loudest at the Base. Aortic Murmurs.

Aortic murmurs are heard in their maximum intensity usually about the base of the heart, and most commonly in what is known as the aortic interspace. This is the second interspace on the right of the sternum, as already described. Authors have described various murmurs heard only or loudest over the aortic interspace and consequently referable to the aortic orifice, the left ventricle, or the aorta itself. They may practically, however, be reduced to seven in number. Five of these are systolic in time and two diastolic. The five systolic murmurs are the aortic obstruction, intra-arterial, intra-ventricular, dynamic, and

cardio-respiratory. Of these the dynamic and cardio-respiratory are purely functional, the rest are organic. The two diastolic murmurs are both organic. Compare the following table:

- Aortic basic murmurs.
  - Systolic.
    - Aortic obstructive.
    - Intra-aortic (aortic non-obstructive).
    - Intra-ventricular.
    - Dynamic,
      - Neurotic origin.
      - Due to anæmia.
    - Cardio-respiratory.
  - Diastolic.
    - Aortic regurgitant.
    - Intra-arterial (aortic nón-regurgitant).

By comparing this table with that of mitral murmurs, we see that the mitral regurgitant and aortic obstructive murmurs are both systolic in time, while the mitral obstructive and aortic regurgitant are diastolic.

Aortic Obstruction.

Aortic obstruction (constriction, stenosis) causes enlargement of the left ventricle only, as a rule. The amount of ventricular enlargement will obviously be proportionate to the degree of obstruction. The radial pulse is generally regular, but where the obstruction is well marked it is small, hard, and rigid. Aortic obstruction is the least harmful of all valvular lesions.

Physical Signs.—On inspection, we observe that the apex beat is displaced downward and outward in proportion to the ventricular enlargement, and that the impulse is more forcible than normal.

On palpation, the heart's impulse is felt to be more forcible than normal and the apex beat displaced downward and outwardly. Basic systolic thrill may be felt, but this is rare. The pulse is regular, but generally hard and small.

On percussion, the area of cardiac dulness is increased, and this will be in proportion to the enlargement of the left ventricle, which in turn depends on the amount of aortic obstruction.

Auscultation reveals a normal or louder first sound, but the second sound over the aortic interspace is weak for reasons already given. The characteristic sign of aortic obstruction, however, is the aortic obstructive murmur, which has received many other names, as constrictive, stenotic, and such like.

The aortic obstructive (stenotic, constrictive, direct, systolic) murmur is heard loudest over the aortic interspace, which is the second right interspace, near the right edge of the sternum. It is systolic in time, and occurs with the first sound or just before the second. Not infrequently this murmur is carried by the blood current up into the arteries of the neck. It may be heard

at any point upon the sternum, being frequently transmitted from one end to the other of that bone. In some cases this murmur is so loud that it may be made out with ease at all the points indicated; at others it may be so feeble that it is heard with difficulty over the aortic interspace or point of maximum intensity.

Diagnosis.—Pericardial (exocardial) and cardio-pleuritic adventitious sounds are excluded here, as in case of mitral regurgitation or other endocardial murmurs. By comparing the table already given for basic murmurs referable to the aortic orifice, we find that there are the intra-arterial, intra-ventricular organic murmurs, and the functional dynamic and cardio-respiratory murmurs to be differentiated.

Intra-arterial, intra-aortic, or aortic non-obstructive murmurs are due to roughening of the inner coat of the aorta near the heart, inflammatory vegetations, coarctation, or constriction of the aorta, sacculation or pouching of that vessel near the heart, and pressure on it from fluid in the pericardial sac, or aneurismal or other tumor. But in these cases, though the conditions are fulfilled for producing a feeble murmur, the circulation is not interfered with to such an extent as to produce enlargement of the left ventricle. This left ventricular enlargement, then, is all-important in making a diagnosis between aortic obstruction and such conditions as those just described.

Intra-ventricular, or muscular murmurs as they are sometimes called, may also be heard in this locality, but they also are feeble, localized, and unattended with enlargement of the left ventricle. These murmurs are more frequently heard at the apex than at the base.

Dynamic murmurs are of common occurrence at the base of the heart, much more so than at the apex. After or during great exertion, as among college foot-ball players, athletic performances, or other violent exercise, a very loud basic systolic murmur is often heard over the aortic interspace and the neighboring vessels, owing perhaps to the great force with which the blood is driven through those vessels. A bashful woman comes up-stairs before a class to be examined, and from the excitement a dynamic murmur may be, and frequently is, developed, but presently disappears as soon as the patient becomes quiet. These murmurs are distinguished from aortic obstructive murmurs by their being absolutely inconstant, as well as the fact that they are not necessarily associated with enlargement of the left ventricle. Sometimes these murmurs may be produced among chil dren or others with thin, yielding chest walls, by pressure with the stethoscope.

Anæmia may also give rise to dynamic systolic basic murmurs, but these are distinguished by their not being necessarily asso-

ciated with enlargement of the left ventricle; by other and co-existing signs of anæmia, of which venous hum is a prominent sign; the non-existence of other murmurs, and finally their disappearance after proper treatment for the anæmia.

Cardio-respiratory murmurs are thrown out here as elsewhere by the murmur ceasing while the patient holds the breath.

Purely hæmic murmurs due to anæmia are heard over the pulmonary rather than the aortic interspace. Anæmia increases the intensity of all murmurs by increasing the vibratility of tissues, it is said. But just how thin (anæmic) blood can give rise to a murmur is not exactly known. According to some authors, in marked anæmia the cavities of the heart are enlarged due to dilatation, but the unyielding rings around the orifices remain the same. This being the case, it amounts relatively to the same thing as normal-sized cavities and constricted orifices giving rise to obstructive murmurs. In other cases the papillary muscles become weakened by fatty degeneration, so that they stretch and allow a slight back leakage, thus giving rise to a feeble, insufficient murmur. I believe, however, that a purely hæmic murmur as heard over the pulmonary artery, or the venous hum, is due to thinness of the venous blood, allowing it to splash in its flow, especially where two currents meet, or in large vessels, or where sharp angles occur in its course.

Guttmann, of Berlin, attributes venous hum to the vortiginous movement of blood in the ampullæ or bulbs at the junction of the jugular veins, for instance. These ampullæ or bulbs being adherent to surrounding connective tissue, remain the same size, while the volume of blood in anæmia is diminished, thus giving space for the vortiginous movements. It is heard, in my experience, more frequently on the patient's right side than the left, though this is not always the case. Pressure on the distal side of the stethoscope causes the sound to stop at once. This fact, besides that of its being a continuous, roaring sound instead of rhythmical, at once distinguishes it from heart murmur.

Venous hum has not yet been satisfactorily explained. According to Fothergill, many ingenious hypotheses have been raised in regard to this subject, but none have as yet been accepted.

The purely hæmic murmur, as sometimes heard over the pulmonary artery, is, I believe, nothing but a venous hum thrown into rhythm by proximity to the heart's impulse.

Aortic Regurgitation.

Aortic regurgitation (reflux, insufficiency) leads to great enlargement (cor bovis) of the left ventricle if the patient lives long enough. The blood regurgitating into the left ventricle, where

it meets the onward flow of the blood from the left auricle, causes the left ventricle a great increase of work to perform. For this reason the left ventricle becomes enlarged, and in some cases it is so much enlarged that the apex is carried down as far as the eighth rib. The second sound in the pulmonary interspace is usually normal. Over the aortic interspace the second sound of the heart is obscured or actually taken up by the aortic regurgitant murmur which occurs with it, as it is diastolic in time.

Physical Signs.—On inspection, the apex beat is found to be carried down and out from the enlargement of the left ventricle. The area of cardiac impulse is observed to be much increased and the impulse itself to be much more forcible than normal. The arteries in the neck are seen to pulsate, as well as all over the body where these vessels are superficial. The radial, ulnar, and other arteries are seen to pulsate, especially when the patient holds the arm up.

On palpation, the apex of the heart is felt to be displaced downward and outward, and sometimes basic diastolic thrill is present. The cardiac impulse is heaving or lifting. The radial pulse is unsustained and is characteristic. Hence it has received various names, such as the water-hammer, collapsing, vanishing, locomotive, or unsustained pulse. This peculiar pulse is characteristic of aortic regurgitation, and is due to the fact that the blood, during diastole, is forced partly backward into the left ventricle, and partly forward into the capillaries. For this reason it is unsustained, or else vanishes or collapses.

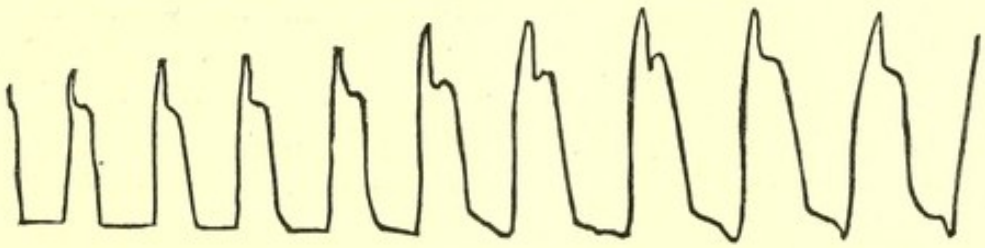


FIG. 5.—SPHYGMOGRAPHIC TRACING OF AORTIC REGURGITATION PULSE. (From the Author's "Physical Diagnosis.")

On percussion, the area of cardiac dulness is found to be markedly increased, especially over the left ventricle, which becomes enormously enlarged in this disease if the patient lives long enough.

Auscultation reveals the presence of the aortic regurgitant murmur, which characterizes this form of valvular lesion. Sometimes it is termed the aortic indirect or insufficient murmur. It is diastolic in time, and occurs with or takes the place of the second sound of the heart. It is also heard loudest, not in the aortic interspace, but over the sternum, about the junction of the fourth costal cartilages. The quality of the murmur varies, but it is

usually harsher and higher pitched than the obstructive murmur. Sometimes they exist together, forming what is termed the steam-tug murmur, *hoo-chee*, *hoo* being the aortic obstructive, and *chee* the aortic regurgitant murmur.

Being directed backward against the column of blood, it is not generally heard up in the arteries in the neck nor so plainly in the aortic interspace as the obstructive murmur. On the contrary, it is conducted downward, so as to be heard loudest about midsternum, though it is often heard also along the whole length of that bone, becoming more and more feeble toward the ends. When confined to one end of the sternum, it is more frequently heard at the lower than the upper, owing to the backward direction given to it. Sometimes it is also heard at the apex, but rather faintly. Occasionally the pulmonary artery may take up the murmur on account of proximity to the aorta, so that pulmonary regurgitation may be imitated. It is also heard sometimes behind, along the spinal column. In some instances it is so loud and musical that one hears it on entering the room, and even the patient may be prevented from sleeping by it.

Diagnosis.—Pericardial friction sounds are excluded here for the same reasons as given when speaking of mitral regurgitation or other valvular lesions.

Mitral obstruction might be mistaken for aortic regurgitation if the examination were confined to the apex, or if, as rarely happens, from insufficiency of the posterior segment of the aortic valve, the aortic murmur is heard only at the apex. But even in such cases the diagnosis is easy, for in mitral obstruction the left ventricle is not enlarged, but it is in aortic regurgitation. The pulse of mitral obstruction has nothing characteristic about it; in aortic regurgitation it is, as is well known, the peculiar water-hammer pulse. Purring thrill may or may not be present in either. But it would be more presystolic in mitral obstruction and felt lower down than in aortic regurgitation. Throbbing of the arteries in the neck is never due to mitral obstruction, but may be said to be always present, though in varying degree, in aortic regurgitation.

Aortic non-regurgitant or diastolic murmur occurring in the aorta itself is rare and is due to roughening of its inner coats with dilatation. This often exists with the aortic non-obstructive murmur. It is easily told from true aortic regurgitation by the fact that the left ventricle is not enlarged.

The pulmonary artery may take up the aortic regurgitant murmur, but pulmonary regurgitation is among the rarest of all valvular lesions, and is attended with very grave symptoms, such as œdema, cyanosis, and the like. Moreover, it is a lesion of fœtal life, and children born with it soon die. The right ventricle in-

stead of the left would also be enlarged in pulmonary regurgitation.

Aneurism is distinguished from the aortic regurgitation by the presence of tumor in aneurism, without great enlargement of the left ventricle. Moreover, the pulse in aneurism would be quite different from the characteristic water-hammer pulse of aortic regurgitation. The murmur in case of aneurism would be loudest over the aneurism also, instead of being loudest at mid-sternum, and the area of transmission of the aortic regurgitant murmur is different. In all cases the diagnosis in aortic regurgitation should be based on the characteristic enlargement of the left ventricle, pulse, and throbbing of the arteries about the neck and points where they are superficial, and upon the murmur.

Arterio-sclerosis also furnishes conditions for the throbbing of arteries. These vessels, resembling pipe-stems, throb on account of their stiffness, and the left ventricle is usually also somewhat enlarged, according to the amount of obstruction in the diseased arteries. But the murmur, if any exists, is systolic in time also, and the patient is past middle life, while the irregularly hardened and nodulated radial arteries can usually be felt.

Aortic Obstruction and Regurgitation.

With this combination of cardiac valvular lesions there is enlargement of the left ventricle, as already described. Two murmurs are present, the aortic obstructive systolic and the aortic regurgitant diastolic. They are often heard together on the sternum, generally about the junction of the fourth cartilage, and form what is known as the steam-tug murmur already mentioned—*hoo-chee*, *hoo* being the aortic obstructive and *chee* the aortic regurgitant murmur.

This combination is ranked by Walshe as second in the order of frequency. The physical signs need not be repeated, being the same as those already described for those two lesions.

Pulmonary Murmurs.

We listen over the apex, ensiform cartilage, and the aortic interspace for mitral, tricuspid, and aortic murmurs, respectively. Fourth and lastly we come to the pulmonary interspace, the second left interspace, for the auscultation of pulmonary murmurs in their greatest intensity.

Pulmonary murmurs are much more rare than aortic murmurs. Pulmonary obstruction and regurgitation are both due to valvular lesion following fœtal endocarditis. The children born with these diseases usually die young, especially in case of pulmonary

regurgitation, and hence few cases are observed. In fact, pulmonary regurgitation is so rarely seen that, like tricuspid obstruction, it may be thrown out altogether. Of the systolic pulmonary murmurs, the same remark would apply here to intra-ventricular, intra-arterial, dynamic, and cardio-respiratory murmurs as when describing the aortic systolic murmurs.

Pulmonary obstruction and the pulmonary hæmic murmurs, therefore, remain to be described.

Pulmonary Obstruction.

Pulmonary obstruction (constriction, stenosis) is more commonly observed among children for the reason that it is due to fœtal endocarditis. Those children, who are born with pulmonary obstruction, usually die early. There are, however, exceptions. It gives rise to a basic systolic murmur, but heard in its loudest intensity in the pulmonary instead of the aortic interspace. The right ventricle becomes enlarged, and the pulse is not affected by it.

Physical Signs.—Sometimes a systolic thrill is felt on palpation, and usually the patient, on inspection, is found to be cyanosed. Beyond this, we rely entirely upon auscultation.

On auscultation, a systolic basic murmur is heard in the pulmonary interspace. It is not, however, carried up into the arteries of the neck, nor is it so widely diffused, especially down to the ensiform cartilage, as the aortic murmur. It is quite superficial, and is conveyed along the pulmonary artery upward and outward toward the left shoulder, and in some emaciated children it is occasionally heard behind.

Diagnosis.—Sometimes mitral regurgitant murmur is communicated to the left auricular appendix, but in these cases the mitral murmur is loudest at the apex, conveyed to the left and heard posteriorly, and is attended with enlargement of the left ventricle. The pulse of mitral regurgitation is often irregular, while that of pulmonary obstruction is not necessarily changed at all. In some cases aortic obstruction may give rise to a murmur that may be caught up by the pulmonary artery, on account of proximity, and may thus resemble the pulmonary murmur. But in the latter case the presence of cyanosis, clubbed fingers, and the fact that the child was born with the murmur, together with absence of enlargement of the left ventricle, would render a correct diagnosis quite easy.

Pulmonary systolic hæmic murmur, due to a marked anæmic condition, is sometimes heard over the pulmonary interspace. It is distinguished from the true pulmonary obstructive murmur by the presence of other marked signs of anæmia, among which

are venous hum and perhaps enlargement of the spleen. In true pulmonary obstruction, also, there is always more or less cyanosis. Fits of dyspnœa are also likely to occur at any time, owing to the lungs being not properly supplied with blood. The condition of the blood in cyanosis does not give rise to a murmur, as occurs in case of marked anæmia.

Regarding systolic anæmic murmurs heard over the pulmonary interspace, Naunyn, of Strasburg, thought that they were due to slight mitral regurgitation due to anæmia, and communicated to the left auricular appendix. Yet in true mitral regurgitation with a very loud murmur, the transmission of such a murmur to this point is very rare. According to Vierordt, of Leipsic, the explanation of these cardiac murmurs is difficult, and he thinks that Sahle's suggestion might be available; namely, that these murmurs may arise from the large vessels concealed in the thorax.

Pulmonary Rugurgitation.

Pulmonary regurgitation (reflux, insufficiency) is such a rare disease as to constitute merely a clinical curiosity and a lengthy description of what might happen when it exists is unnecessary and of no practical value. The lesion is the result of endocarditis during fœtal life, and, being a very grave affection, the children die young, so that few live long enough to be observed. There would be a pulmonary regurgitant murmur, diastolic in time, and hardly possible to be confounded with any functional murmur, as the accompanying symptoms of cyanosis, dropsy, and the like would be very marked, as compared with the conditions giving rise to any functional murmur. Jugular pulsation, and enlargement of the right ventricle, following pulmonary regurgitation, would at once distinguish it from aortic regurgitation with the enlarged left ventricle, throbbing arteries in the neck, and characteristic water-hammer pulse.

Relative Gravity of Valvular Lesions.

The following is the order of the relative gravity of valvular lesions, according to Walshe: (1) Tricuspid regurgitation; (2) mitral regurgitation; (3) mitral obstruction; (4) aortic regurgitation; (5) pulmonary obstruction; and (6) aortic obstruction.

Pulmonary regurgitation is a fatal disease, but as both it and tricuspid regurgitation occur so rarely, nothing further need be said in regard to them.

Neither of the first three above-mentioned lesions produce what is generally understood as sudden death from heart disease. But all three are dangerous from complications that are likely to

arise, such as pulmonary congestion, hemorrhagic infarction of the lungs, cardiac dropsy, and pulmonary œdema. But in aortic regurgitation the patient is liable to die at any time from apoplexy, owing to the great force with which the blood is driven into the brain by the enormously enlarged left ventricle. Failure of the heart's action may also suddenly occur, from pressure of the enlarged heart on the coronary vessels, causing their occlusion. The heart's action, therefore, fails from lack of blood supply to its structure. Thoracic aneurism is also likely to be produced by the tremendous force with which the blood is forced into the aorta by the enlarged left ventricle. For these reasons it appears that aortic regurgitation is one of the most dangerous of all cardiac valvular lesions.

Symptoms.

The diagnosis, prognosis, and physical signs of the heart for the various valvular lesions to which it is subject having been given, it is now proposed to state the symptoms briefly and give a general outline of treatment for each one.

Symptoms.—The symptoms produced by valvular lesions of the heart are summed up in few words. In the first place it is well to note that so long as compensative hypertrophy exists, there may be no particular symptoms, especially in case of mitral lesion. When this fails, then the lungs, in case of mitral regurgitation or obstruction, are subject to congestion. This becomes more and more marked as dilatation and thinning of the cardiac walls gain on the compensative hypertrophy. Besides cough, shortness of breath, and hæmoptysis, especially on exertion, the patient suffers also with congestion of the liver, as evidenced by signs of passive gastro-intestinal hyperæmia and dyspepsia, with alternate constipation and diarrhœa. In mitral regurgitation the blood is regurgitated back to the lungs; in mitral obstruction it is prevented from leaving. In either case pulmonary congestion follows. Relative tricuspid insufficiency takes place sooner or later, and then cardiac dropsy and œdema of the lungs follow. Renal congestion, with a small amount of albumin in the urine, is not infrequent. Emboli, separated from thrombi that are likely to form in the dilated ventricles, are carried about in the circulation, producing cerebral, splenic, and renal infarctions from the left ventricle and auricle, and pulmonary infarctions from the right.

In aortic regurgitation, owing to the great force with which the blood is forced into the arteries, the patient suffers with fulness about the head, sometimes epistaxis, and even apoplexy. Sudden death may occur in this way, or from such enlargement

that the coronary arteries are pressed upon and the circulation is thus cut off from the heart muscle, causing it to fail.

In mitral regurgitation or obstruction, death may not occur so suddenly, but, owing to congestion of the lungs and important organs, the patient's life is much shortened.

Aortic obstruction is the least harmful of all valvular lesions, and the patient may live a long time without discomfort, unless compensation fails or the disease that gave rise to the lesion also causes endocarditis with aneurism, steno-cardia, or the like. In case of pulmonary obstructions, as sometimes observed among children, venous stasis and cyanosis are marked in proportion to the amount of lesion. The children usually die young. This is more truly the case in pulmonary regurgitation. The symptoms from tricuspid regurgitation are already described with mitral obstruction and regurgitation to which the tricuspid regurgitation is generally secondary. Should it occur in general emphysema, however, the same signs of congestion of the liver, kidneys, and other important organs follow.

Treatment.—So long as compensative hypertrophy exists, no particular treatment is called for. The patient should, however, avoid all mental excitement or physical exertion that would cause excessive cardiac action. For the same reason alcohol and tobacco should be avoided altogether, or else used very sparingly. The habits should be regular, and hygienic rules in general strictly adhered to. By these means patients with valvular disease of the heart often live to fifty or sixty years, or even more.

As soon as compensation begins to fail, as evidenced by dyspnœa, œdema, and symptoms already described, treatment becomes necessary. This varies according as the aortic or mitral valves are diseased. Aortic obstruction, as already stated, is the least harmful of any valvular lesion, and seldom calls for active treatment. Should the heart's action become feeble and irregular, and the patient suffer from attacks of dyspnœa, digitalis, morphine, and nitro-glycerin are indicated, as will be presently described when speaking of mitral lesions.

In aortic regurgitation the chief indication is rest on the part of the patient. The left ventricle becomes so enormously hypertrophied and throws the blood into the arteries with such force that digitalis, as a rule, and all similar drugs are contra-indicated. Aconite may be used instead. One-eighth of a grain of the extract may be given ter die in combination with one-fourth of a grain of hyoscyamus and extract of gentian to make the mass. (℞ Extr. aconit., gr. iss.; extr. hyoscyami, gr. iij.; extr. gentian., q.s. M. ft. pil. No. xij. Sig. One, ter die, before meals.) Instead of the extract of aconite its equivalent in the tincture may be used. A very good combination is the tincture of aconite,

Fowler's solution of arsenic, and iodide of potassium. (℞ Pulv. potass. iodidi, ℈iv.; tinct. aconiti rad., ♏x.; Fowler's solution of arsenic, ʒ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die, after meals.) Both the arsenic and iodide of potassium exercise a somewhat controlling influence over the inflamed membrane and exudates. The aconite should not be given continuously, but only at such times as tumultuous action of the heart indicates it. Attacks of dyspnœa are controlled by morphine and nitro-glycerin as in mitral lesions.

When the patient has mitral disease, whether regurgitative or obstructive, the one remedy for irregular heart's action and impaired compensation is digitalis. The tincture is the best form in which to use it. Digitalis is a heart tonic. It steadies the action of the hart and renders the pulse slower and more uniform. It is also diuretic and reduces temperature to a slight extent. It may be given indefinitely without fear of toxic effects if it be given in doses of five drops twice daily at intervals of ten or twelve hours, and the patient's urine be passed in normal amount. As the patient not infrequently suffers dyspepsia from the general venous stasis, it is well to give the tincture of digitalis in combination with the rhubarb and soda mixture at times. (℞ Tinct. digitalis, ʒ i.; pulv. rhei, pulv. sodii bicarb., āā ℈ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. two or three times daily after meals.)

Where digitalis is not well borne by the stomach, the tincture of strophanthus may be used. This remedy is also good in combination with tinct. ferri chloridi should the patient be anæmic. (℞ Tinct. strophanthi, ʒ ss.; tinct. ferri chloridi, ʒ iss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Shake. ʒ i. ter die.)

Convallaria, vernis adonis, and other drugs of the kind are recommended, but they are very much inferior to digitalis and strophanthus. The same may be said of helleboreine and sparteine.

Should dropsy occur, as will surely happen when the right ventricle becomes so enlarged that relative insufficiency of the tricuspid valves follows, with jugular pulsation and more or less cyanosis and dyspnœa, great relief may be obtained at once by the prompt administration of a hydragogue cathartic, such as pulvis purgans or elaterium. If the case be not urgent, Fothergill's pills, consisting each of a grain of calomel, extract of the root of squills, and powdered digitalis, may be given, one every three hours until the bowels move. By this means the liver is unloaded and both diaphoresis and diuresis established. This treatment should at once be followed up with the administration of the infusion of digitalis and acetate of potash. (℞ Infusi digitalis, ℥ viij.; pulv. potass. acetat., ℥ ss. M. Sig. Tablespoonful four times daily.)

The dropsy returns from time to time,and has to be treated in the same general way. The following prescription completely relieved a patient of cardiac dropsy also: ℞ Fl. extr. convallariæ, ʒ iij.; tinct. strophanthi, ʒ ij.; glycerin., ℥ iss.; aquæ, q.s. ad fl. ℥ iij. M. Sig. Shake. ʒ i. ter die.

For attacks of dyspnœa, nothing gives such speedy relief as the hypodermic injection of a small quantity of morphine—two drops of Magendie's solution—to be repeated if necessary. In other cases the inhalation of amyl nitrite gives speedy relief. A glass bead containing a few drops of the drug may be crushed in a handkerchief and applied to the nostrils. This is particularly indicated when the case is complicated with stenocardia or angina pectoris. In the mean time, in such cases, the patient should take nitro-glycerin (glonoin) for the purpose of dilating the arteries of the heart. A full description of the use of this drug, however, is given when speaking of the treatment of stenocardia, to which the reader is referred (p. 45).

For attacks of heart failure, dyspnœa, and fainting, stimulants are indicated. Of these Hoffman's anodyne is one of the best, the patient being in the recumbent position. The hypodermic injection of morphine is, however, in my experience, superior to all other remedies.

Pericarditis.

Etiology and Pathology.—Pericarditis is inflammation of the pericardium, which is the fibro-serous sac that envelops the heart, and is adherent to the diaphragm below and attached to the large vessels for about two inches above the heart. The disease may be acute, subacute, or chronic, the latter usually resulting from repeated attacks of the acute form.

Pericarditis is rarely, if ever, an idiopathic primary affection, but is usually secondary to some other disease. Of course it may be due to surgical injury. Perhaps it occurs more frequently in connection with articular rheumatism than any other disease. It also occurs in connection with acute infectious diseases, such as small-pox, scarlet fever, typhus and typhoid fever, Bright's disease of the kidneys, syphilis, tuberculosis, and scurvy.

Extension of inflammation from other organs may also cause pericarditis, as pleurisy and pneumonia. Finally it may be caused by new growths, such as cancer, tubercle, or the like.

The effusion occurring during pericarditis is usually serofibrinous, and the amount varies from a few ounces to several pints. In other cases—as in cancer, for instance, or scurvy—the effusion is bloody.

Should the effusion all become absorbed, the disease may terminate in complete resolution and no serious consequences re-

sult. Often, however, adhesions occur which subsequently interfere greatly with the heart's action. The sac may also become much thickened, due to proliferation of the subserous connective tissue.

Symptoms.—Pain in the precordial region and palpitation of the heart, with more or less dyspnœa, are the chief symptoms of acute pericarditis. In many cases the patient may have pericarditis during the course of some other disease without its ever attracting the notice of patient or attendants. When the effusion becomes excessive, the heart's action is much impeded by the pressure. In such cases the patient becomes restless and anxious, and dyspnœa may be extreme. The patient then occupies the half-sitting posture instead of that usually preferred, lying on the back, with the head elevated.

The temperature rises a degree or two, and the pulse, at first full and strong, becomes feeble and irregular if there be much effusion. Delirium not infrequently occurs in the course of pericarditis, and its cause is difficult to explain. In some cases it depends on the primary disease, but in the absence of such cause it may be due to the interference with the circulation owing to the pressure exercised on the heart muscle. Cerebral anæmia and congestion may thus be produced. Death from syncope may suddenly occur owing to this pressure. It is only by means of the physical signs, however, that we are enabled to make a diagnosis.

Physical Signs.—These vary according to the stage of the disease, and there are three stages, as in acute pleurisy with effusion. In the first stage there is congestion, in the second effusion, and the third is that of absorption. In the first stage the action of the heart is usually forcible and irritable, as revealed by palpation, inspection being chiefly negative in its results. On percussion the area of dulness is as yet unchanged. On auscultation the pericardial (exocardial) friction sound is heard. Endocardial murmurs may also exist. But pericardial (exocardial) friction murmurs are superficial, rubbing, churning, clicking, or creaking, never blowing, whistling, or roaring, and are limited to the cardiac region, and often vary in intensity with position of the patient, or pressure with the ear or stethoscope, and occur independently of the heart sounds—that is, not fixed. Endocardial murmurs, on the contrary, are fixed in their time of occurrence with regard to the heart sounds, and are often conveyed or transmitted over certain areas, as already described.

The second stage of pericarditis (effusion) is characterized by the effusion of liquid—acute hydro-pericarditis.

Inspection now shows prominence of the precordial region in proportion to the amount of effusion, diminution or absence of

the apex beat, and diminution of the respiratory movements on the left side. On palpation, the apex beat is felt to be raised upward and outward to the patient's left, is feeble or suppressed, and may change with position of the patient. If not felt when the patient is on the back, it may be perceptible if the patient

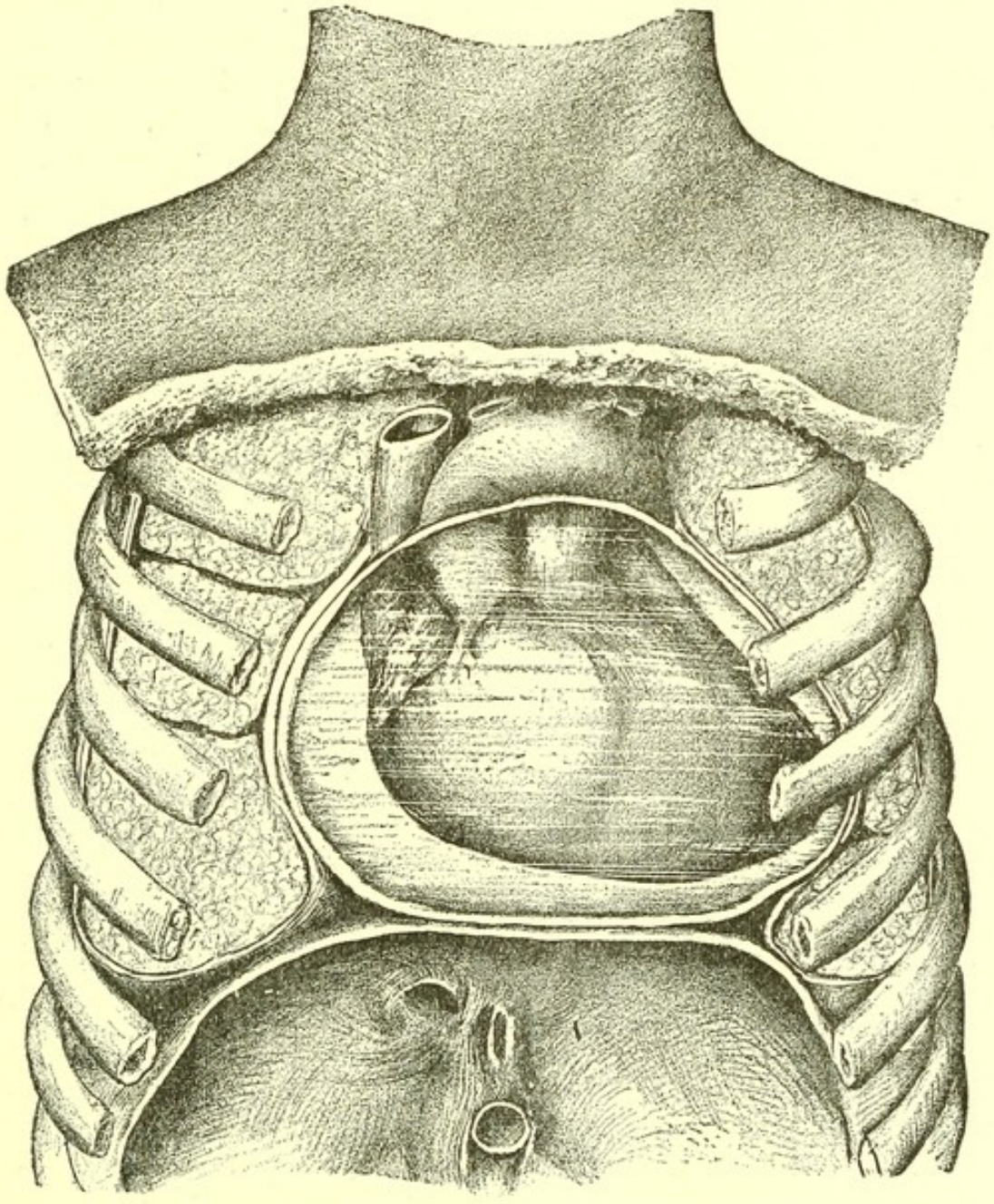


FIG. 6.—PERICARDITIS DURING THE STAGE OF EFFUSION.

leans forward. An undulating impulse is sometimes felt, and the epigastrium may be bulging from depression of the diaphragm.

On percussion, the area of precordial dulness is found to be enlarged. If the effusion be great, this area is found to be wider below than above, on account of the shape of the pericardial sac. It may extend down to the seventh rib and up to the first, and from nipple to nipple, or even farther. On auscultation, the peri-

cardial (exocardial) friction sounds have disappeared, since the two surfaces can no longer rub together. The heart sounds are feeble and heard better at the top of the sternum than elsewhere, as the effusion occupies less space than below. Sometimes a basic systolic murmur, due to pressure of the fluid on the aorta, is heard. The respiratory murmur, pectorophony, and fremitus are diminished or absent over the central portion of the cardiac region.

The third stage is that of absorption. The friction sound returns—frictio redux—the heart sounds become more distinct, and there is a gradual return to health in favorable cases. In other cases it may become subacute or chronic.

Chronic pericarditis may be attended with adhesions simply, or there may be adhesions with hypertrophy or atrophy. In other cases there may be chronic pericarditis with effusion, and then it is termed chronic hydro-pericarditis. The physical signs of chronic hydro-pericarditis are similar to those of the acute variety just mentioned.

Pneumo-hydro-pericarditis, or air and fluid in the pericardium, is rare, but may possibly result from decomposition of liquid effusion, or, usually, from perforation communicating with the œsophagus or lungs. In these cases the heart's action is accompanied by metallic (amphoric) tinkling, metallic (amphoric) buzzing, and splashing like a water-wheel.

Hæmo-pericardium, or blood in the pericardium, may result from cancer, scurvy, and the hemorrhagic diathesis, or surgical injury, and rupture of aneurism. If the patient lived long enough, the blood, while fluid, would give the same signs as hydro-pericarditis.

Hydro-pericardium, or dropsy of the pericardium, is merely a symptom of general dropsy, and associated with Bright's disease of the kidneys, or some other cause of general dropsy, without any inflammation of the pericardium. The physical signs are those of hydro-pericarditis, already described.

Pneumo-pericardium, or air in the pericardium, is due to gas arising from post-mortem changes, as a rule, and is rarely, if ever, seen during life; and pneumo-hydro-pericardium, if such a condition could exist, during life, would give the same physical signs as pneumo-hydro-pericarditis, already described.

Diagnosis.—This rests entirely on the physical signs. The difference between endocardial murmurs and pericardial friction sounds has already been mentioned. After effusion takes place, it may be mistaken for hypertrophy. But in pericardial effusion the area of dulness is triangular in shape with the base downward and extending outside of the apex beat. In enlargement of the heart, the area of dulness is quadrilateral. Moreover, in hy-

pertrophy the force of the heart's action is greatly increased with a heaving, lifting impulse, whereas in pericardial effusion the impulse is much weakened. The intensity of the heart's sounds in hypertrophy are greatly increased; in pericardial effusion they are diminished.

Pleuritic friction sounds may be mistaken for pericardial; but if the patient be directed to hold the breath, pleuritic friction sounds cease at once, but are not affected if they are pericardial.

Prognosis.—Pericarditis usually terminates in recovery unless it occurs in the course of Bright's disease of the kidneys or pyæmic conditions. The prognosis is bad in case of hemorrhagic and purulent effusions. Should the effusion be great, sudden death from heart failure due to compression may occur, but this is rare. Myocarditis, fatty degeneration, and atrophy may be a result, especially if the case became subacute or chronic. The duration of the disease is from one to three weeks.

Treatment.—During acute pericarditis absolute rest in the recumbent position is necessary, and the chest should be protected so as to avoid taking cold. Opium in moderate doses may be given to allay pain and irritability of the heart's action. After the active stage is over, the question of absorption of the fluid in the pericardial sac arises. Counter-irritants appear to do no good unless it be the compound iodine ointment. Hydragogue cathartics, diuretics, and diaphoretics only weaken the patient. The diet should be nutritive, the compound iodine ointment may be rubbed over the precordial region once daily (at bedtime), and all violent excitement or exercise must be avoided. If the effusion does not disappear in three or four weeks, aspiration should be carefully performed. Only a little fluid—a few ounces—need be withdrawn at first. By relieving pressure on the absorbents, the rest of the fluid may be speedily absorbed as in pleurisy. Aspiration should not be performed too early, however, for fear of the opposing surfaces adhering together.

In all cases of purulent effusion, aspiration is the only remedy; where the disease becomes chronic, hygienic rules are chiefly indicated. When the pericarditis is due to cancer and other incurable disease, the treatment is purely symptomatic and palliative.

Myocarditis.

Myocarditis, or inflammation of the heart muscle, may be acute or chronic.

Acute myocarditis usually results from extension of inflammation from endocarditis or pericarditis. The etiology is therefore the same.

The symptoms of myocarditis are not distinctive, but are sim-

ilar to those of valvular disease. The pulse becomes irregular, frequent, and feeble, and paroxysms of dyspnœa occur. Palpitation and irregular pulse, with tendency to syncope, and great pain in the cardiac region are the chief symptoms.

Physical examination is of little assistance in making out a diagnosis. There are no heart murmurs unless due to some other cause. The area of precordial dulness is, however, somewhat increased, owing to the dilatation that is usually present.

The anterior wall of the left ventricle near the apex is most frequently the seat of the disease, and the muscular fibres are gradually replaced by connective tissue.

Chronic myocarditis is not infrequently associated with sclerosis of the nutrient vessels of the heart. Embolism of these vessels also leads to this condition. Aneurism or localized dilatation of the anterior wall of the left ventricle is one of the results of this fibroid degeneration of the heart or chronic myocarditis. On account of the enlargement of the left ventricle and the presence of a systolic apex murmur, it is sometimes difficult, if not impossible, to distinguish between cardiac aneurism and mitral regurgitation. Sudden death occurs in this form of heart disease chiefly from rupture of the left ventricle, due to thinning of the wall. In other cases the muscular fibres become so replaced by connective tissue that the heart ceases to beat similarly as in fatty heart. It is one of the causes of sudden death due to heart disease.

Diagnosis.—The diagnosis of acute myocarditis as well as chronic myocarditis or cardiac fibrosis is difficult and often impossible. Signs of heart failure following endocarditis or pericarditis without any of the physical signs of valvular disease would point to acute myocarditis. Chronic myocarditis very much resembles fatty heart, with want of correspondence between the heart and pulse beat. In both, the patient is usually in advanced life. But in chronic myocarditis or cardiac fibrosis there is usually the history of previous attacks of endocarditis, pericarditis, rheumatism, gout, syphilis, lead-poisoning, or the like.

Prognosis.—This is altogether unfavorable. Though death may not be caused directly by the lesion, yet this leads in time to dropsy, œdema of the lungs, and the like, just as in uncompensated valvular disease.

Treatment.—This is very similar to the treatment for fatty heart. All violent exercise or mental excitement are to be avoided. The patient should not be allowed to go up-stairs without assistance. The diet should be of the most nutritious kind. Stimulants and digitalis are to be used with great moderation, especially in acute myocarditis. Should there be a syphilitic history, the patient should be placed at once on anti-syphilitic remedies.

Hypertrophy.

Etiology and Pathology.—Hypertrophy of the heart is an enlargement of the already existing anatomical elements, thus differing from hyperplasia, which consists in an increase in the number of those elements. In either case the heart is enlarged.

Hypertrophy may be general, or limited to one or more of the heart's compartments. The left ventricle is by far the most frequently affected, then the left auricle, right ventricle, and finally the right auricle may sometimes be enlarged.

Again, hypertrophy may be concentric, simple, or eccentric. In the first case the walls are thickened and the cavities become smaller. This is a very rare occurrence—so much so that it may practically be thrown out altogether.

Simple enlargement—thickening of the walls, the cavities remaining the same—is also rare. Eccentric hypertrophy is by far the most common form, and, unless otherwise specified, enlargement of the heart will signify eccentric hypertrophy; that is, hypertrophy with dilatation, or dilated hypertrophy.

Of the causes of enlargement of the heart (1) valvular lesions are the most frequent. Moreover, each of these lesions gives rise to its own characteristic enlargement, which will be marked in proportion to the degree of the lesion. Thus, mitral regurgitation causes enlargement (dilated hypertrophy) of the left auricle, left ventricle, and right ventricle in the order named. Mitral obstruction causes enlargement of the left auricle and right ventricle. Aortic obstruction gives rise to enlargement of the left ventricle, and aortic regurgitation does the same thing, only the enlargement is generally greater in the latter case. Pulmonic obstruction or regurgitation, or both, give rise to enlargement of the right ventricle, as would also tricuspid regurgitation from any cause, while tricuspid obstruction would give rise to enlargement of the right auricle only.

(2) Bright's disease of the kidneys also causes enlargement of the heart. In the chronic interstitial nephritis the left ventricle alone is enlarged, owing to the general arterial fibrosis thoughout the body. For this reason the calibre of the arterioles is diminished, and hence the left venticle has more work to do than normally in order to drive the blood through the constricted vessels. In chronic tubular nephritis, valvular lesion due to endocarditis is apt to occur. The cardiac enlargement, therefore, differs in its mechanism for these two varieties of nephritis.

(3) General pulmonary vesicular emphysema leads to enlargement of the right ventricle, often with tricuspid regurgitation owing to the obstruction in the pulmonary circulation.

(4) Exophthalmic goitre (exophthalmus, Basedow's or Graves' disease) also gives rise to enlargement of the heart. Owing to vaso-motor dilatation of the nutrient vessels of the heart, the organ becomes over-nourished and palpitates, and consequently becomes hypertrophied. According to Niemeyer, Bamberger, and others, the nutrient vessels of the heart in this disease are enlarged from vaso-motor dilatation due to some disturbance of the cervical ganglia of the sympathetic nervous system.

(5) Palpitation from anæmia or other cause may give rise to enlargement of the heart from its overwork. The alcoholic habit probably acts partly in this way. Habit, mode of life, occupation requiring prolonged muscular exertion (as among athletes, laborers and the like), as well as excessive venery, also enlarge the heart to a certain extent.

Symptoms.—The pulse is usually full and strong. The patient not infrequently experiences a sense of fulness about the head, and epistaxis occurs now and then. In case of excessive hypertrophy, especially when associated with arterial fibrosis, apoplexy suddenly terminates the life of the patient. Pulsation of the arteries about the neck, flushed face, irritability of temper, cough, attacks of dyspnœa, are all symptoms of cardiac hypertrophy. Vertigo, ringing in the ears, hæmoptysis, and palpitation are among the chief symptoms.

Physical Signs.—On inspection, enlargement of the heart more to the patient's left than right is noticed, though the line of the base is rarely, if ever, changed. The base line of the heart normally corresponds to the upper border of the third costal cartilage. The apex beat should fall about an inch and a half below the left nipple and a half-inch within the nipple (mammillary or papillary) line. Gray puts it two inches below the left nipple and one inch within the nipple (papillary or mammillary) line. Flint states that the apex should fall somewhat within the nipple line. In case the nipple is misplaced, as sometimes happens, especially with nursing women, the nipple line should be drawn by a line let fall vertically from the middle point of the left clavicle.

The extent of visible impulse, in cardiac enlargement, is increased, and there is more or less prominence of the precordial region. The apex beat is also seen to be more forcible than normal, and it may be as low as the ninth rib and outside the nipple (mammillary, papillary) line. Enlargement of the right ventricle pushes the apex farther to the left than normal, but also crowds it back, the apex being formed of the left ventricle, which is behind the right.

Palpation reveals the impulse, heaving and lifting in character, with or without thrill, with its area increased. Hypertrophy of the right ventricle usually gives a strong epigastric impulse.

When the left ventricle is hypertrophied, the apex beat is carried down and out. Presystolic impulse is sometimes felt over an hypertrophied left auricle, as may occur in mitral disease.

The radial pulse in hypertrophy of the right side of the heart is not appreciably affected in character. But in hypertrophy of the left ventricle without regurgitation, or obstruction, the radial pulse is full, prolonged, and sustained.

Percussion shows both superficial and deep areas of cardiac dulness increased. General enlargement may give dulness on percussion from the third to the eighth rib, and from an inch to the right of the sternum to two or three inches outside the left nipple. Walshe mentions a case where enlargement was mistaken for pleurisy of the left side with effusion. Hypertrophy of the left ventricle gives dulness usually beyond the left nipple; of the right ventricle, considerably to the right of the sternum. In hypertrophy of the left auricle the area of dulness over that locality is enlarged and more marked.

On auscultation, the first sound is heard to be dull, muffled, prolonged, diffused over a larger area than in health, and increased in intensity. Indeed, it very much resembles a slight systolic murmur, so that sometimes it is difficult to decide. The second sound is also louder and more diffused than normal. If murmurs are present, they obscure or take the place of heart sounds. There is diminution or absence of respiratory murmur over the precordial space.

Diagnosis.—Cardiac hypertrophy is more likely to be mistaken for displacement than any other condition. For instance, when the apex beat is found to be carried downward and outside of the nipple (papillary, mammillary) line, it has been pushed there by effusions, tumors, and the like, or else it has been drawn there by pleuro-pericardial adhesions or else it has arrived there by enlargement. In displacements from any cause, such cause is readily ascertained by careful examination, whether it be pressure or traction. In case of hypertrophy, the area of impulse and cardiac dulness together with the character of the pulse and the symptoms of fulness of the head and palpitation, at once renders the diagnosis complete.

Dilatation is distinguished from hypertrophy by the physical signs as well as the symptoms of dilatation, to which the reader is referred. The diagnosis from aneurism, mediastinal tumors, and the like will be considered under the head of thoracic aneurism.

Prognosis.—This depends on the cause and the nature of the co-existing valvular lesion, if there be any. So long as hypertrophy compensates for dilatation in valvular lesion, the prognosis is favorable. Hypertrophy of the left ventricle in chronic

interstitial nephritis, as usually obtains, is unfavorable, on account of the liability to retinal and cerebral apoplexy.

Treatment.—Digitalis is contra-indicated in cardiac hypertrophy, as a rule, unless it be associated with mitral lesion. Even then, if the heart's action is very forcible, it may be omitted.

On the other hand, aconite is the remedy of most value. This has already been referred to when speaking of the treatment of valvular lesion, to which the reader is referred. The extract or the tincture of aconite may be used as stated. All mental excitement and excessive physical exertion should be avoided. Alcohol and tobacco are especially to be avoided. The habits are to be even and regular, and the bowels kept open. Veratrum viride is recommended by many, but aconite, in my experience, is to be preferred. A course at Carlsbad is often of the greatest benefit to the patient, not only for its immediate curative effect, but also for the knowledge one learns there of how to take care of one's self.

Dilatation.

Etiology and Pathology.—Dilatation of the heart is an increase in the normal size of the cavities of the heart, and may be one of three kinds: (1) hypertrophous dilatation, or dilated hypertrophy, which is the most common form; (2) simple dilatation, where the walls remain the same but the cavities are enlarged; and (3) attenuated dilatation, where the cavities are not only enlarged, but the walls are thinner than normal.

It is the last variety that requires our attention. Attenuated dilatation, or dilatation without compensation, may result from valvular lesion, or general vesicular emphysema, where dilatation and hypertrophy occur together, producing the various enlargements characteristic of those diseases. The time arrives, however, when hypertrophy ceases to compensate, and then the case becomes one of dilatation, since, evidently, enlargement cannot go on indefinitely. Atheroma, capillary fibrosis, and compression of the large vessels by tumors and the like also give rise to hypertrophy to be followed by dilatation.

Abuse of alcohol and narcotics, as well as excessive venery, will produce cardiac dilatation in some instances, although the reason for it is not exactly known. It probably follows the overwork and strain put upon the heart during such excesses.

Dilatation may also result from defective nutrition, whether due to anæmia, insufficient food, or old age, or as may occur in the course of typhoid fever, diphtheria, and scarlet fever. Myocarditis from any cause will also give rise to it, and it is also likely to occur in the course of any disease that produces degenerative changes in the structure of the heart, as syphilis or fibrosis.

Heredity also plays an important part.

Symptoms.—These are chiefly dyspnœa, palpitation, syncope, and dropsy. The dyspnœa is increased on the least exertion. Sometimes it is paroxysmal in character, but it is always present to a greater or less degree. The pulse is irregular and intermittent, the countenance is anxious and not infrequently there is cyanosis, especially about the lips. Œdema of the lower extremities alarms the patient. It is found that it is difficult or impossible to get on one's shoe, a very uncomfortable situation for one who is away from home. The scrotum, in the male, becomes enlarged more and more, so that one suspensory bandage after another has to be altered or abandoned. The abdomen also enlarges. The limbs become so heavy that the patient finds difficulty in dragging one foot after the other. Cough and expectoration of a watery, thin mucus is not infrequent. Hemorrhagic infarction of the lungs, with all the symptoms of that condition, occurs. The urine is scant and contains some albumin. The lower limbs are spotted with petechiæ. The patient finally dies suddenly of heart failure or from some intercurrent disease.

Physical Signs.—On inspection, the visible area of the apex beat, if indeed it be visible, is increased without any particular point of maximum intensity. Dyspnœa and cyanosis are sometimes observed, especially after attempted exertion.

Palpation reveals a feeble cardiac impulse. The area is increased, rarely is there any thrill, but an undulating motion over the precordial region is felt, especially if there be mitral regurgitation. The radial pulse is feeble, sometimes irregular, small, and compressible.

On percussion, the area of cardiac dulness is found to be increased in the direction of the part dilated, or generally increased if the dilatation affect the whole heart. In the latter case it is oval or somewhat square in shape, instead of being triangular with the base downward, as in pericarditis with effusion.

On auscultation, both sounds are found to be short, abrupt, feeble, and of equal duration, the second being often inaudible at the apex. The post-systolic or first period of silence is prolonged. Endocardial murmurs, when present, are indistinct. The respiratory murmur is diminished or absent over the precordial region, owing to the cardiac enlargement.

Diagnosis.—This is readily made out. It is easily distinguished from hypertrophy. In both, the area of cardiac impulse and dulness is enlarged. But in hypertrophy there is the heaving, lifting impulse which strongly contrasts with the feeble, undulating impulse of dilatation. In hypertrophy, also, the pulse is full, prolonged, and sustained. In dilatation it is weak, short, and yielding, as well as irregular. Aneurism, or other tumors of the thorax,

give signs so distinctive that it is useless to consider them further in this connection.

Prognosis.—This depends on the cause. In the case of organic valvular lesion, general emphysema, old age, and hereditary influence the prognosis is hopeless. The patient is simply doomed. But where dilatation depends upon opium-eating, smoking, abuse of alcohol, excessive venery, defective nutrition, and the like, especially occurring in young and otherwise healthy subjects, the prognosis is more favorable, provided the patient is willing to be treated.

Treatment.—In the first place, the cause of the disease should be ascertained and removed if possible. Of course this cannot be done in such cases as valvular lesion, general emphysema, or other organic disease. But among opium-eaters, tipplers, and topers, the habit must be dropped. In any case all unnecessary mental excitement and physical exertion must be avoided. The habits should be regular.

In addition to these general hygienic rules, certain symptoms call for active treatment. In order to strengthen the heart, digitalis is the drug to be relied on. When this is not well borne by the stomach, strophanthus may be used instead. Strychnia in small doses and electricity are used by some for toning up the heart. Regarding attacks of dyspnœa, œdema, and the like, the treatment is identically the same as that already described in connection with mitral lesions, to which the reader is referred. The diet should be nutritious.

Fatty Heart.

Etiology and Pathology.—Fatty heart is of two kinds—(1) that in which the fat is added to the organ without or within or between its fibres, and causing trouble by pressure, and (2) that in which the muscular fibre is replaced by fatty tissue.

The first is, by Walshe, termed fatty infiltration, and is simply an accumulation of fat. The second is known as Quain's fatty degeneration, and by Walshe is termed fatty metamorphosis of the heart. It is a serious and often fatal disease. Obesity from any cause is associated with fatty infiltration. It is simply an accumulation of fat due to luxurious living, want of exercise, or hereditary tendency to become obese.

There is no known cause, however, for Quain's fatty heart, or fatty metamorphosis. It occurs at middle life, or past, and in men rather than women. It also occurs more frequently among the so-called upper classes than among laborers. For this reason luxurious living, want of exercise, and the too free use of alcohol and tobacco may predispose to the disease. It is probable, also, that any condition that interferes with the proper nutrition of

the heart, such as sclerosis of its nutrient vessels from any cause, may lead to fatty metamorphosis. In tuberculous and other wasting diseases the heart is more frequently normal than fatty, and hence they cannot be said to be causes of the disease. The real cause, whatever it may be, is probably inherited rather than acquired.

Symptoms.—Fatty infiltration gives rise to no indications of an alarming character. Beyond a little shortness of breath and inconvenience from being too fat, nothing more need be said as to symptoms.

Fatty metamorphosis, however, gives rise to very serious symptoms, which increase in extent as the disease progresses. It is insidious in its approach. The patient easily becomes exhausted, as in dilatation, and feels better lying down with the head low, as the heart then has less to do. Paroxysms of dyspnœa with cold, clammy sweat, and attacks of tachycardia with irregular and intermitting pulse, become more and more frequent and alarming. At one time the pulse is very frequent, at another it may be slower than normal, falling as low as thirty or forty beats to the minute. Cheyne-Stokes breathing is repeated at shorter and shorter intervals, the extremities become cool, and not infrequently dropsy supervenes. Attacks of angina pectoris sometimes occur. The patient may die suddenly of heart failure or rupture of the heart, or else become gradually exhausted or die of some intercurrent disease, as œdema of the lungs.

Physical Signs.—On inspection, the heart's impulse is usually not observable, owing to its feebleness. The patient may be observed to be suffering with a fit of dyspnœa, and as having a peculiarly anxious expression. The arcus senilis may be present, but bears no fixed relation to the disease.

Palpation reveals the fact that the impulse is so weak as to be scarcely felt, even though the patient be emaciated and lean forward. If the heart was hypertrophied first, there may be an undulating impulse, as in attenuated dilatation. The pulse is feeble and sometimes abnormally slow; or it may be irregular and intermitting, changing from abnormal slowness to rapidity, from 20 or 30 beats per minute to 150 or more, but always weak. Percussion elicits a normal area of dulness, unless hypertrophy coexists, when it would be larger; or smaller if there be atrophy.

On auscultation, the first sound of the heart, even at the apex, is heard to be short, high-pitched, and weak, instead of being low-pitched and well-marked as in health, and the first rest is noticeably prolonged. The second sound is feeble but distinct, and is accentuated in the aortic or pulmonary interspace according as the right or left ventricle is chiefly affected. Of course murmurs of various kinds may be present, but they are rare, and when

they are present they are usually weak. The one most commonly heard is the aortic direct, due to atheroma of the aorta.

Diagnosis.—It may be impossible to distinguish between fatty heart and fibroid degeneration. The latter, however, is usually traceable to syphilis, gout, lead-poisoning, or alcoholism; and the history of the case, therefore, becomes valuable as an aid to the diagnosis. The same may be said in regard to the degenerations, as amyloid, parenchymatous, and pigmentary. In cardiac dilatation the symptoms are very similar to those of fatty heart, but in dilatation the heart is enlarged, whereas in fatty heart it may be normal or even atrophied. Cheyne-Stokes breathing and attacks of angina pectoris are more frequent in fatty heart than dilatation.

Prognosis.—This is favorable so far as fatty infiltration is concerned. But in fatty metamorphosis the prognosis is hopeless.

Treatment.—Fatty infiltration may be modified or entirely got rid of by a Carlsbad course or restricted diet, if it be thought necessary to treat it at all. But in fatty metamorphosis there are no means of restoring the degenerated muscular fibres. With careful attention to diet, exercise, and hygiene in general, however, the progress of the disease may be rendered less rapid than otherwise. Tobacco and excessive use of alcohol and opium must be stopped. Violent mental excitement and excessive physical exertion are to be avoided. The diet should be nutritious, and such tonics as iron and strychnia may be indicated. For the attacks of dyspnœa nothing acts so well as the hypodermic injection of a small quantity of morphine, say three to five minims of Magendie's solution according to circumstances, including the number of times the patient has taken the drug. Two drops are often sufficient, and the dose can then be repeated if necessary. When the heart flags in its work, as it often does, Macuna's prescription is often serviceable: ℞ Tinct. strophanthi, ʒ ss.; spts. etheris comp., fl. extr. ergot., āā ℥ ss.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. and repeat every half-hour or two hours as required. Cardiac dropsy and other complications occurring are to be treated as elsewhere described.

Atrophy of the Heart.

Atrophy of the heart is diminution in the size and weight of the organ. Unless it be senile, atrophy of the whole heart is of very rare occurrence. It sometimes takes place in connection with wasting diseases, like phthisis, suppurating bone, calcification of the coronary arteries, tightly adherent pericardium, and, rarely, after pregnancy. Local atrophy of some part of the heart is more common, and occurs in connection with fatty heart. In mitral obstruction, also, the left ventricle becomes somewhat

atrophied, and when this lesion occurs in children there is not infrequently some deformity of the chest resembling pigeon-breast. The flattening is particularly well marked in the lower precordial region, to the left of the sternum, but whether it be due to atrophy of the left ventricle or to a lack of general nutrition from imperfect cardiac function is not exactly known.

Regarding the physical signs of general atrophy of the heart the area of percussion dulness is diminished, the impulse is feeble, the heart sounds are clear, and the pulse quick and feeble but regular, and there is, according to Da Costa, a great tendency to palpitation.

The symptoms of senile atrophy call for no special remarks. Otherwise they resemble those of weak heart with feeble pulse. The treatment is chiefly hygienic. Violent mental excitement and physical exertion are to be avoided. The diet should be nutritious and liberal, and alcoholic stimulants to a moderate degree are of service. Tonics, including iron, may be indicated.

Cardiac Dropsy.

Cardiac dropsy usually begins about the feet and ankles and, generally extending upward, is afterward met with in the scrotum and various other localities. It is most constantly associated with dilatations of the right heart, as in tricuspid regurgitation, but there are exceptions. Albumin, when present in the urine, is due to renal congestion simply, unless there be also coexisting structural lesion of the kidneys. The treatment has already been described when speaking of mitral lesions (p. 30), to which the reader is referred.

Stenocardia.

Etiology and Pathology.—Stenocardia is ischæmia of the myocardium, or localized anæmia of the heart, due to sclerosis of its nutrient vessels, the coronary arteries, and manifests itself paroxysmally in one of five forms: (1) The painful form, or true angina pectoris or suffocative breast pang; (2) the arhythmic form, in which the rhythm becomes irregular; (3) the pulmonary form, with symptoms of cardiac asthma, so-called; (4) the tachycardiac form, in which there is simply rapidity and weakness of the heart's action; and (5) the asystolic form, in which rapid dilatation occurs due to weakening of the walls of the heart from the cardiac arterial sclerosis.

Stenocardia is found among men rather than women, and usually those in the so-called upper walks of life rather than among the poor. It occurs also at middle life or past. It depends on what is termed ischæmia of the myocardium, which is simply

a local anæmia of the heart due to sclerosis of its nutrient vessels as the result of peri-arteritis or endarteritis. The latter often terminates in ossification.

The causes of sclerosis of the nutrient vessels of the heart are, according to Huchard, of Paris: (1) Toxic, as from alcohol, tobacco, especially cigarette-smoking, malaria, and lead-poisoning; (2) diathetic, as in gout, rheumatism, and syphilis; and (3) physical, moral, and intellectual over-strain.

Obliterating arteritis of the nutrient vessels of the heart is the lesion commonly found. If its progress is slow and gradual, compensating hypertrophy may take place. But in those cases where the course of the disease is rapid, dilatation from weakness of the heart's walls, the asystolic form, or else fatty metamorphosis occurs. Tobacco in excess would appear to be more destructive to the heart than alcohol. A patient who has had this disease manifested in one form may have a return of it in any of the other four forms, for the same form does not necessarily return every time, when once commenced.

Symptoms.—Angina pectoris or suffocative breast pang, the painful form of steno-cardia, usually comes on without warning. The patient may be asleep in bed, or it may be after a heavy meal or during a fit of anger, or while walking briskly, especially up-hill, against a stiff breeze. Suddenly a pain like a death pang pierces him through and through in the lower precordial region. This pain not only extends through to the back, but up to the neck and down the left arm, usually, but sometimes to both arms, and even to one or both lower extremities. This fearful neuralgic pain is thought to originate in the cardiac plexus of nerves, and extends not only to the parts mentioned, but along the gastric branches of the pneumogastric nerve, as evidenced by the belching of wind, and sometimes even vomiting. The pulmonary branches of the pneumogastric nerve, on the other hand, seem to escape in this painful form, since the patient not only can often breathe freely, but sometimes a deep, long-drawn breath will give speedy relief. The attack may last from a few seconds or minutes to an hour or more if the patient lives, and may consist of one prolonged attack or many separate and distinct attacks. In the latter case it may last several days or more. During the attack the pulse may not be notably affected, but if the attack be prolonged the pulse becomes more frequent and feeble, and the patient may die of sheer exhaustion, or else suddenly from paralysis of the heart, and not spasm of that organ as supposed by some.

During an attack the skin becomes cool, the face pale or cyanosed, and anxious, and there is a cold, dripping sweat.

Instead of the painful form, or true angina pectoris, the disease may be manifested in some other way, as the arhythmic form,

in which irregularity of the heart's action and palpitation are the chief symptoms. Or else there may be an attack of cardiac asthma with prolonged expiration and the various râles characteristic of such an attack. In other cases there may be tachycardia, the pulse going up to one hundred and fifty or even more per minute with a great feeling of thoracic oppression, dyspnœa, and a dread of some impending calamity. Finally, in the asystolic form, the pulse becomes feeble, frequent, and irregular, dyspnœa becomes extreme, and not infrequently sudden death occurs due to rapid dilatation and failure of the heart's action.

Diagnosis.—Stenocardia of the painful form, or true angina pectoris, may be mistaken for the so-called false angina pectoris. The latter disease, however, occurs chiefly in young and hysterical women, or persons of a neurotic temperament. In such cases the pain does not extend through to the back, and down the left arm, but is simply located apparently in the chest wall, like an intercostal neuralgia, but attended with palpitation of the heart and dyspnœa.

The arhythmic form may easily be mistaken for irregularity of the heart's action from dyspepsia and other causes. But the age, habits, and condition of the patient, together with the previous history of rheumatism, gout, syphilis, and other causes of sclerosis, would lead to a correct diagnosis between organic arhythmic stenocardia and merely functional palpitation. The pulmonary form might be mistaken for a case of genuine spasmodic asthma. Here, also, the circumstances of the case, including especially the age and habits of the patient, together with the physical examination of the heart, would be likely to lead one to a correct conclusion. Tachycardiac and asystolic stenocardia are also diagnosticated upon similar circumstantial evidence and physical examination of the heart.

Prognosis.—The prognosis of stenocardia depends somewhat on the form it assumes. If angina pectoris, the prognosis is unfavorable. Arnold, of Rugby, died in his first attack. The great John Hunter died in his twentieth attack. Being a man of irritable temper, as most people are who have heart disease, he remarked that his life was in the hands of any rascal that chose to provoke him. One attack of stenocardia in any form is almost sure to be followed by others, and it is beyond our knowledge to say in which attack the patient will die. Under improved methods of treatment, however, the death rate has been noticeably decreased.

Treatment.—This refers to the paroxysm and during the interval.

During the paroxysms there are two remedies, morphine and amyl nitrite or its kindred remedies, as nitro-glycerin (glonoin), sodium nitrite, and the like.

During the paroxysm, the hypodermic injection of five to ten minims of Magendie's solution of morphine often gives immediate relief. It acts by relieving pain and stimulating the flagging heart. Brandy or whiskey may also be given for a similar purpose. According to Mr. Brunton, the amyl nitrite is indicated, and undoubtedly this is often a valuable remedy. The best method of administration is to crush a glass bead or two containing a few drops of the drug in a handkerchief, and let the patient inhale it. Or else five drops may be given in a teaspoonful or more of brandy. The sodium nitrite is also given for the same object in about three- to five-grain doses; namely, to dilate the coronary arteries and thus stimulate the heart's action by increasing its nutritive blood supply. A mustard paste over the epigastrium, hot pediluvia, and keeping the patient in a position in which he can breathe most easily are also of service. After the patient is over the paroxysm, the treatment is then to be directed against his having a return of the attack.

For this purpose all exciting causes should be guarded against. Violent mental excitement or excessive physical exertion is to be avoided, as well as errors in diet, including smoking and drinking, both of which are too often indulged in at public dinners and the like. The bowels and digestion are to be regulated. Beyond this, Huchard's treatment is probably the best. The patient is to take glonoin and sodium iodide alternately for about two years. This is termed the radical cure. The iodide of potassium may be used instead of the sodium iodide. The author suggests that Fowler's solution be added: ℞ Pulv. potass. iodidi, ʒviij.; Fowler's solution, ʒ ss.; aquæ, q.s. ad ℥ ij. M. Sig. Shake. ʒ i. ter die for two weeks;—℞ Sol. nitro-glycerin (glonoin) (1 per cent sol.), gtt. xvi.; aquæ q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die two weeks. These remedies are to be alternated every two weeks and to be continued for about two years. At the end of that time, if the patient has followed out the hygienic rules indicated, he is permanently cured in many cases. Instead of the solution of glonoin (nitro-glycerin), very convenient tablets are put up of a strength equivalent to that mentioned. One tablet ter die is the usual dose.

Exophthalmic Goitre.

Etiology and Pathology.—Exophthalmic goitre, cardio-thyroid exophthalmos, Basedow's disease, or Graves' disease, as it is variously called, in order to be complete, consists of three factors: (1) palpitation and enlargement of the heart; (2) enlargement of the thyroid gland, with throbbing of the arteries about the neck; and (3) protrusion of the eyeballs.

The disease is said to be due to some irritation from change in or pressure on the cervical ganglia of the sympathetic system of nerves, which send branches directly or indirectly to the three localities mentioned.

It occurs more frequently among women than men, and in most cases the women are nervous, if not hysterical, and anæmic. Of exciting causes, sudden mental emotion, as fright from any cause, is regarded as the starting-point of many cases. Sometimes it occurs in men, and Graefe mentions the case of a young man in whom it was suddenly developed on account of nervousness at the prospect of being married.

In most cases it develops slowly, but in some instances, as in the case of the young man just cited, it may develop very suddenly. The disease is not confined to any particular localities.

Symptoms.—Palpitation of the heart usually first attracts the attention of the patient. The heart is observed to beat 120 or even 140 times to the minute instead of 60 to 70. Enlargement of the heart follows, partly from the palpitation, but chiefly from over-nutrition of the organ. The nutrient vessels of the heart become dilated from vaso-motor disturbances, and the heart receives more blood supply than normal. Hence its palpitation as well as over-growth.

Secondly, the thyroid gland now begins to enlarge, and throbbing of the inferior thyroid, carotid, and sometimes temporal arteries is observed. The enlargement of the thyroid gland may not be very perceptible, and when present is due to dilatation of its vessels, serous infiltration, and hyperplasia of its tissues. The gland is rarely so much enlarged as in simple goitre or bronchocele. The arteries about the neck and temples sometimes throb, because they become dilated also from vaso-motor disturbance, and the blood is sent through them with great force by the hypertrophied heart. Finally, the eyes in this disease protrude, because of the increase of fat at the bottom of the orbit. The intra-orbital fat is increased from hyperplasia, according to Niemeyer, and it may become not only hyperæmic, but œdematous also. Sometimes the eyes protrude so that the lids cannot be closed, and consequently ulceration of the cornea, from foreign particles, may result. The upper lid, according to Graefe, becomes fixed early in the disease, from spasm of the levator muscle, and consequently does not follow the eye in looking downward. All three factors of this disease are not equally present in every case. The heart may be chiefly affected, with scarcely any perceptible change in the thyroid gland, while the eyes remain perfectly normal, and so on. In course of time, however, all the phenomena are apt to appear.

Anæmia is observable in most cases before treatment, and

marked venous hum in the neck, with or without thrill, is pretty constant, while not infrequently a true hæmic murmur is heard over the pulmonary interspace; and over the aortic interspace a loud, systolic, dynamic murmur, owing to the force with which the blood is driven at times through the aortic orifice by the hypertrophied left ventricle. It is inconstant, however, as is characteristic of all dynamic murmurs.

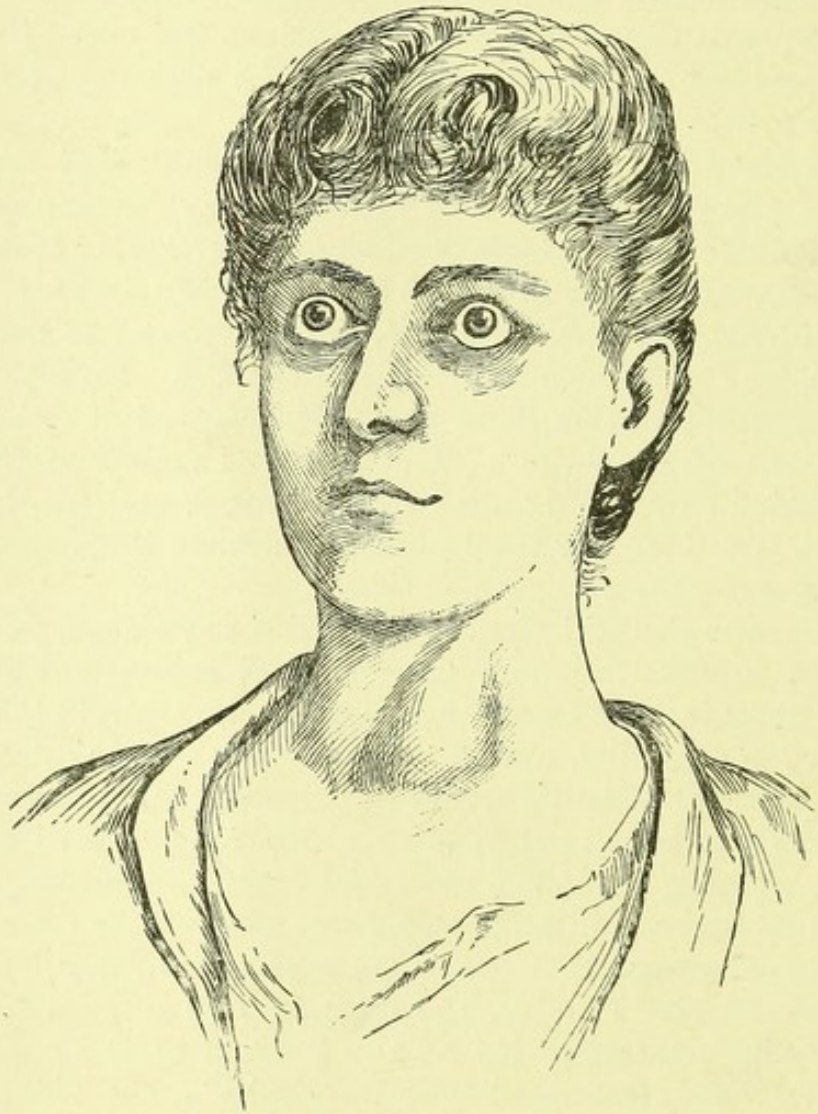


FIG. 7.—EXOPHTHALMIC GOITRE.

The physical signs of cardiac hypertrophy have already been considered.

Diagnosis.—The only disease that exophthalmic goitre would likely be mistaken for is simple goitre or bronchocele. But the latter disease is confined to certain localities, is not attended with heart and eye symptoms, and the thyroid gland in exophthalmos is far more elastic on pressure than bronchocele.

Prognosis.—Unless the patient dies from apoplexy, or though rarely, from suffocation due to pressure on the trachea, the disease is not directly dangerous to life. Recovery, according to Niemeyer,

is more common than death. According to Loomis, recovery occurs in from four to five per cent of cases, and great improvement in about forty-five per cent. The duration of the disease is variable. Recovery occurs rapidly in some cases, in others the disease lasts through life.

Treatment.—Excellent results have been obtained from the administration of tinct. digitalis and iodide of potassium. (℞ Tinct. digitalis, ʒ i.; pulv. potass. iodidi, ℈ viij.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. ter die after meals.) Recently, however, it has been claimed that tinct. of strophanthus is a specific in this disease. When anæmia is marked and iron is indicated, strophanthus may be given in combination with tinct. ferri chloridi, as it forms a clear mixture. (℞ Tinct. strophanthi, ʒ ss.; tinct. ferri chloridi, ʒ iss.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. ter die after meals.) The dose of strophanthus may gradually be increased up to five and even ten drops, but in the author's experience digitalis is to be preferred. The two may be alternated, however. So far as ergot is concerned, the author has not found any benefit to be derived in its administration, either by the mouth or hypodermically. Electricity is also recommended. The diet should be liberal and nutritious, but alcohol and tobacco are to be avoided.

Sudden Death from Heart Disease.

Sudden death from heart disease is not so common as the laity generally suppose. There are certain forms of disease of the heart, however, which do undoubtedly cause sudden death, while other forms, though fatal from the first, are likely to give rise to complications which produce death indirectly rather than directly through the heart itself.

Aortic Regurgitation.—Not only may sudden death from apoplexy occur in this disease, due to the force with which the blood is driven from the left ventricle, owing to the existing enlargement of that part of the heart, but it may also occur in some way not yet thoroughly understood. In such cases it is thought by some to be due to failure of the circulation in the nutrient vessels of the heart. Owing to the enormous enlargement of the left ventricle, which sometimes occurs in this disease, the coronary arteries are so pressed upon that blood cannot enter them, and the heart fails from want of blood supply. A case in point was that of a man of excellent habits, aged thirty-five, and otherwise in apparently good health. He was seen by Dr. Francis Delafield, of this city, at my request, and the diagnosis confirmed. He died suddenly on his stairway, without cerebral lesion.

Stenocardia.—In this disease, as already described, the patient may die suddenly, not from spasm, but paralysis of the

heart, from failure of the coronary circulation due to cardiac arterial sclerosis and shock from the terrific pain in the form known as angina pectoris.

Fatty Metamorphosis.—In this disease, known also as Quain's fatty degeneration of the heart, sudden death may occur at any time due to heart failure or its rupture.

Attenuated Dilatation.—In this disease also the heart may suddenly fail or rupture. Dropsy and other complications, however, may, and are likely to, cause death before such a sudden catastrophe.

Aneurism of the Heart.—This is usually situated in the wall of the left ventricle, near the apex, and is due to thinning of the cardiac wall from previous inflammation and fibroid changes. Sometimes it is almost impossible to distinguish between it and mitral regurgitation. Both are accompanied with an apex systolic murmur, and both cause enlargement of the left ventricle. But in mitral regurgitation the murmur is usually louder than in cardiac aneurism, and more frequently heard posteriorly. Enlargement of the left auricle and right ventricle, with accentuation of the second sound in the pulmonary interspace, are usually observed in mitral regurgitation, but not in cardiac aneurism. Sudden death in the latter disease is generally due to rupture of the heart.

Fibrosis of the Heart.—This, as already mentioned, may result from syphilis, alcoholism, gout, rheumatism, and lead-poisoning. The muscular tissue becomes more and more replaced by connective tissue, until finally it fails to act, or else leads to cardiac aneurism and rupture, as already described.

Hypertrophy of the left ventricle, while the arterioles throughout the body are fibrosed and brittle, as occurs in chronic interstitial nephritis. These conditions predispose to cerebral apoplexy, and hence sudden death from such cause not infrequently happens in this disease. In many cases it is preceded by retinal apoplexy, as may plainly be observed by the aid of the ophthalmoscope.

Other forms of heart disease may indeed be fatal indirectly by giving rise to congestions, infarctions, and fatal complications; but they rarely cause sudden death of themselves.

The diagnosis and treatment of these forms of disease of the heart have been considered in their proper places.

Functional Diseases.

Palpitation, irregular rhythm, pain, and syncope or fainting are the chief so-called functional diseases of the heart.

Little need be said about fainting and neuralgia as functional cardiac diseases, since they are found among the nervous and

hysterical—chiefly anæmic and spoilt or over-petted young women. Among the aged, or those having weak heart due to organic change, syncope has more significance. In any case, the patient lies down or falls, either one of which usually causes reaction, as the heart has less to do with the body in the recumbent posture. In those cases of neuralgia of the heart occurring in men of middle life, or past, if the pain extend to the left arm and be accompanied by palpitation or irregular rhythm, it generally indicates cardiac arterial sclerosis, as already described.

Palpitation.—Authors generally agree that by palpitation of the heart is meant increased force of the heart's action as well as increased frequency. Flint, however, says that sometimes the heart's action may be feeble. Walshe describes three kinds of palpitation: (1) simple palpitation where the heart's force is increased but the rhythm is regular and there is no increase of frepuency; (2) irregularity in force and rhythm, occurring in paroxysms; and (3) increased frequency, with diminution of force. The second variety is the one usually referred to when speaking of palpitation.

Of course palpitation of any kind may be coincident with, or due to, organic disease of the heart. But it may occur also in a perfectly normal heart, as proven by the normal size of the organ, the normal heart sounds, and the absence of adventitious sounds or murmurs. The causes of functional cardiac palpitation and irregular rhythm are so nearly allied that in stating one we state both.

Irregular Rhythm.—This generally occurs with irregular force also, and may be only momentary or last for several days or more. There is every conceivable sign of irregular rhythm, the enumeration of which, as a learned author remarks, would allay curiosity rather than prove useful. Sometimes the heart intermits, with, of course, corresponding intermission in the radial pulse. Sometimes the radial pulse intermits when the heart does not. This may occur in two ways. If the heart is beating frequently and feebly, the pulse wave may not reach the wrist every time, though the heart does not intermit. This is termed false intermission. Again, while the left ventricle contracts once, the right ventricle may beat twice, giving two systolic cardiac shocks, with only one radial pulse. This is termed bigeminy. These terms could be multiplied but are of no practical use.

Etiology.—Both palpitation and irregular rhythm may be, and often are, associated with organic cardiac disease. More frequently, perhaps, they are both functional. There is no valvular lesion that is characterized by any particular palpitation or irregular rhythm. Mitral lesion, more often than any other, is attended by irregular pulse. Fatty metamorphosis, fibrosis, and

aneurism of the heart are productive of paroxysms of palpitation and irregular rhythm of every known kind, as is also stenocardia.

The causes of functional palpitation and irregular rhythm may be classified, according to Walshe, as follows:

1. *Centric Causes.*—Chorea, epilepsy, hysteria, and cerebral and spinal irritation from any causes, especially cerebral irritation attended by insomnia, as from over-study.

2. *Reflex Causes.*—These include dyspepsia in all its forms; intestinal irritation from worms or any cause; articles of diet, such as alcohol, tea, and coffee as well as opium, cocaine, and tobacco; genito-urinary irritation, as seen in cases of gonorrhœa, cystitis, uterine catarrh, old stricture, ovarian disease, and the like, including piles, fissure of the rectum, rectitis, and proctitis.

3. *Blood-Poisoning and Anæmia.*—Tobacco and cocaine have already been alluded to, as well as opium, alcohol, and the like. Besides these may be mentioned malaria, syphilis, lead-poisoning, gout, rheumatism, and Bright's disease of the kidneys.

4. *Mechanical Causes.*—We see these in general emphysema, where, owing to obstruction to the pulmonary circulation, the heart becomes tired, and not only becomes irregular in rhythm at times, but often intermits so as to take a rest. In pressure from tight lacing, effusions from pleurisy, in pneumothorax, ovarian and other tumors, pregnancy, aneurism, and such like causes the heart may palpitate or intermit.

Prognosis.—Where the palpitation is purely functional and especially if the patient be not advanced in life, the prognosis is favorable. Death rarely, if ever, results, however disagreeable and even alarming the symptoms may be. Organic heart disease must be diagnosticated by methods already considered, and if present renders the prognosis unfavorable accordingly.

Treatment.—Before attempting to treat irregular rhythm and palpitation, the cause of the disease is first to be ascertained and removed if possible. All violent mental excitement and physical exertion, in fact anything giving rise to cerebral and spinal irritation with insomnia, is to be avoided. Chorea, epilepsy, and hysteria are to be treated, if present. Among hysterical subjects, Hewitt's mixture and digitalis is often of the greatest benefit. (℞ Tinct. digitalis, ʒ i.; spts. etheris comp., spts. ammoniæ aromat., tinct. lavendulæ comp., āā ʒ ij.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. every two or three hours.) The abuse of alcohol, opium, and tobacco is to be discontinued among those addicted to such articles. For dyspepsia the diet is to be regulated and the rhubarb and soda mixture, or else equal parts of diastase and glycerite of pepsin, may be given. (℞ Pulv. sodii bicarb., pulv. rhei, āā ↄ ij.; aquæ, ℥ ij. M. Sig. ʒ i. ter die. ℞ Forbes' diastase, glycerite of

pepsin, āā ℥ ij. M. Sig. Dessertspoonful ter die immediately after meals.) A drachm of tinct. digitalis, with or without an equal quantity of tinct. nux vomica, may be added to any of these two-ounce mixtures, and often with great benefit. Fairchild's two-grain tablets of pepsin and distase after meals are excellent. If the patient is anæmic the sol. ferri albuminat. may be added in equal proportions to the diastase and pepsin mixture. Better still, perhaps, is the tinct. strophanthus and tinct. ferri chloridi. (℞ Tinct. strophanthi, ʒ ss.; tinct. ferri chloridi, ʒ iss.; glycerin., ℥ ss.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. ter die after meals.) Narcotics are generally contra-indicated. At first they act well in some cases, but the patient soon learns the habit, which is much worse than the original disease. The simple remedies above mentioned, together with attention to the diet and hygiene, are usually sufficient to effect a cure, especially if the patient can be made to believe that there is no disease of a serious character present.

Arterio-Sclerosis.

Etiology and Pathology.—Arterio-sclerosis is arterial induration or hardening of the arteries, due to atheromatous degeneration of the inner and middle coats.

Atheromatous degeneration is the result of inflammation—endarteritis deformans. In the first stage there is hyperæmia; in the second, fatty degeneration, thickening, and softening, giving the inner coat especially a pasty or atheromatous consistency. In the third and last stage this pasty substance may be washed away, leaving the vessel much thinner and more yielding at that point, or else lime-salts are deposited, giving rise to calcification. We can now understand the etiology of atheroma and subsequent sclerosis. Any of the causes of chronic endarteritis will produce it. Of these are such as syphilis, chronic lead-poisoning, gout, chronic nephritis, chronic alcoholism, and rheumatism, mentioned in the order of frequency, according to the author's observation. According to Reynolds, hereditary influence also plays an important part. Men are more frequently affected than women, and usually at middle life or past. The aorta is more frequently affected than any other artery. Next in order come the iliac and femoral, the brachial, radial, and ulnar, the coronary arteries of the heart, and arteries of the brain. But in some rare cases, according to Strümpell, the gastric, hepatic, and mesenteric arteries also become affected. Only very rarely, according to Strümpell, are veins atheromatous.

The symptoms of arterio-sclerosis vary so much according to the vessels affected that the physical signs of the disease are more

readily described. On account of obstruction to the arterial circulation in general arterio-sclerosis, from the thickening and roughening of the intima, the left ventricle of the heart is generally found, on inspection, to be pulsating more forcibly than normal, with a somewhat increased area downward and outward. The vessels of the neck also throb. The smaller arteries, such as the brachial, radial, and so on, are also observed to jump, so to speak, especially where they are superficial and when the patient holds the arm up. In this respect it very much resembles aortic regurgitation. The chief reason why the vessels jump so is because they are simply stiffened like pipe-stems.

On palpation, the left ventricle is felt to have rather a forcible impulse. Thrill, however, is usually absent. The arteries at the wrist feel hard and uneven like a string of pulsating beads or shot under the finger.

Percussion elicits dulness over an increased area, especially about the left ventricle.

On auscultation, the first sound of the heart is often prolonged at the apex, and the second sound accentuated over the aortic interspace. Not infrequently a direct systolic intra-aortic murmur is also heard over the aortic interspace on account of roughening of the inner coat of the aorta from endarteritis. It then becomes difficult, if not impossible, to make a positive diagnosis between this murmur and one due to true aortic obstruction, since the left ventricle is enlarged in both. The age of the patient and signs of arterio-sclerosis in other parts would point to intra-aortic non-obstructive murmur.

Owing to roughening of the inner coats, thrombi form here and there, from which emboli may be given off with symptoms of embolism in the brain and various organs, with softening, as elsewhere described. This condition of the arteries is the initial step for the formation of aneurism, owing to weakening of the walls of vessels at various points as well as increase in the tension from hypertrophy of the left ventricle. Miliary cerebral aneurisms are numerous, and hence the predisposition of such patients to cerebral hemorrhage and the frequent recurrence of that catastrophe.

Senile gangrene is always preceded by arterio-sclerosis. A large artery leading to a foot, for instance, becomes sclerosed, the calcified form usually. Thrombus or clot forms at some point within the roughened vessel, the circulation is cut off, and the part necessarily becomes gangrenous.

Cardiac arterio-sclerosis or stenocardia has already been described.

Finally the kidneys may undergo granular degeneration from obstruction to the renal arterial circulation, due to atheroma of

the renal arteries. Such kidney is termed the granulated senile kidney.

Besides arterio-sclerosis, other degenerations of arteries are mentioned by authors.

Arterio-Fibrosis.—This is the term applied by Sir William Gull and others to the condition of arterial capillaries in chronic interstitial nephritis. Charcot and Bouchard incline to the belief that this arterio-fibrosis is the result of periarteritis instead of endarteritis, which, as we have seen, gives rise to atheroma and sclerosis. The etiology of fibrosis resulting from periarteritis is in general the same as that of sclerosis resulting from endarteritis. Instead of endarteritis, the most common form, or periarteritis, rarely chronic arteritis, leads to one of those conditions.

Contraction and dilatation of arteries usually depend on previous disease of their walls. To those already mentioned may be added albuminoid disease, not found in the large arteries, but confined to the small arteries of the spleen and kidneys; also senile fatty degeneration and calcification unconnected with endarteritis, as well as syphilitic gummatous nodosities of the outer coats.

Treatment.—The treatment of arterio-sclerosis is chiefly prophylactic. By avoiding the causes of the disease in the first place, the patient escapes. After the disease has become established, there is no cure for it, and only symptoms to which it gives rise are to be then treated as they occur. In addition to nutritious diet and well-known hygienic laws to be observed by all, it is believed that Huchard's plan of treating stenocardia is a good one also for general arterio-sclerosis. From one to five drops of glonoin (nitro-glycerin) of a one-per-cent solution, or its equivalent in tablets, should be given ter die for two weeks, and then small doses of iodide of potassium or sodium are to be given instead for the same length of time, and this alternate treatment continued indefinitely. The nitro-glycerin dilates the arterial capillaries, the amount of urine is increased in cases where such a result is frequently desirable, and the functions of various organs are better performed. Headache and dyspnœa, which are sometimes troublesome, are frequently relieved by this treatment, and œdema is also to a great extent prevented.

Aortic Aneurism.

Aneurism signifies a dilatation. According to Walshe it is, in its widest sense, a local increase of the calibre of an artery. Aortic aneurism is, therefore, a local increase of calibre, or a dilatation, of the aorta in some part of its course. If it affect the aorta anywhere within the thorax, it is termed thoracic aneurism, whether it be any portion of the arch or thoracic aorta. It is termed ab-

dominal aneurism when it affects the abdominal aorta in any part of its course. Anatomically the aorta is divided into three parts—(1) the arch, (2) thoracic aorta, and (3) the abdominal aorta.

The arch consists of three parts—(1) the ascending, (2) transverse, and (3) descending portion.

The ascending portion of the arch, about two inches in length, arises from the upper part of the left ventricle, on a level with the lower border of the left third costal cartilage, behind the left edge of the sternum, a little below and to the right of the pulmonary artery. It ascends obliquely upward to the right to the upper border of the right second costo-sternal articulation. The transverse portion commences at that point, and, arching from right to left and from before back, passes in front of the trachea and œsophagus to the left side of the body of the third dorsal vertebra. The descending portion extends from this point downward to the left side of the fourth dorsal vertebra.

The thoracic aorta commences at the left lower border of the fourth dorsal vertebra, and ends in front of the body of the twelfth (last) dorsal vertebra, at the aortic opening in the diaphragm, where it becomes abdominal.

The abdominal aorta, commencing at the last point named, descends a little to the left side of the vertebral column, and terminates on the body of the fourth lumbar vertebra, generally somewhat to the left of the median line, where it divides into the two common iliac arteries.

Classification of Aneurism.

There are various classifications, but the simplest is the best. The classes may be reduced to two, (1) dissecting and (2) circumscribed.

Dissecting aneurism generally belongs to advanced age, and affects both sexes alike. It is caused by weakening and rupture of the internal and middle coats of the artery from fatty metamorphosis, due to senile decay. From the fact that aneurism is said to be false when some of the coats of the artery are ruptured or worn through, all dissecting aneurisms are necessarily false. Dissecting aneurism is not only false, but it may also be sacculated, fusiform, and so on, according to the shape assumed. Sometimes it is cylindrical, but generally it is sacculated for obvious reasons.

Circumscribed aneurism is generally a man's disease, and occurs generally at middle life or past. Seventy-five per cent of thoracic and about ninety per cent of abdominal circumscribed aneurisms occur in men past middle life. This is evidently due to the difference from women in the mode of life and occupation.

About five per cent of all cases occur below the age of thirty, and in all such cases that I have observed there was a clear history of syphilis.

Circumscribed aneurism may be false or true according as to whether or not some of the coats of the vessel have sustained solution of continuity from some cause. The inner and middle coats generally give way in false aneurism, so that the sac is chiefly formed by the outer coat. In case of wounds, however, the outer coat may yield, so that the middle coat protrudes, giving rise to hernial false aneurism, so called. Consecutive aneurism results when all the coats are ruptured from wounds or disease. This kind of aneurism is also termed diffuse.

Any class of aneurism, however, may be sacculated, globular, fusiform, or cylindrical. The most common form of aortic aneurism is first of the circumscribed class, and secondly of the sacculated variety and false, inasmuch as the outer coat is usually the only one left. Among the aged, dissecting, sacculated, false aneurism is most common.

Etiology and Pathology.—Two classes of causes favor the production of aneurism—(1) increase of blood pressure, and (2) diminution of resisting power in the walls of the vessel.

Increase of blood pressure is caused by heavy lifting or straining, occupations necessitating long-continued effort, compensating hypertrophy of the left ventricle in aortic regurgitation, and intemperance. The course of the artery must be also taken into consideration. The pressure is greater, naturally of course, where the artery is curved instead of being straight. The pressure is directed against the periphery, of course, and this will be in proportion to the sharpness of the curve. Let us look at the arch of the aorta to illustrate this to a remarkable degree. Of 880 cases collected by Sibson, 632 affected the arch, while only 71 occurred in the thoracic aorta, which is straight in its course instead of being curved.

In the second place, weakening of the walls of the aorta by surgical injuries, or constitutional disease that gives rise to endarteritis inherited or acquired, may cause aortic aneurism. Of these syphilis stands undoubtedly at the head and front. Lead-poisoning, gout, rheumatism, and renal disease come next in order as causes of endarteritis. In some cases, according to Reynolds, heredity is a potent factor, but this is, in all probability, due to inherited syphilis or other constitutional vice.

Relative Frequency of Site.—Of 880 cases collected by Sibson, 632 occupied the arch, 71 the thoracic aorta, and 177 the abdominal aorta.

In the case of the aortic arch, the 632 cases were distributed as follows: 420 in the ascending portion, 140 transverse, and 72 in

the descending portion. The principal reasons for this marked difference is the course of the vessel and proximity to the force of the heart's action. Both the force of the heart's action and the curve of the vessel favor the production of aneurism in the arch. But how do we account for the sudden rise of frequency when we reach the abdominal aorta?

Here the artery is much more exposed to injury than it is in the thoracic cavity. Moreover, the abdominal aorta is subject to be bent on itself, or stretched or twisted, or to be changed in its direction with every movement of which the body is susceptible. Bowing as an act of politeness, the effort at recovery when thrown off the balance, the act of lifting, wrestling, or in the performances of athletes, all put a strain on the abdominal aorta, the repetition of which not only tends to make the vessel brittle, but also may be the immediate cause of abdominal aneurism. According to some authors, all cases of abdominal aneurism may be traced to some act of violence.

Aneurism of the Arch of the Aorta.

Symptoms.—In thoracic aneurism the symptoms may begin suddenly as if something had given way, but generally they come on gradually with failing health.

Pain is one of the first and most constant symptoms of aortic aneurism in any part of its course. It is an early and usually a persistent symptom, though it exacerbates and remits like neuralgia, and is often radiating. Generally it is deep-seated and extends through from before back. Instead of pain, it may be a feeling of soreness. At times it disappears altogether.

Dyspnœa is a more or less constant symptom; and when the aneurism is situated high up, there is with it alteration of voice with hoarse, stridulous cough. The voice is unnatural, sounding like that of a parrot, and the cough is almost metallic. The dyspnœa is of two kinds—(1) constant and increasing, and (2) paroxysmal.

The constant and increasing dyspnœa is due to the growing aneurism, pressing on and displacing important organs of respiration. But when paroxysmal, it occurs in one of three ways: (1) spasm of the glottis from irritation of the recurrent laryngeal nerve due to aneurismal pressure; (2) paralysis of these nerves from said pressure with paralytic closure of the glottis; and (3) pressure on the trachea by the aneurism, with accumulation of mucus at that point.

Of these, spasm of the glottis is the least dangerous. But paralytic closure of the glottis is necessarily a dangerous and often fatal symptom. The greater the effort at inspiration, the more

completely are the laryngeal walls sucked together. In case of pressure on the trachea with accumulation of mucus at that point, violent coughing or vomiting may remove the obstruction.

Dysphagia is not common, but headache due to obstruction to the return circulation is not infrequent. The size of the pupils may become changed by pressure on the sympathetic nerves, causing disordered vision. Cough is usually present, and attended often with slight hæmoptysis from local congestion and irritation. The patient loses flesh and acquires a careworn appearance.

Physical Signs.—These differ according to the portion of the vessel affected. We will first consider them in relation to the arch of the aorta.

Inspection will usually be negative until the tumor has attained sufficient size to cause bulging. Then it appears as a pulsating tumor, synchronous in its movements with the heart's systole, and is most frequently located at the right edge of the sternum in the second interspace, since the ascending portion is most frequently affected. Sometimes, however, it appears on the left edge of the sternum. When the transverse portion of the arch is affected, the tumor may push forward the upper part of the sternum. If the descending portion of the arch be affected, the pulsation may be observed in the inter-scapular region of the left side. Enlargement of the veins on one or both sides of the neck, with more or less lividity, will be observed according as the tumor presses on one innominate vein only or upon the superior vena cava. More or less loss of flesh is often apparent.

On palpation, two centres of pulsation synchronous with the heart's systole are felt, the one caused by the heart itself, the other by the aneurism. Thrill is often felt, but it may be entirely absent if the sac contain much fibrin.

The pulse is weaker at the left wrist and on the left side of the head and neck than the right when the aneurism occupies the transverse portion of the arch, and should always be examined. By pressing the finger into the supra-sternal notch with the patient's head bent forward, the pulsation may be distinctly felt. Tracheal tugging (p. 68) is also present, as a rule.

Vocal fremitus is generally diminished or absent in proportion to the size of the aneurism, displacement of lung tissue, and pressure on bronchial tubes causing their obstruction.

Percussion should be gently performed, otherwise the sac may be ruptured, and it also causes much pain to the patient. Auscultatory percussion is very useful in some cases. There will be dulness over and around the tumor in proportion to its size and locality. It is of very great importance to observe whether or not the dulness extends across the median line or outward

toward the acromial angle. When percussion dulness extends across the median line, it is a sure sign that there is a tumor of some sort in the mediastinum. This will be more fully considered when speaking of diagnosis. When the descending or some-

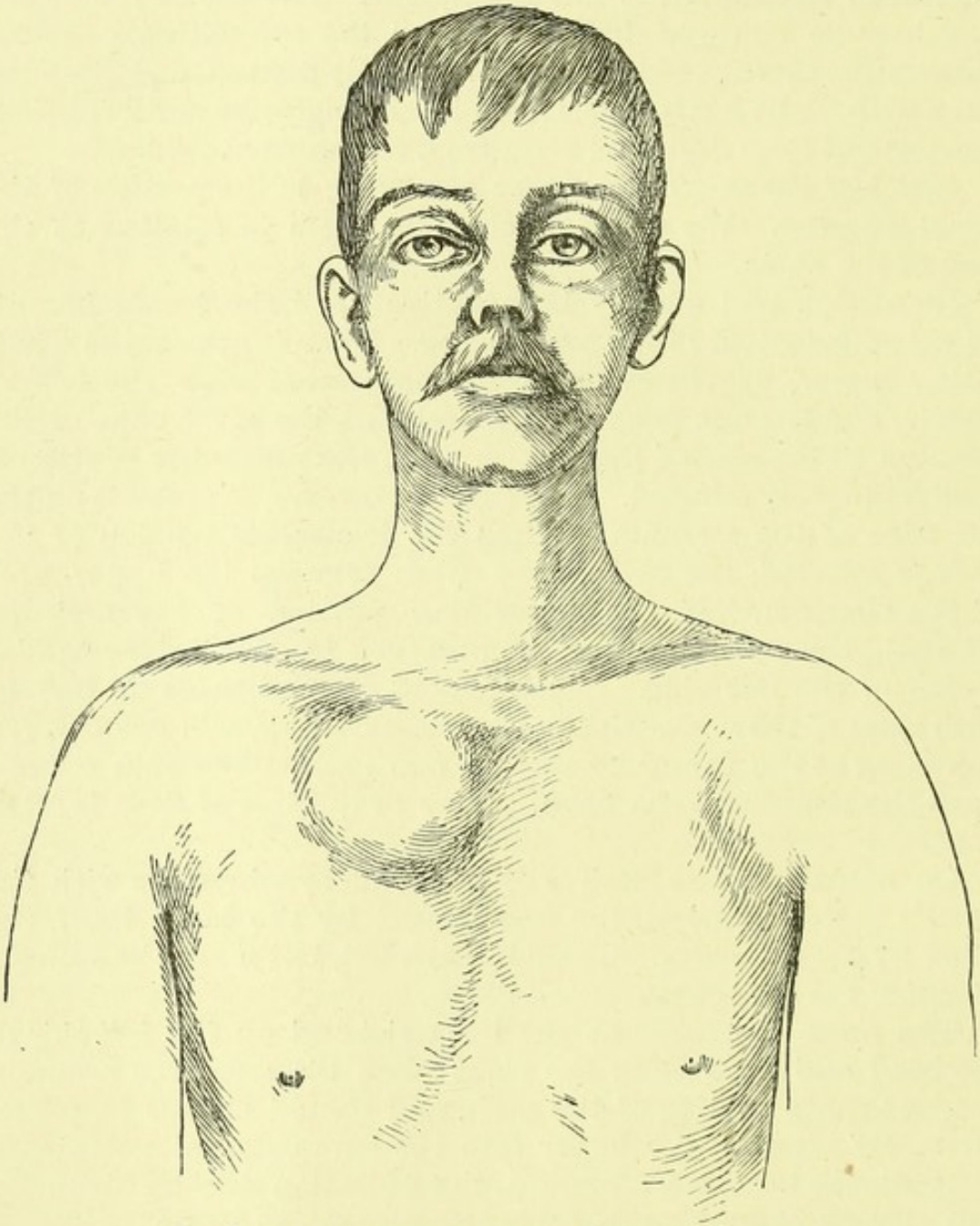


FIG. 8.—ANEURISM OF ASCENDING PORTION OF ARCH.

times the transverse portion is affected, percussion dulness may be obtained in the inter-scapular region of the left side.

On auscultation, a murmur or bruit is usually heard, but not always. If the heart's action be very feeble and the aneurismal sac be filled with fibrin, so that a small stream passes through it, there may be no murmur whatever. Generally it is present, however, and heard loudest over the tumor. The bruit is systolic in time, louder than the heart's sounds, lower in pitch, and gen-

erally blowing in quality. Sometimes, however, it is filing or rasping in quality, and then the pitch will be high. At other times it is roaring or whistling. In some cases there is also present the diastolic bruit which is softer than the first, and the two produce what is known as the to-and-fro sound. When the descending portion of the arch is affected, the bruit may be heard in the inter-scapular space of the left side.

The respiratory murmur is generally diminished or absent over the tumor. A few bronchial râles are often heard near the tumor, owing to a localized bronchitis. Bronchial breathing would be heard over lung tissue should any become solidified by pressure from the tumor or extension of inflammation in to the air cells.

Diagnosis.—We distinguish aneurism of one part of the arch from another by keeping in mind the physical signs already given. Aneurism of the ascending portion is by far the most frequent, and then the tumor nearly always appears in the right second interspace, pushing the heart down and to the left. Aneurism of the transverse portion pushes forward the manubrium, is more apt to press on the œsophagus and trachea, causes a weaker pulse at the left wrist than the right, and is easily felt in the supra-sternal notch by having the patient bend the head forward while pressing the finger down the notch. Aneurism of the descending portion of the arch gives rise to physical signs to be found in the interscapular region of the left side.

Aneurism of the arteria innominata is distinguished by the facts that it pulsates behind, or above, the inner part of the clavicle, causes a weaker pulse on the right side than the left, and is rarely attended with inward pressure signs—that is, dysphagia and distressing dyspnœa. Pain and even paralysis of the right arm are not infrequent. Pressure beyond the aneurism also causes the pulsation to diminish or cease. In all of these points it differs from aneurism of the aorta.

Mediastinal tumors are sometimes very difficult to differentiate. But unless they are associated with cancer elsewhere, they generally occur in women under twenty-five, and aneurism rarely, if ever does so. They are also associated with cancerous, currant-jelly expectoration, distention of the superficial veins on the chest, also with œdema of the chest and arm, and other tumors may also exist elsewhere.

Cancer of the lungs, if associated with cancer of the mediastinal glands in a man of middle life or past, would give dulness across the median line like aneurism. But there would be no inward pressure signs in cancer, the lungs would become retracted instead of bulging, and there would be the cancerous cachexia, besides cancer appearing elsewhere.

Syphilis and phthisis, giving rise to solidified lung tissue, would cause dulness, but it would not extend across the median line, and there would be wanting the inward pressure signs also. If pulmonary sphilitic tumor be suspected and the disease did not yield to anti-syphilitic treatment, it would rather favor the presence of aneurism. Coarctation of the aorta, or stricture of that vessel would probably cause a systolic murmur, but there would be no bulging, dulness on percussion, or pressure signs. Coarctation or structure generally result from syphilis, though the former is sometimes a congenital malformation.

Subperiosteal abscess of the sternum would give rise to some dulness on percussion, and slight bulging of the sternum, but all other signs of aneurism, including inward pressure signs, would be wanting.

Pericardial effusion gives an area of dulness triangular in shape with the base down, which is never the case with aneurism.

Cardiac hypertrophy gives only one point of impulse; when aneurism is present there are two. If the aneurism be situated very near the heart, however, and be associated with aortic regurgitation, the diagnosis may be very difficult if not impossible. Enlargement of the left ventricle, absence of inward pressure signs, and presence of dropsy, if it occurs, would favor the assumption of heart disease instead of aneurism. If the characteristic water-hammer pulse is felt, that would also be against aneurism.

Finally, pulsating empyema is readily distinguished by the equality of the radial pulse in that disease, as well as absence of thrill and murmurs, and the inward pressure signs giving rise to dysphagia, dyspnœa, and such laryngeal symptoms as alteration of the voice, stridulous cough, and the like.

Aneurism of the Thoracic Aorta.

Aneurism of the thoracic aorta is not so easily recognized as when the arch is affected. Persons have died suddenly and post-mortem examinations revealed the fact that heretofore unsuspected aneurism of the thoracic aorta was the cause of death.

As for symptoms, pain is here as elsewhere, in case of thoracic aneurism, one of the most constant as it is the most prominent. Generally it consists of a gnawing sensation felt in the dorsal vertebræ. Pain in the side with bulging may cause the disease to be mistaken for pleurisy with effusion, so that the question could be settled by the exploring needle alone. There may be dysphagia from pressure on the œsophagus, but laryngeal signs are of course absent.

The physical signs, owing to the position of the vessels are

referable to the left side of the spinal column rather than the right, though exceptions to this rule are rarely met with. Curvature of the spine may result from erosion of dorsal vertebræ. Bulging may also be rarely noticed posteriorly. Dulness on percussion over a circumscribed area is generally elicited. A bruit may be heard on auscultation, but this is more frequently absent.

Owing to the want of physical signs, aneurism of the thoracic aorta often escapes detection, necessarily.

Aneurism of the Abdominal Aorta.

The symptoms in case of abdominal aneurism, though much fewer and less marked than when the arch is affected, are, however, much more perceptible than in case of aneurism of the thoracic aorta.

Pain here, as in other portions of the aorta, is one of the earliest symptoms. It may be local or it may extend along the branches of the lumbar plexus of nerves. The symptoms of this disease usually come on suddenly, and may generally be traced to some act of violence, as lifting, straining, falling, wrestling, and the like. For this reason, as already stated, the disease is found among men more frequently than women. Inward pressure signs, as observed in thoracic aneurism, are of course wanting. Jaundice from pressure on the common bile duct, however, occurs sometimes, though it is not frequent. Changes in the urine from pressure on the renal vessels are even more rare. Nausea and vomiting are not infrequent, due to pressure against the stomach.

Physical Signs.—Inspection generally yields negative results, but, in an emaciated patient, pulsation of the tumor may be visible in the recumbent dorsal position.

On palpation, a pulsating tumor is felt somewhat to the left of the median line. It is synchronous with cardiac systole, and is expansile in character; that is, it expands in all directions under the grasp of the hand. Thrill is sometimes present. The pulsation is regarded by some as systolic, by others as post-systolic. Practically it is purely systolic in time.

On percussion, there will be dulness over the tumor if it be large. But owing to gas in the neighboring viscera, it is usually difficult to elicit.

On auscultation a systolic bruit may be heard, but it is often absent. If the tumor be well filled with fibrin, no bruit will be present. Diastolic bruit by some, Reynolds for instance, is regarded as diagnostic of abdominal aneurism, but it is rarely present.

Diagnosis.—Pulsation of the abdominal aorta may be mistaken for abdominal aneurism. But in the former case the pul-

sation will be along the course of the vessel, giving, under palpation, the sense of a pulsating cord rather than an expansile tumor. The fact that such pulsations of the aorta usually occur in young and nervous women with thin abdominal walls, rather than in middle-aged men, is also against aneurism.

Pulsating tumors of any kind, whether cancerous, impacted fæces, or the like, may also simulate abdominal aneurism and he even accompanied by a bruit. But by placing the patient in the knee-chest position, the pulsation at once ceases if it be not aneurism, since the tumor simply gravitates away from the aorta and no longer has its pulsations imparted to it. In such cases, especially occurring in young and nervous women, the tumor often consists of fecal accumulation. A dose of castor oil will confirm the diagnosis by causing a large evacuation of the bowels and sudden disappearance of the tumor, which will be remembered as having a boggy feeling and simply thumping under palpation, instead of being expansile.

Prognosis of Aortic Aneurism.

Thoracic aneurism usually terminates fatally, the average duration being from one to four years. Death may occur from strangulation due to pressure on the trachea, or some intercurrent disease, as pneumonia or pleurisy, but often from rupture of the sac. Rupture into the pericardium occurs most frequently. But the sac may also open into the pleural cavity, œsophagus, trachea, or bronchi; or in some rare cases it ruptures externally.

The prognosis in case of abdominal aneurism is also unfavorable, but perhaps not so much so as in case of the thoracic variety, as pressure above the site of the abdominal aneurism can be applied in some cases.

The average duration before the fatal issue is thought to be about two years.

Treatment of Aortic Aneurism.

The ligation of arteries and the insertion of fine needles into the sac for coagulating the blood and McEwen's recent method of scratching the inner walls of the sac to induce fibrinous exudate belong to the domain of surgery. Instead of needles, fine wire, horse-hair, or catgut has also been tried, but generally with less success. Fergusson's method of injecting the sac with some astringent is a dangerous proceeding owing to the formation of emboli. Galvano-puncture has been tried and claimed to be successful in a few cases.

Pressure by means of the tourniquet can be applied to the abdominal aorta in some cases. The pressure should be made as

high up in the epigastric region as possible. In some cases bruit has ceased and coagulation taken place in the sac within twenty-four hours after pressure has been applied.

So far as the medical treatment of aortic aneurism is concerned, it is chiefly symptomatic. Iodide of potassium will, however, give temporary relief. It lessens the size of the sac, and by diminishing pressure also lessens the amount of pain very often. For a short time the patient imagines that real improvement is going on, but gradually the old symptoms return. The drug may be given in ten-grain doses ter die. (℞ Pulv. potass. iodidi, ʒviij.; aquæ, ℥ij. M. Sig. ʒi. ter die.) The dose may be increased to fifteen or even twenty grains ter die if thought necessary, but usually ten are sufficient.

Iodide of potassium, also, it is claimed, increases the coagulability of the blood, but this is doubtful.

In some cases iodide of potassium is not well borne by the patient. In these cases the chloride of barium is sometimes of great benefit, especially when combined with ergot and arsenic. (℞ Pulv. barii chloridi, gr. vi.; fl. extr. ergot., ℥ss.; Fowler's solution, ʒss.; aquæ, q.s. ad ℥ij. M. Sig. ʒi. ter die.) The dose may be gradually increased to a grain at a dose.

Morphine, or some preparation of opium, is indispensable in the treatment of aneurism to allay pain, cough, and dyspnœa, and promote rest. McMunn's elixir of opium was a favorite remedy with the late Dr. Alonzo Clark in these cases. Whatever preparation is used, it should be given as sparingly as possible at first, so that its effects may not be lost, and to prevent enormous doses in a short time. In other words, the opium habit should be restricted as long as possible.

Other remedies besides iodide of potassium and opium are of little or no use. It is claimed that ergot is a valuable remedy in aneurism, but this is doubtful. It may, however, be given in combination with iodide of potassium, though I prefer to give the latter alone. (℞ Pulv. potass. iodidi, ʒviij.; fl. extr. ergot, aquæ, āā ℥i. M. Sig. ʒi. ter die.) Acetate of lead and vegetable astringents are, perhaps, worthless. They appear to have no influence over the progress of the disease.

Tufnell's method consists in a combination of rest, dietetic regimen, and the use of iodide of potassium, opium being reserved until absolutely required. The patient is put to bed in the recumbent posture and on the following diet: Breakfast, two ounces of bread with butter, and two ounces of milk; dinner, two or three ounces of bread, same amount of meat, and two to four ounces of milk or claret wine; for supper, two ounces of bread with butter, and two ounces of milk. The patient to remain in bed at least three months. It may be expecting too much to

look for many cures, even under this plan, but Tufnell does claim cures in many cases, and there is no doubt that it offers a better chance than any other plan, especially if a diagnosis is made early and treatment begun at once.

Loomis mentions ten cases of thoracic aneurism where cures were effected by these means and had lasted over two years without signs of returning. Dr. Lawrence Johnson, of this city, showed me a case of undoubted thoracic aneurism where certainly apparent recovery had taken place. The patient had remained in bed perfectly quiet for nine months, only turning over or shifting position very gently in order to avoid bed sores.

Loomis' method of giving iodide of potassium is to place the patient in bed, medication being withheld for three or four days until the pulse rate is established. The iodide is then given in increasing doses and finally maintained at the highest point possible without increasing this previously established rate. I have usually given it in ten-grain doses ter die for about six weeks and then discontinued its use, to begin again after the expiration of several weeks, according to the symptoms.

It may be added that tracheal tugging (p. 61) in thoracic aneurism was first described by Oliver in 1878, and more recently was brought forward by McDonald.

Place the patient in the erect position with his mouth closed and chin elevated to the fullest extent. Then, on grasping the cricoid cartilage between the finger and thumb and making gentle traction upward, the pulsations of dilated aorta or aneurism, if any exist, will be distinctly felt, in most cases, transmitted through the trachea to the hand. Dr. Gordonier, of Troy, N. Y., very properly regards this sign as of considerable diagnostic value, and first called the author's attention to it.

CHAPTER II.

DISEASES OF THE RESPIRATORY ORGANS.

Diseases of the Nose and Larynx.

Coryza or rhinitis, commonly called snuffles, is acute catarrhal inflammation of the nasal mucous membrane.

It may be due to taking cold or the action of chemical or mechanical irritants. Persons who work in dust are liable to coryza. The internal use of iodine excites coryza in some. From iodiosyncrasy, coryza is excited in some persons by smelling certain substances, as ipecac, burnt feathers, and the like. It is usually a marked symptom in hay fever, excited by the action of the external irritant on the vulnerable area of mucous membrane in the nostrils. Snuffles not infrequently result from syphilis, especially among children who have inherited that disease. We also observe coryza as an early symptom in measles. Scrofulous subjects are predisposed to the disease. Finally, gonorrhœal matter getting into the nares, or the secretion of purulent conjunctivitis, will give rise to the disease. In some cases the nasal secretion is infectious, and the disease may then be conveyed by means of handkerchiefs and the like.

Ozæna or chronic rhinitis is chronic catarrhal inflammation of the nasal mucous membrane, and derives its name from the fetid odor that sometimes arises from it.

It may, though very rarely, result from one or repeated attacks of coryza. More frequently, however, it is simply the result of deep-seated syphilitic or tuberculous disease.

Two forms are found, the hypertrophic and, more commonly, the atrophic. In the former case the nasal mucous membrane is much thickened and red. In the atrophic form it is much thinner than normal. The atrophy extends to the underlying tissues and turbinated bones, leaving the nasal passages dilated. Syphilitic and tuberculous necrosis of nasal bones, and ulceration, are not infrequently observed.

Epistaxis or nose-bleed may be merely a symptom of some other disease, or surgical injury, or else, as observed among some, there is great disposition to nose-bleed from very trivial or even unknown causes. It may be due to the hemorrhagic diathesis, or occur in the course of such diseases as scurvy, purpura, typhoid

fever, heart disease, and finally as vicarious menstruation. Occurring as a transient symptom among healthy people, nose-bleed requires no interference, as it will stop of itself, after being often of great relief to the patient. But when it occurs among the feeble and anæmic, it often requires prompt and energetic attention.

Symptoms.—In coryza the nasal passages become more and more stopped up from increase of the secretion and swelling of the inflamed nasal mucous membrane, until the patient is obliged finally to breathe through the mouth. Children at the breast find it impossible to nurse, or else suffer greatly with dyspnœa while attempting to do so. The edges of the nostrils and upper lip frequently become sore from the irritating discharge. Should catarrh of the frontal sinuses also occur, there would be considerable frontal pain. Sometimes other sinuses in the neighborhood, the antrum of Highmore, and even the eye and ear, become involved. There is usually only a slight elevation of temperature and corresponding increased frequency of the pulse, thirst, loss of appetite, furred tongue and disordered bowels. In some cases neuralgia becomes insufferable. Abscess very rarely forms.

In ozæna, the chief sign is the foul odor arising from the nasal discharge. The naso-pharynx is often implicated in this disease. The nasal discharge is hardly ever abundant, but has a tendency rather to dry up and form crusts. Rarely are the nasal passages so impeded that the patient has to breathe through the mouth. If necrosis of bones takes place sufficiently, the nose falls in, causing much deformity in some cases. On examination by means of the rhinoscope, the hypertrophied or atrophied form of the disease is readily made out.

Treatment.—Most cases of coryza recover without special treatment. Strümpell recommends inhalation of ten parts each of alcohol and carbolic acid and five of ammonia water when the secretion is abundant and annoying. (℞ Alcohol, acid carbolic liq., āā ʒ i.; aquæ ammoniæ, ʒ ss. M. ft. inhalatio. Sig. Inhale for ten minutes every hour or two.) Should scabs form, they may be washed off with a tepid solution of borax. (℞ Sodii biborat., ʒ ij.; aquæ, Oi.) Gentle syringing is to be preferred to the spray. The edges of the nostrils and upper lip should be greased at bedtime with clean mutton suet or vaselin. This is a homely remedy, but a very useful one, and children should habitually have their noses and lips greased with clean mutton suet or vaselin before going to bed. Sometimes the edges of the eyelids should also be touched with vaselin by means of a camel's hair pencil. It prevents their becoming glued together.

Should coryza become chronic, or ozæna occur, local applications by a specialist are indispensable. The constitution should

be treated also if syphilis or tuberculosis is present. Luke-warm douches of weak solutions of borax (℥ ij. : Oi.) are about the best. Permanganate of potash is also used. The patient soon learns how to use the douche alone. The fountain syringe or one worked by hand may be used. In order to be effective, the douche must pass through the nasal cavity into the pharynx and come out of the mouth or the other nostril, as stated when treating diphtheria. In hypertrophic ozæna, nitrate of silver (gr. x. : ℥ i.) or tinct. iodine should be applied every other day. The galvano-cautery is also serviceable in some cases. Chromic acid (gr. x. : ℥ i. and gradually made stronger) is very serviceable as a topical remedy in these cases. In case of epistaxis, internal remedies alone are useless. Ergotin pills (gr. i.) may be given every three hours, or ℥ i. of the fluid extract of ergot. Or better still, from one to three grains of ergotin may be injected hypodermically once and for all, but it generally fails by itself. Hence, in addition to it, the patient should remain perfectly quiet, and the nares should be plugged if necessary. In the great majority of cases plugging the anterior nares is sufficient. Absorbent cotton or styptic cotton should be gently and carefully passed up the bleeding nostril as far as possible. Pressure on the side of the nose by means of a bit of ice may be done at the same time. In many cases this pressure is sufficient without the plugging. But should it fail, the plug can easily be inserted. Should this also fail, the posterior nares can be plugged by means of Bellocq's canula or a simple flexible catheter. The putting of cold applications to the back of the neck and elevating one or both hands are unnecessary, as they are useless. After clot has formed and hemorrhage ceases, care should be taken not to pick at or blow the nose too early, otherwise the whole trouble has to be gone over again.

Nutritious diet and some preparation of iron should be given if much blood is lost.

Laryngitis.

Etiology and Pathology.—Laryngitis is inflammation of the mucous membrane lining the larynx, and may be acute, sub-acute, or chronic. Exposure to cold and wet gives rise to acute laryngitis among those who, for some unknown reason, are more subject to the disease than others. Such exposure, therefore, can be regarded only as an exciting cause. Inhalation of dust or irritating gases will also cause it. The disease is also secondary to others, as in measles, for example. In some cases the inflammation extends from some other organ, as in pharyngitis. Of course it may also be caused by surgical injury. Finally, it sometimes is caused by straining the voice, as in singing high notes, shouting the words of command on drill, and the like.

Chronic laryngitis may follow one or more attacks of the acute form, or extension from chronic pharyngitis, as observed among topers and persons who smoke excessively. Hypertrophied or elongated uvula is also said to be capable of producing the disease, but this is doubtful. The same cause in these cases no doubt gives rise to both conditions. Tuberculosis, syphilis, and tumors of the larynx also give rise to or are associated with more or less chronic laryngitis. Finally, chronic laryngitis may be due to occupation necessitating the inhalation of dust or to straining the voice.

Symptoms.—Hoarseness is one of the earliest symptoms of laryngitis, and this may go on to complete aphonia. It is due to swelling of the vocal chords, or paresis, or perhaps both. Along with this there is usually some cough, which is characteristic of laryngitis, and already referred to as being a hoarse laryngeal cough when speaking of aneurism. It is attended with but little expectoration. In severe cases there may also be a feeling of soreness and dryness of the part rather than actual pain. The organ sometimes becomes sensitive to pressure from the outside. Dyspnœa is rarely troublesome except as it occurs sometimes in children, and then, combined with spasms of the glottis, it is known as false croup. There may be some constitutional disturbance, but usually the fever is slight, with a little headache perhaps, pains in the limbs, loss of appetite, and the like.

Physical examination of the larynx by means of the laryngoscope shows reddening and swelling of the mucous membrane, especially in both sets of vocal chords between the arytenoid cartilages. In severe cases, hemorrhage and erosions may occur, and on phonation there is incomplete closure of the vocal chords, due chiefly, as already stated, to paresis. Should the inflammation and swelling extend to the inferior laryngeal space, as it is called, then symptoms of dyspnœa become marked, and even suffocation may be threatened, as in œdema of the glottis.

False croup is usually described as laryngismus or spasm of the glottis simply. But according to Strümpell and others, it is undoubtedly associated with laryngitis. The laryngitis causes more or less stenosis in the larynx of children, and this combined with spasm gives rise to the disease in question. The child appears well during the day. Toward evening it begins to be a little hoarse. Later on, and often while asleep, the child is awakened by the characteristic barking cough. The child becomes restless, the respiration labored and noisy. Rarely does the temperature exceed normal, but the pulse becomes rapid during one of these paroxysms, which may be repeated several times during the same night. The spasm, which is an important factor in false croup, is no doubt excited by the laryngitis. But inasmuch

as some children are much more disposed to false croup than others, we conclude that the disease occurs chiefly among those of a neurotic temperament. Indigestion and teething are also thought to predispose to an attack of false croup.

The symptoms of chronic laryngitis resemble those of the acute form. There are hoarseness, laryngeal cough with but little expectoration, and a disagreeable feeling of dryness in the larynx. This amounts to a feeling of soreness if the inflammation becomes more active, or after straining the voice.

On examination with the laryngoscope, similar conditions are usually found as in acute laryngitis. The mucous membrane is not so red, however, but rather grayish-red, and the parts become irregularly thickened. This is particularly true of the membrane between the arytenoid cartilages. In some cases little nodules form on the true chords, giving rise to what is known as chorditis tuberosa. The author had this form of chronic laryngitis in 1879, for which he was treated and completely cured. The accompanying diagram was drawn at the time.

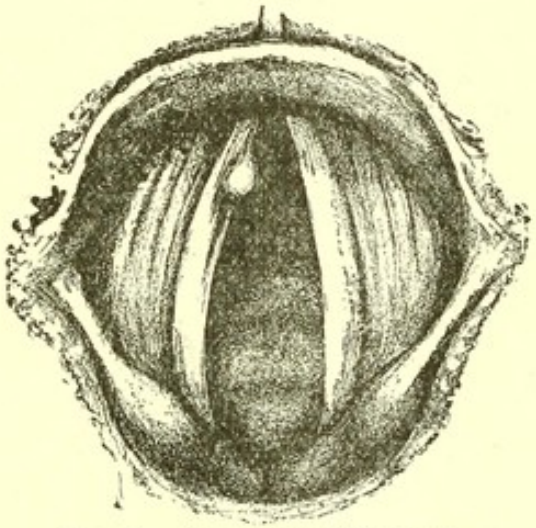


FIG. 9.—CHORDITIS TUBEROSA.

If chronic laryngitis be associated with tubercle, the bacilli are to be looked for in the expectoration or some of the little ulcers that form. Or else phthisis may be discovered on careful examination, as they usually coexist.

If the laryngitis be due to syphilis, we find syphilitic lesions in the pharynx and nasal cavities, and evidences of the disease elsewhere. In all cases of chronic laryngitis, not only is a laryngoscopic examination necessary, but the patient's history should be carefully ascertained, as well as closely examining other organs.

Treatment.—For acute laryngitis the treatment is very simple. The patient should, if possible, be confined to a warm, dry room with an even temperature of about 70° F. Any exciting cause, if it exist, should be removed if possible. The patient should, at

least temporarily, give up singing or smoking, for example. The larynx should be kept at perfect rest, and unnecessary speaking, even in a whisper, should be avoided. Meantime inhalation of steam is one of the best remedies. For adults a teaspoonful of laudanum may be added to a basin of steaming water, and the patient should inhale it. Or else a fluid drachm of extract of hyoscyamus may be added to the water of any inhaling apparatus. The patient can inhale the steam as often as necessary to give relief. If the bowels are constipated, they should be cleared out by giving a little calomel and bicarbonate of soda at bedtime. (℞ Hydrarg. chlor. mit., gr. ij.; pulv. sodii bicarb., gr. v. M. Sig. Take at bedtime.) This should be followed by a Seidlitz powder or some mild saline cathartic next morning, unless the bowels move through the night some time, as not infrequently happens.

The diet should consist of warm milk, with or without pepsin as may be necessary for the patient's digestion. Slippery-elm tea *ad libitum* is an excellent and soothing remedy. Astringents, such as sage tea and the like, are not indicated in acute laryngitis, and external applications are of little use. In severe forms, however, ice to the larynx is recommended, but I have never had occasion to use it.

The remedy for false croup is the syrup of ipecac. It should be given to the child freely, in drachm doses, for instance, every hour, or every half-hour in severe cases, until the paroxysm ceases, which generally occurs as soon as nausea or vomiting is produced. A cloth or sponge wrung out of hot water, as hot as can be borne, may also be applied to the larynx. By means of these two simple remedies, false croup is readily controlled. The air of the room, however, should be warm. The bed-clothes placed over the patient's head, so as to compel the breathing of warm air, will often stop a paroxysm without any other means. The bowels should be cleared out if necessary. Gums requiring it may be lanced without the least danger to the teeth, and with much relief to all concerned. Errors of diet are to be corrected, and the child not be allowed to eat *ad libitum* of everything, since indigestion renders an attack more than likely. During the day the child should be out of doors at any time from ten until four o'clock say, but properly protected against cold. Especially are the feet to be kept dry.

In the case of chronic laryngitis, we also try to find out the cause and remove it if possible. The toper and smoker must be willing to forego indulgence to a moderate degree, or, better, stop altogether if he has not the will to regulate his appetite. Occupations necessitating exposure to cold and wet or the inhalation of dust, or singing and loud speaking, have to be abandoned,

temporarily at least. Where the patient has some constitutional disease, like syphilis or tuberculosis, general treatment directed accordingly becomes necessary. The general condition of the patient is always to be taken into consideration, and the physician should not be satisfied with merely treating locally the one diseased organ.

Topical treatment becomes absolutely necessary, however, in chronic laryngitis. Either some astringent may be inhaled or topical applications are to be made, or both. Of inhalations, a one-per-cent tannin solution or a two-per-cent alum solution is recommended by Strümpell. A four-per-cent solution of bromide of potassium or fifty parts of cherry-laurel water to one thousand of water is also recommended by the same author when the larynx is sensitive. In the case of a priest that I treated, the inhalation of a ten-per-cent solution of carbolic acid alone, of the many remedies tried, gave relief. It dissipated the dryness and soreness, and the voice rapidly improved under its use, so that complete recovery resulted in about two months.

In my own case (chorditis tuberosa), tinct. iodine, undiluted, was applied to the vocal chords by means of a sponge and probang. The spasm of the glottis and inability to breathe for a short time after the application is alarming at first, but soon a tolerance to the application is established. The tinct. iodine was applied every other day for about six weeks, and resulted in complete recovery. Nitrate of silver is also used. At first a rather weak solution should be applied (gr. x. : ℥ i.). After a few days this may be increased to ʒ ss. : ℥ i. or even more. In case of ulceration, as occurs in tuberculous laryngitis, the application of nitrate of silver is one of the best remedies. To allay pain and soreness, the interior of the larynx may be sprayed out with a twenty-per-cent solution of cocaine. Extreme care must be taken, however, not to form the cocaine habit in the patient. It is worse than the opium habit and easily acquired. A powder of morphine and iodoform is also a good remedy for allaying the pain and healing the ulcers. For many details in connection with the treatment of chronic laryngitis, the reader is referred to works specially devoted to that subject.

Perichondrial Laryngitis.

Perichondrial laryngitis is inflammation of the laryngeal perichondrium and is usually a secondary disease, especially to syphilis and tuberculosis.

The seat of the disease is in the cricoid and arytenoid cartilages usually, sometimes in the thyroid cartilage, as well as the epiglottis.

The usual symptoms of laryngitis, such as hoarseness, laryngeal cough, stridulous breathing, and the like, are present. Bulging of the mucous membrane here and there point to the formation of abscess. Necrosis and expulsion of cartilage may follow, and œdema glottidis is a possible complication.

The patient usually dies of the primary disease. Sometimes, however, œdema glottidis or stenosis of the larynx suddenly brings the disease to an unexpected close, while the patient's health is apparently improving otherwise.

The diagnosis cannot be made with certainty. But, taken with the history of the case, if there be chronic laryngitis from some cause, as syphilis or tuberculosis, then sudden dyspnœa occurring would indicate perichondritis with œdema glottidis or stenosis. The treatment should be directed toward improving the general health and relieving laryngitis by means already mentioned. Tracheotomy or intubation must be performed in case of threatened death from suffocation. In some cases the patient may be compelled to wear the tracheotomy tube during life.

Œdema of the Glottis

is the result of dropsical effusion or inflammatory exudation into the submucous connective tissue of the larynx. As a consequence, stenosis follows, and, unless promptly relieved, frequently terminates in death.

The site of this œdema is usually above the vocal chords, but it may also occur in the inferior or subchordal laryngeal space.

As the result of a dropsical effusion, it may occur in Bright's disease of the kidneys, or any other disease giving rise to general dropsy. Or it may occur during an attack of laryngitis, in which case the œdema would be due to the presence of an inflammatory exudation rather than a serous transudation. The causes of laryngitis have already been considered. In one case observed, the œdema was the result of double metastatic parotitis, and in another case it was the result of inhaling flame in a burning building. In both cases sudden death resulted—the former in spite of tracheotomy performed in the presence of the late Prof. Wm. H. Van Buren, M.D., and the latter at Bellevue Hospital, before the operation could be performed. Inhalation of steam or other irritating substances, or the lodgment of foreign bodies, also produce it. Dyspnœa is the symptom characteristic of œdema glottidis. Inspiration is chiefly impeded at first, but presently there is obstruction to expiration also. Stridulous breathing is often heard, and the efforts of the patient become distressing. The muscles about the neck stand out at the vain efforts to inspire. The face becomes cyanosed. Large beads of perspiration

stand out on the forehead, and soon the cold sweat drips from the patient's head and body. To the bystander impending death is evident, however unaccustomed to such scenes. If the physician thinks he has time to use the laryngoscope, he finds the ary-epiglottic ligaments swollen together with swelling of the false chords and epiglottis. Usually the oval-shaped lumps of œdema can be felt on the outside, which, with the history of the case and the ugrent symptoms, renders the diagnosis certain and immediate treatment imperative. Puncturing the œdematous lumps with a bistoury gives immediate relief usually. If not, intubation or tracheotomy must be performed without delay. After that, and the patient is able to breath, the original disease of which the œdema is usually a secondary symptom can be treated at leisure.

Tumors of the Larynx.

Tumors or new growths of the larynx are to be recognized by the laryngoscope only. The sooner such tumor or new growth is recognized the more satisfactory to the physician, and the better, perhaps, for the patient. Tumors of the larynx may be divided into benignant and malignant.

Benignant tumors of the larynx are as follows:

1. *Papilloma.*—This is one of the most frequent forms of tumor, and is usually situated on the anterior part of the vocal chords. There is no known cause.

2. *Cysts*, due to occlusion of mucous follicles; they are quite rare. They are found on the epiglottis and ventricles of Morgagni, chiefly.

3. *Fibromata*, usually situated on the vocal chords, and pedunculated; the papillomata having a broader base. While papillomata form cauliflower excrescences, fibromata are whitish-brown nodules, usually about the size of a whortleberry or chinquinpin. The symptoms depend on the location of the tumor and its size. More or less signs of laryngitis and interference with phonation are present.

Malignant growths form the second group; of these cancer requires most notice.

The vocal chords or Morgagni's ventricles are most frequently the seat of the cancer, which is usually that kind known among the laity as rose cancer. It rarely begins in the larynx, but usually extends there from the pharynx or œsophagus. It usually occurs in people at middle life or past. Excessive smoking is thought to excite the disease. The reader is reminded of two illustrious cases, Gen. U. S. Grant and Emperor Frederick William. Both these patients died; further remarks on this disease are simply unnecessary.

Tubercle and syphilis also give rise to new growths in the larynx. The patients generally die if these diseases have been allowed to progress to that extent, or if they have gone so far in spite of treatment. For the treatment and management of tumors of the larynx the reader is referred to special works on that subject.

Croup.

Croup, also called membranous croup and true croup, is a croupous inflammation of the larynx.

The membrane is whitish or yellowish-white in color, and varies in thickness. Sometimes it exists only as a thin layer to be expectorated in shreds. At others it is a tube cast, or it may even fill up to the larynx, trachea, or a bronchial tube. The disease usually occurs among children between dentition and puberty. It appears to be more frequent in certain localities and among certain families. Ziemssen mentions low grounds and subjection to northeast winds, with dampness, as being peculiarly favorable for the occurrence of membranous croup. I have not only been confirmed in this opinion, but I have seen several children in the same family die of the disease, in spite of all efforts, in such a locality. The symptoms are those of catarrhal laryngitis until stenosis takes place, and then they are the same as those of diphtheritic croup, to which the reader is referred. Indeed, many authors now contend that croup and diphtheria are one and the same disease. My own reasons for believing that they are utterly different and distinct diseases are given when speaking of the diagnosis of diphtheria.

The diagnosis between false croup or laryngismus stridulous and true croup is sometimes difficult at first. In false croup, however, spasm of the glottis plays an important part, and the paroxysms of dyspnœa which came on at night soon yield to treatment; indeed, they cease spontaneously. In true croup there is often spasm of the glottis also, but then the symptoms of suffocation steadily increase. The catarrhal and febrile symptoms in true croup also are much more severe than in false croup. True croup is a very fatal disease, the more so as the patient is young. Tracheotomy is no guaranty that life will be saved, since often the membrane forms below the seat of tracheotomy or intubation.

The treatment is the same as that for acute laryngitis until signs of suffocation begins, and then intubation or tracheotomy should be performed. The sooner this is done, once the true condition is known requiring it, the better for the patient. For remarks on tracheotomy and intubation and their relative merits, the reader is referred to diphtheria.

Bronchitis.

Etiology and Pathology.—Bronchitis is inflammation of the mucous membrane lining the bronchial tubes. The disease may be acute, subacute, or chronic. When limited to the larger-sized bronchial tubes, it is ordinarily known as a cold. But when it attacks the smallest bronchial tubes, as sometimes happens, it is then termed capillary bronchitis. In neither case are the air cells affected unless as a complication. As an independent primary disease, bronchitis of any form is a bilateral disease, local bronchitis being secondary to some other disease, as tubercle or other neoplastic growths, aneurism, or surgical injury.

Acute bronchitis may be primary, the result merely of taking cold. It may involve the larger and middle-sized bronchi only, or it may extend into the smaller tubes and thus become capillary.

Or it may be secondary to some other disease, the exanthemata, for instance, or blood diseases, or in connection with heart and lung affections. Mitral regurgitation or obstruction leads to congestion of the pulmonary circulation, and bronchitis not infrequently results. In chronic general emphysema, there is overdistention of the remaining pulmonary capillaries, and bronchitis nearly always accompanies that disease.

In the third place, acute bronchitis may be mechanical, as observed among those whose occupation necessitates the inhalation of irritating dust or vapors, as among stone-cutters, brush-makers, carpet-weavers, jute-pickers, brass-finishers, gasmakers, and the like.

Finally, in some instances it appears to be epidemic, as abundantly proven within the past two years, where it is associated with the grippe.

Bronchitis is more liable to occur in temperate climates, where sudden changes of temperature occur, than in very warm or very cold climates. In like manner it is more prevalent at certain seasons of the year, in winter and spring, for instance.

Symptoms.—Nasal catarrh, watery eyes, and a slight grade of laryngitis not infrequently are among the early signs. The patient sneezes and the voice is somewhat hoarse. There may be also some slight constitutional disturbance such as headache, pains in the back and limbs, loss of appetite, a furred tongue, and perhaps constipated bowels. In severe cases a chill may usher in the attack. More frequently, however, there is no actual chill, but rather chilly sensations alternating with hot flashes. Rarely is there much fever. The temperature may go up to 100° F. to 101° F., but may also remain perfectly normal, while the pulse may be somewhat increased in frequency. In addition to these, there is usually a sense of tightness and constriction behind the sternum.

Cough is an early symptom. It comes on in paroxysms which increase in frequency as the disease progresses. At first the cough is dry, there being but little expectoration; at first this is scant, thin, white, and frothy. Soon it increases in quantity, becomes thicker and opaque. Finally it becomes abundant and muco-purulent, of a yellowish or even greenish color. Blood, except a few streaks, is rarely seen in the sputa. As they become more abundant and altered, they are more easily expelled, so that the patients state that the cough is looser and they raise more easily than at first. Various epithelial cells are found in the sputa, at first, such as the squamous, columnar, and ciliated, but later on exudative corpuscles and even pus cells are also found.

The urine undergoes few changes. It is a little scant and high-colored, with an increase of urates, as happens in all cases where any fever exists. In a few days, or two or three weeks, the symptoms subside and the patient is completely recovered. In other cases the disease may become subacute or even chronic.

Capillary bronchitis is inflammation of the mucous membrane lining the smallest bronchial tubes. It not infrequently results from extension of the inflammation from the larger tubes, but it may also occur independently.

In the latter case it occurs chiefly among children or the aged or those suffering with some debilitating disease with a weak heart, as typhoid fever. Occurring among robust adults, it usually results from the extension of the inflammation from the larger tubes. Capillary bronchitis has frequently been that form of the disease accompanying the grippe, that has been epidemic with us during the past two winters.

The disease is sufficiently dangerous, even in a robust adult; but among children, the aged, and those suffering with typhoid diseases it is particularly grave in character. This danger is not only due to imperfect aeration of the blood, and the increase of fever, but the great tendency to the occurrence of lobular pneumonia. Among adults the symptoms are more severe than those complained of in ordinary bronchitis. But among children and the aged the symptoms may be overlooked, physical signs alone revealing the true condition of the case. Chills, however, may usher in the disease, and instead of these, among children, convulsions sometimes occur. Fainting fits and great nervous depression frequently precede the capillary bronchitis of the grippe. Dyspnœa and cough are present in capillary bronchitis. The number of respirations may be increased to fifty or more. The sputa are more tenacious than in ordinary bronchitis, and expectoration is performed with difficulty, even among adults. In some cases fibrinous casts of the minute bronchial tubes are ex-

pectorated. Among children, typhoid patients, and the aged, expectoration is not performed, or rather they swallow what is raised from the tubes.

The pulse becomes frequent, but full as a rule. There is usually some fever, about 102° F. or even 103° F. toward evening, but it is generally about two degrees less in the morning. The tongue is furred, the appetite is lost, there is headache and restlessness, and the face becomes flushed or cyanotic. The urine not infrequently becomes albuminous.

The symptoms after reaching this point may now begin to subside and the patient recovers. But in other cases cyanosis becomes more marked, the skin becomes cold and clammy, delirium from carbonic-acid poisoning sets in, and the patient may die in coma or from exhaustion.

Chronic bronchitis is similar in its etiology to the acute form. It may result from repeated attacks of acute bronchitis, or be associated with some chronic lung disease as phthisis or emphysema; heart disease, especially mitral lesions; various blood affections, as gout, inhalations of irritating particles or vapors and gases; or it may follow such diseases as measles and whooping-cough. Chronic acloholism is said to predispose to it. Finally the disease is often chronic when first observed, as seen among old people, and then is known as senile bronchitis. The mucous membrane becomes irregularly thickened and the tubes dilated in some places and strictured in others. More or less emphysema is usually present.

The symptoms of chronic bronchitis very much resemble those of the acute form, but are less severe. There are cough, expectoration, some dyspnœa, and not infrequently a sense of constriction or weight across the sternum.

According to Roberts, of London, there are three principal forms of chronic bronchitis, each of which is characterized by symptoms peculiar to itself.

First there is the ordinary form of chronic bronchitis resulting from repeated attacks of the acute form. Finally the patient coughs all winter. The cough begins earlier every year and lasts longer, until a very short respite during summer is left. The expectoration is muco-purulent and abundant. The patient becomes hectic, loses flesh, and either acquires phthisis or else chronic lobular pneumonia.

In the second class are those cases of dry bronchitis usually associated with the gouty diathesis. The smaller tubes contain more secretion than the larger ones. The cough occurs in paroxysms and fairly exhausts the patient. Relief is obtained upon expectorating a small amount of a pearly white viscid substance resembling starch. This form of bronchitis is very chronic and

is almost certain to give rise to, or be associated with, general vesicular emphysema and asthma. The feeling of constriction about the chest is generally marked. Fever is absent.

The third and last class of chronic bronchitis is known as senile bronchitis. It is also called bronchorrhœa. Heart disease is not infrequently present. The cough comes on in paroxysms, generally early in the morning while dressing. After a violent fit of coughing of variable duration, the patient expectorates profusely. The substance expectorated is watery and almost clear. Sometimes it is frothy or else ropy. The amount expectorated in twenty-four hours varies, but sometimes amounts of four or five pints when the paroxysms of coughing are frequent.

Regarding the form of chronic bronchitis due to inhalation of irritating substances, the reader is referred to what is said under the head of Fibroid Phthisis.

Fibrinous bronchitis, also called plastic and croupous bronchitis, is that form in which a plastic material is thrown out so as to form casts of the tubes instead of the ordinary secretion. It appears to have no connection with diphtheria or croup, and the plastic material is never found in the trachea, though any of the bronchial tubes may be the seat of the disease.

The cause of the disease is unknown, though in the few instances in which I have seen it the cases were those of tuberculous children. It may be met with at any age, but usually is found among the young who are feeble and delicate if not positively tuberculous. The symptoms increase in severity until the plastic material is coughed up. Upon carefully washing it and spreading it out or suspending it in a vial, exact tree-like casts of the tubes will be found. The following is copied from a specimen furnished by Dr. Charles Lewis Allen:

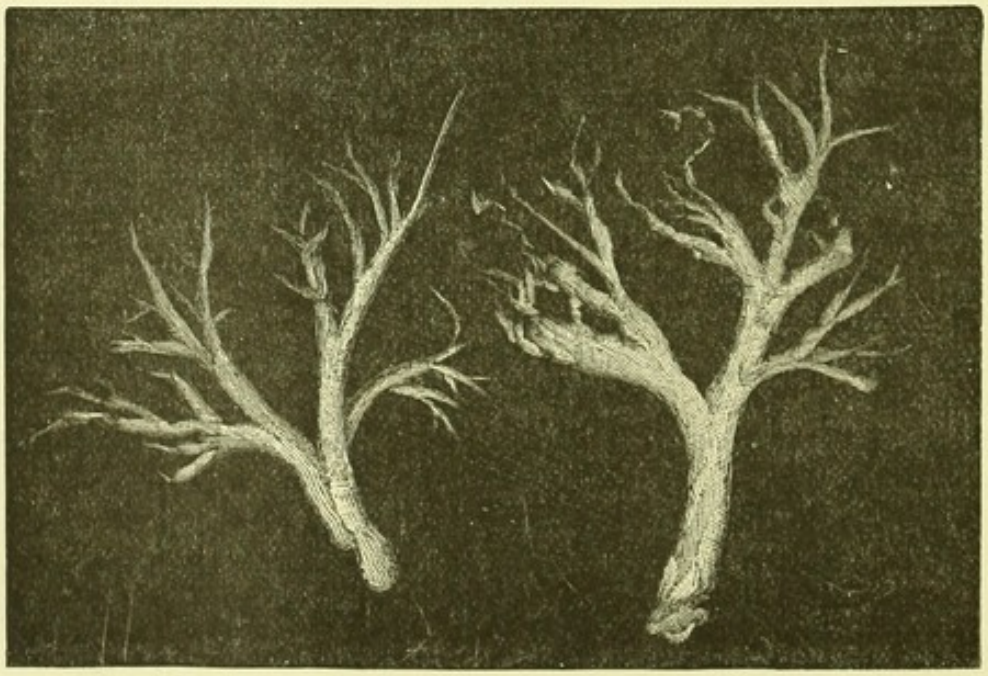


FIG. 10.—BRONCHIAL-TUBE CASTS IN FIBRINOUS BRONCHITIS.

Abundant mucous expectoration occurs afterward in many cases, and even hæmoptysis may be observed.

Physical Signs of Bronchitis.—If we remember that bronchitis is simply inflammation of the mucous membrane lining the bronchial tubes, while the air cells are intact, we can readily understand the physical signs.

Thus, for bronchitis affecting the larger tubes, whatever the cause or form of the disease, inspection, palpation, and percussion would be negative in results. Only by auscultation do we discover signs of the disease by means of the râles usually present. On auscultation of the organs of respiration, we listen for the respiratory murmur, the pectorophony or vocal resonance over the chest, and finally the adventitious sounds.

The respiratory murmur in an ordinary case of bronchitis is usually normal, the vesicular element being unchanged as the air cells are unaffected. In some cases, owing to the roughened condition of the mucous membrane, the respiratory murmur may have a certain amount of roughness or harshness imparted to it. The expiration may also be somewhat prolonged; and if the secretion be abundant, or if stricture of the tube be present, there will be more or less obstruction to convection of sound along the bronchial tubes. For this reason the respiratory murmur may be a little less intense than normal. The pectorophony may be diminished for the same reasons, especially also if the air cells be in an emphysematous condition, thereby refracting or diffusing the sounds more than in health.

In the dry stage the adventitious sounds usually consist of dry râles of some variety, either sonorous or sibilant, according as they are coarse or fine. Later on, as the secretion becomes more abundant, we hear moist râles of some kind, or perhaps several varieties may exist at the same time. These râles are the mucous or submucous if made in the larger-sized or middle-sized bronchial tubes, or the subcrepitant (muco-crepitant) if produced in the capillary bronchial tubes.

Capillary bronchitis furnishes more distinctive physical signs than the ordinary form. Inspection in capillary bronchitis usually reveals increased frequency of respiratory movements. These respiratory movements may equal or even exceed the number of pulse beats per minute. Not infrequently there will be cyanosis, due to imperfect aeration of the blood, and noticeable especially about the cheeks, ears, tip of the nose, lips, and fingers.

Palpation generally yields negative results, or the fremitus may be diminished or even absent from obstruction of the tubes, as already stated. Rhonchal fremitus is sometimes felt.

On percussion, the note may be normal, or it may be and frequently is exaggerated from temporary over-distention of the air

cells. This is due to the fact that forced expiratory efforts empty chiefly the larger bronchi, but have little or no influence over the air cells. Hence, so far as the air cells are concerned, inspiration is a more forcible act than expiration. The air passes more easily into the air cells than it gets out, and so it accumulates in the cells and distends them. On the other hand, among children, the aged, and those suffering with typhoid conditions, the air cells may collapse, giving rise to atelectasis (apneumatosis) instead of emphysema. In such cases there is not power enough to overcome the obstruction in the tubes. The air in the cells then becomes absorbed, the oxygen disappearing first, and then the carbonic acid. In these cases there may be some dulness on percussion, which is sometimes mistaken for pneumonia.

Auscultation reveals the presence of abundant subcrepitant (muco-crepitant) râles over both sides and especially low down posteriorly, owing to the gravitation of mucus in many instances. Other râles may be present at the same time. The respiratory murmur, if heard at all, would be about normal in quality, expiration being somewhat prolonged, however, owing to the obstacle to the free escape of air. Usually it is so weak that it is entirely obscured by râles. Sometimes obstruction in the tubes is so complete that it is suppressed. Pectorophony is usually normal, but may be diminished like the fremitus. If exaggerated or markedly increased, it would indicate pneumonia to a considerable extent.

Prognosis.—This depends on the age of the patient, other conditions present, the extent of the inflammation, and many other considerations to be noted. Among children, the aged, and those suffering with typhoid fever, heart and lung disease, extensive pleurisy, pneumonia, and pulmonary œdema, acute bronchitis often proves fatal. Capillary bronchitis widely affecting both lungs is always to be regarded as a serious disease. Chronic bronchitis is also to be regarded as not a slight matter. It often gives rise to chronic emphysema, a serious and often incurable disease. It also undoubtedly predisposes to phthisis of some form. The same is true of plastic bronchitis. The prognosis is, however, usually favorable, as is well known, when the condition occurs in an adult of previously good health and family history, and as the result of taking cold to a moderate degree.

Diagnosis.—This is not usually difficult. Being a bilateral affection with no physical signs of material value except various râles to be detected over both sides of the chest by auscultation, and which change on coughing, and are attended with a certain amount of expectoration, it is readily distinguished from acute lobar pneumonia, which, besides being usually attended with severe constitutional symptoms, is generally unilateral, and con-

fined to the lower lobe of the right lung. Moreover, owing to solidification of lung tissue in pneumonia, we usually obtain marked increase of fremitus over the affected part under palpation, marked dulness on percussion, and bronchial breathing and bronchophony on auscultation.

In capillary bronchitis the inflammation may extend, here and there in spots, into the air cells, giving rise to lobular pneumonia, which is also called broncho-pneumonia or catarrhal pneumonia. It is often difficult to detect minute spots of lobular pneumonia. If, however, in the course of capillary bronchitis, respiration becomes more hurried, with exaggerated movements of the alæ nasi and, above all, sudden rise in the temperature, it is fair to infer that lobular pneumonia has set in, even if it be to such a small extent that other signs are wanting. One can hardly expect to hear a few crepitant râles in the midst of abundant and much louder subcrepitant râles of the capillary bronchitis; and a small area of pulmonary consolidation would hardly give noticeable increase of fremitus, dulness on percussion, and bronchial breathing with bronchophony on auscultation. If, however, these signs are present to such an extent as to be recognized, the diagnosis of pneumonia would be complete.

Atelectasis or apneumatosis, from collapse of air cells due to the capillary bronchitis, as already described, would also give some dulness on percussion, but it would be symmetrically bilateral and there would be sucking in of the intercostal and supraclavicular spaces on inspiration, with no extra rise in the temperature. The presence or absence of the chlorides or albumin in the urine would be of little or no value as aids to diagnosis.

In plastic or fibrinous bronchitis the coughing up of the fibrinous casts would be diagnostic.

Treatment.—In acute bronchitis limited to the larger tubes, active treatment is rarely necessary. Blisters and cups, and particularly leeches, are rarely if ever called for. If the bowels are constipated and there is a little fever, two grains of calomel with five grains of bicarbonate of soda at bed-time, or two tablets each of a grain of calomel triturate, is usually sufficient. A Seidlitz powder, or small dose of some saline cathartic, or a glass or two of Congress or Hathorn water may be taken next morning before breakfast to insure the bowels moving. The patient should remain indoors for a few days and sleep in a well-warmed, dry, and comfortable room. The diet should be somewhat restricted during that time according to lack of accustomed exercise. If the cough be annoying and dry, as is usually the case, the syrup of ipecac is one of the best remedies. This may be combined with a little paregoric and fl. extr. of squills to prevent constipation if the patient is kept awake at night much. (℞ Tinct. opii

camphoratæ, ʒ iij.; fl. extr. scillæ, ʒ ss.; syr. ipecac., ℥ i.; aquæ, q.s. ad ℥ ij. M. Sig. Teaspoonful at once and repeat every hour or two.) For children the paregoric may be omitted altogether or a very small quantity allowed. A large hot poultice of flaxseed meal placed over the chest, and so covered with oil silk as to keep it moist and warm, may give great relief. Hot drinks, as hot milk and water, or a little hot ginger tea, is often beneficial. The custom among the laity of hot pedluvia and a hot gin sling at bed-time is often efficacious, but care should be taken not to repeat such remedies so often as to accustom the patient to becoming addicted to alcoholic drinks, and being petted too much. If fever becomes troublesome, a five-grain tablet of anti-febrin, or ten grains of phenacetin or antipyrin, may be given two or three times daily. Either is better than quinine, which is not indicated unless the patient lives in a malarious district or is a malarious subject. Should the urine not flow sufficiently freely, a few doses of nitre may be given, but usually the calomel is sufficient to start all the secretions. (℞ Spts. ætheris nitrosi, ℥ ss.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. ter die.) The ipecac and paregoric will be sufficient for promoting diaphoresis. The liquor ammoniæ acetatis is an old remedy and highly recommended, but is disagreeable to take and is generally unnecessary. Hot lemonade is better. The ice bag may be applied to the head in case of severe headache.

Generally, in treating acute bronchitis, remaining indoors, restricting the diet for a few days, moving the bowels, and giving the ipecac cough mixture, as already mentioned, are sufficient.

In capillary bronchitis more active treatment is necessary. The patient, especially a child, should be kept in bed. The temperature of the room should be uniformly kept at about 70° F., and draughts avoided, although sufficient ventilation is necessary. The chest should be enveloped in a thick hot poultice and oil silk. The syrup of ipecac should be freely administered to the point of vomiting. Very often the act of vomiting gives great relief. Antimony in these cases is out of the question. The patient quickly rallies from any depression arising from the free use of ipecac, but antimony as was formerly given is a dangerous depressant.

Alcoholic stimulants are indicated in many cases of capillary bronchitis, especially when there are signs of heart failure. For a child one teaspoonful to two teaspoonfuls of whiskey or brandy should be given every two hours in a little sweetened water during the day, or every three hours during the night. Among adults, or those addicted to drink, more should be given, half an ounce or an ounce every two hours. The nourishment, consisting of milk and water equal parts, or bouillon, should be given

soon after the stimulant, in quantities varying from three to six ounces according to the age and condition of the patient. If dyspnœa be marked and the poultices do not give the expected relief, dry cups should be applied by means of fire and not by the ordinary method of a rubber bulb, as the latter does but little good. In no case are blisters or leeches indicated. Quinine will do no good unless the usual malarious elements are present as evidenced by marked periodicity of the fever, chills, and the like, but antifebrin should be given as already mentioned. Antipyrin or phenacetin may be used instead. A few doses crowded together toward evening, with the pulse watched, are better than doses given at long intervals during the day, since the patient is almost invariably worse toward night.

Cold-water compresses to the chest, or even ice bags, are highly recommended, but the author has had no experience with them.

The inhalation of steam in the room is insisted on by many practitioners. There is reason to believe that the inhalation of steam impregnated with turpentine, as for croup and diphtheria, is serviceable. The steam from lime-water is also good. Spasm of the glottis, so apt to occur in this disease, with distressing dyspnœa is often aborted by steaming the room. Should these fail, dilute hydrocyanic acid may be given. (℞ Acid. hydrocyanic. dil., ʒ i.; syr. prun. virginianæ, ℥ ss.; aquæ, q.s. ad ℥ ij. Sig. ʒ i. ter die.) After the acute symptoms are over, the muriate of ammonia is beneficial. (℞ Pulv. ammoniæ muriat., ʒ i.; syr. prun. virginianæ, aquæ, āā ℥ i. M. Sig. ʒ i. every three hours.)

In fibrinous or plastic bronchitis, inhalation of steam sometimes gives great relief, especially when ipecac is at the same time administered. The syrup of ipecac given to the point of nausea, or even vomiting, is a good remedy—much better than antimonial wine, though the latter in small doses and given frequently is highly recommended. (℞ Vini antimonii, ♏ x.; syr. prun. virginianæ, aquæ, āā ℥ i. M. Sig. ʒ i. every three hours.) Cod-liver oil is indicated as a nutritious tonic. It may be combined with syr. ferri iodidi and diastase if iron and a digestive are indicated. (℞ Syr. ferri iodidi, ʒ i.; Forbes' diastase, ℥ i.; olei morrhuæ, q.s. ad fl. ℥ vi. M. Sig. Tablespoonful ter die after meals.) Should iron rather than cod-liver oil be indicated, an excellent preparation is a mixture of the sol. ferri albuminat., glycerite of pepsin, and diastase. (℞ Sol. ferri albuminat., glycerite of pepsin, Forbes' diastase, āā ℥ ij. M. Sig. Dessertspoonful ter die.) Where the patient can afford it, change of climate may be indicated.

In subacute or chronic bronchitis, besides suitable clothing and climate, both of which often become essential to a cure, the diet should be nutritious and easily digested. In this respect the

same remarks apply here as in phthisis. As a cough mixture that of Stokes, of Dublin, Ireland, is perhaps as good as any. (℞ Pulv. ammoniæ carb., gr. xvi.; fl. extr. senegæ, fl. extr. scillæ, āā fl. ʒ ss.; tinct. opii camphoratæ (paregoric), fl. ʒ iij.; syr. tolu., q.s. ad fl. ℥ ij. M. Sig. ʒ i. every two or three hours.) The squills not only act as a stimulating expectorant, but also prevent constipation of the bowels following the use of the paregoric. When expectoration is profuse, terebine or terpine hydrate are excellent remedies. Five to ten drops of terebine is given on a lump of sugar as required. Terpine is best given with glycerin. (℞ Terpinæ hydrat., gr. xxiv.; glycerini, ℥ ss.; alcohol., q.s.; aquæ, ad ℥ ij. M. Sig. ℥ i. every three hours.)

Where the chronic bronchitis is associated with gout, iodide of potassium and the wine of colchicum are indicated. (℞ Pulv. potass. iodidi, ↄviij.; vini sem. colchici, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) While the paroxysms of cough last, a mixture of equal parts of Hoffman's anodyne and the U. S. solution of morphiæ sulphat. may be tried. (℞ Spts. æther. comp., sol. morphiæ sulphat. U. S. P. (gr. i.–℥ i.), āā ℥ i. M. Sig. ʒ i. at once and repeat every half-hour until relief is obtained.) Usually one or two doses are sufficient.

In senile bronchitis, one of the best remedies is the muriate of ammonia in the infusion of gentian. This I learned from the late Dr. C. R. Agnew, of this city, with whom I had a case of an elderly lady in consultation for deafness. The deafness was due to her coughing dependent on an old bronchitis. By relieving the cough, therefore, the hearing would be improved, and this plan of treatment was verified by putting it into practice. In about six weeks the cough was very much lessened and the hearing correspondingly improved. (℞ Pulv. ammoniæ muriat., ʒ ss.; infusi gentian., Oi. M. Sig. Wineglassful before meals.) It also served as an excellent bitter tonic for improving the appetite.

In many cases of chronic bronchitis of mixed forms, iodide of potassium and arsenic form an excellent mixture in the treatment. (℞ Pulv. potass. iodidi, ↄiv.; Fowler's solution, ʒ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) The dose of iodide of potassium may be gradually increased from five to ten grains at each dose. It aids in causing absorption of inflammatory exudation, and the arsenic hastens fatty degeneration of inflammatory products so as to lead to their liquefaction and absorption—in other words, resolution.

Asthma.

Etiology and Pathology.—Asthma is a reflex neurosis, characterized by recurrent paroxysms of violent dyspnœa.

The paroxysms of dyspnœa are due sometimes to spasm of the

muscular coats of the bronchial tubes, sometimes to tumefaction of their mucous membrane from capillary vaso-motor disturbance, and sometimes both of these conditions are present.

It attacks both sexes at all ages, but men are affected by it twice as often as women, being more exposed to the causes.

Three factors are required for the production of this disease—(1) a vulnerable area of mucous membrane, (2) an abnormally sensitive nerve centre, and (3) an external irritant. Given all these factors simultaneously, and an attack of asthma is produced, and it cannot be produced by any two without the third.

The name by which the variety of asthma is known is derived from the locality of the vulnerable area of mucous membrane. It may be situated in the naso-pharynx, bronchial tubes, or stomach. The irritant applied to either of these points, provided they be hyperæsthetic from chronic inflammation, and the abnormally sensitive nerve centre also exists, is reflected along the pneumo-gastric nerve, giving rise respectively to naso-pharyngeal asthma, bronchial asthma, or peptic asthma. Cardiac asthma is also described, but this properly comes under the head of bronchitic asthma, owing to the bronchitis due to heart disease.

The second factor, or the abnormally sensitive nerve centre, may be inherited, or acquired by long-continued application of the irritant to the vulnerable area of mucous membrane. Not only this, but one sensitive area of mucous membrane may give rise to a second, so that naso-pharyngeal or even peptic asthma, for example, may become bronchitic asthma. Of external irritants, which constitute the third factor in this disease, dust of some sort is the most common. But there are a great variety of external irritants, some of which also give names to the disease, as hay asthma, and the like.

Naso-pharyngeal asthma is very closely allied to what is known as hay fever. In the latter case the vulnerable area of mucous membrane is situated more anteriorly in the nares than in asthma, and by reflex action the branches of the facial nerve are involved, giving rise to lachrymation, sneezing, and other symptoms of hay fever. Sometimes hay fever and asthma may occur at the same time. The irritants in case of peptic asthma are certain kinds of food; and in bronchitic asthma, fog, cold, with dampness and changeable weather, often give rise to an attack.

Symptoms.—A paroxysm of asthma is not infrequently preceded by certain premonitory symptoms. Thus, the patient, may be unusually exalted or depressed mentally. Sometimes there is an irresistible disposition to sleep. Profuse diuresis of clear water may occur a few hours before an attack, according to Hyde Salter. In other cases constriction about the chest is felt, there

are short, dry cough with tendency to wheeze, and flatulence. In many cases none of these initiatory symptoms are observed.

The patient goes to bed as usual without ever suspecting an attack. Sometimes after midnight, generally between 2 and 4 A.M., the patient is awakened out of a sound sleep to find an attack of asthma present. When it does occur, it is usually at exactly the same hour every time, so that the patient can usually tell exactly what o'clock it is when first awakened by it. Going to bed earlier than usual, or after any unusual excitement, or in unfavorable atmosphere, like a strange and cold spare room, will bring on the attack earlier than usual by an hour or so. Sometimes the paroxysm comes on two hours or so after a heavy dinner, or on getting into a cold bed. But all asthmatics are freer from symptoms during the forenoon, that is from breakfast to noon, than any other time during the twenty-four hours. Sleep and the recumbent posture appear to aggravate the hyperæsthetic condition of the vulnerable area of mucous membrane, and for that reason the paroxysm occurs generally during the night.

Patients attacked with a paroxysm of asthma are awakened out of sleep and at first sit up in bed in order to get their breath. Presently they often find it necessary to get up and go to the window and open it for the same reason. They assume all kinds of positions in order to breathe more freely, but this is usually sitting up and leaning forward on a table, chair, or some piece of furniture in the room. At first they are pale or dusky, but in severe cases they become more or less cyanotic. The breathing is labored and wheezy, and the cold sweat rolls off the face. All clothing is unloosened and they wish no one near. There is no fever as a rule, but the pulse is usually excited. The countenance becomes anxious or indifferent. The breathing during a paroxysm is peculiar. Inspiration is short and easily performed, but expiration is prolonged. This is owing to the fact that inspiration, so far as the smaller tubes and air cells are concerned, is a more powerful act than expiration. The difficulty is not on inspiration, as the air easily enters the lungs, but on expiration in order to expel the poisoned air. The greater the effort at expiration, the greater the pressure on the tubes, and the more surely is air retained in the lungs, rather than expelled. Meantime the air cells become more and more distended, so that the patient, in a state of acute vesicular emphysema, will be found to have the chest measure several inches more in circumference than it did before the attack.

The whole of the lungs may be affected in a paroxysm, or they may be affected in patches, so that the physical signs are fugitive, or, as in some cases that I have seen, only one lung may be attacked, the other lung wholly escaping.

Expectoration commences before the paroxysm ceases. And after a time, varying from a few minutes to several weeks, the paroxysm ends with abundant expectoration of a thin glairy mucus. Sometimes casts of the smallest bronchioles and known as Curschmann's spirals are expectorated. The sputa also often contain Leyden's octahedral crystals, which are also called asthma crystals. They are the same as Charcot's crystals found in leukæmic spleen (p. 460). In some cases oxalate of lime crystals are found. Leyden concluded that attacks of asthma were due to reflex irritation caused by these crystals. In some cases, however, it is dry all through the attack. The longer the attack lasts, the more gradually it disappears. The usual duration is a few hours. Not infrequently, however, it lasts a day or two. It is usually the same for each particular patient, though seizures tend to reappear at shorter and shorter intervals, and last longer and longer when they occur.

For a short time after an attack the patients may feel a little out of sorts, as the saying is, but during the interval they often enjoy perfect health.

Physical Signs.—During an attack or paroxysm, the physical signs are as follows:

Inspection shows labored breathing. Usually the patient sits up and leans forward in order to breathe more freely. The shoulders are elevated and brought forward, the countenance is pale or dusky, and during respiration the expiratory act is seen to be prolonged for reasons already given. During inspiration, which is usually deferred, short, and sometimes jerking, the supra-clavicular and supra-sternal fossæ, *scrobiculus cordis* or pit of the stomach, as well as the intercostal spaces, are seen to be sucked in and depressed, because the lungs do not become inflated to a degree corresponding to the enlargement of the thoracic cavity. After the paroxysm is over, inspection, so far as the asthma itself is concerned, is chiefly negative in results.

Palpation gives rhonchal fremitus in some cases, owing to the loud rhonchi usually present. This fremitus depends much on the condition of the chest walls, as to whether they are thick or emaciated. The vocal fremitus is either unchanged or else slightly diminished on account of the obstruction to the convection of the voice sound along the tubes owing to spasm and mucus, and the emphysematous condition of the lungs rendering them more positive refractors or diffusors of the voice than in health.

Percussion elicits exaggerated resonance owing to the emphysematous condition of the lungs. After the paroxysm, the resonance may be normal, or still exaggerated if the air cells have become permanently dilated.

On auscultation, dry râles of various kinds are heard, but

chiefly on expiration, which is much prolonged, while inspiration is so short as to scarcely give sufficient time for these râles to be thoroughly developed. Sometimes they are loud enough to be heard by the patient and friends in the room.

As the paroxysm declines, and increased secretion occurs, various moist râles may also be heard, such as the mucous, submucous, and subcrepitant. Sometimes the moist râles are present with the dry râles from the first.

The râles may be heard only on one side of the chest, or here and there in spots, but changing about from place to place. Generally, however, they are heard all over both sides.

The respiratory murmur is usually so obscured by râles, or weakened, or suppressed from obstruction in the tubes and increased refraction in the lungs, that it cannot be heard. But if heard at all, it would not be changed in quality so much as rhythm, the inspiration being shortened and expiration prolonged. In a typical case the rhythm is just the reverse of what it is in health; that is to say, inspiration is to expiration in length as 1:4, instead of 4:1 as in health. The explanation for this change in rhythm has already been given, and depends on the fact that inspiration is a greater force than expiration so far as regards the finer tubes and air cells.

Pectorophony or vocal resonance is normal or somewhat diminished for the same reasons as the fremitus would be. After the paroxysm is over, bronchial râles of various kinds, both dry and moist, may be present for a few hours or even days.

Prognosis.—Asthma rarely causes death by itself, however severe and distressing the paroxysms may be at times. Patients who are asthmatic subjects not infrequently live to advanced age. In many cases asthma can be radically cured owing to a better knowledge of its etiology and more rational methods of treatment. To Dr. William H. Daly, of Pittsburg, Pa., belongs the chief credit for much of our present knowledge of this important subject, and which he brought out in connection with the study of hay fever. In 1819, Bostwick first described the disease, and in 1839 Elliotson first attributed it to the pollen of plants. In 1881, however, Dr. Daly first claimed that the inflamed nasal mucous membrane was an all-important factor, and suggested local treatment accordingly for eradicating the disease. Hack, of Germany, also claims the discovery, but he is several months later than Daly. Since that time Bosworth, Lefferts, Delavan, and others, of New York, and Roe, of Rochester, N. Y., have thoroughly studied this subject and brought it clearly before the profession. Where the cause can be reached and eradicated, which in bronchitic asthma is impossible, the cure is radical, provided a second and unattainable area of hyperæsthetic

mucous membrane has not been produced. The prognosis depends also on the length of time patients have been subjects of the attacks. The longer the disease has lasted before scientific treatment has been adopted, the less chance is there for radical cure.

Diagnosis.—Proper attention to the history of the case and the physical signs usually enables the physician to make the diagnosis of asthma with certainty.

From bronchitis it is easily told by there being in asthma the sudden onset and departure, the peculiar labored breathing with expiration notably prolonged and wheezing, abundant and loud râles heard chiefly on expiration, the absence of muco-purulent expectoration and fever, and the suddenness with which it sometimes yields to remedies.

In emphysema, the dyspnœa is constant instead of paroxysmal, owing to organic change in the lungs, besides other physical signs described in connection with that disease.

Heart disease, in some cases, gives rise to paroxysms of dyspnœa, but they are usually shorter than those of asthma, and are unattended with the prolonged expiration so peculiar to asthma. Besides this, there are also evidences of heart disease present.

Spasmodic and other affections of the larynx cause change in the voice, and if wheezing be present it is located over the larynx as easily determined by the stethoscope. Moreover, in laryngeal spasm, inspiration and not expiration is prolonged and labored. This is also true of polypus in the trachea sometimes.

Œdema of the lungs causes dyspnœa, but instead of being paroxysmal it comes on gradually and increases with the œdema, which will be found also to be associated often with dropsy from some cause, as cardiac, renal, or hepatic disease. There will be also some dulness on percussion over the œdema, which is generally found to be posteriorly on both sides and low down at the most dependent portions of the lungs. Liquid crepitant râles are also heard at the end of inspiration.

Hydrothorax also causes dyspnœa, but this also comes on gradually as a part of general dropsy, like œdema. There is marked dulness, or even flatness, on percussion over the pleural cavities up to the level of the fluid, instead of extra resonance.

In pulmonary hypostasis occurring in old age with enfeebled heart, the dyspnœa resembles that of œdema, rather than asthma.

Treatment.—The treatment of asthma is divided into two parts—(1) during the paroyxsm, and (2) during the interval.

Various remedies have been advocated for cutting short the paroxysm, and there is no end to the nostrums for curing asthma.

The two best remedies for treating asthma during the paroxysm are the sodium nitrite and morphine. The dose of the so-

dium nitrite for an adult is about three grains. (℞ Pulv. sodii nitrit., gr. xxiv.; aquæ, ℥ i. M. Sig. ℥ i. at once and repeat in half an hour once or twice if necessary.) In recent cases where spasm is predominant and before organic change, due to inflammatory exudation in the tubes from repeated attacks, has taken place, the sodium nitrite rarely fails to relieve the patient in a few minutes. In old cases it does not completely relieve the patient, but even then it is often beneficial—as much or more so than the vaunted Datura Stramonium, Grindelia robusta, and many other remedies the long list of which it is impossible to remember. Where the heart is weak, five to ten minims of Magendie's solution of the sulphate of morphia, with or without atropin, will often cut short the paroxysm. A very convenient form of giving the morphine is to have the tablets already prepared, each being of the strength of $\frac{1}{6}$ grain morphine and $\frac{1}{120}$ grain of atropine.

Instead of sodium nitrite, five drops of the amyl nitrite, or less, in a teaspoonful of brandy, sometimes gives relief. The object of the nitrite preparations is to relax spasm and this they do. To Mr. Fraser, of Edinburgh, Scotland, is due the credit of introducing the nitrite preparations instead of the nitrates in the treatment of this disease.

Saltpetre or nitrate of potash, when burnt and inhaled, acts well in some cases. A good way is to soak strips of blotting paper in a saturated solution of saltpetre and let them dry for use. During an attack, throw some of these strips on a shovel of live coals and inhale the fumes. The fumes are not unlikely the nitrite, rather than the nitrate, of potash.

Sometimes, of course, everything fails. Himrod's powder, though a patent remedy, is a good one in many cases, and probably contains saltpetre. If it were composed of the sodium or potassium nitrite, I have no doubt that it would be a much better remedy.

During the interval, steps are to be taken to eradicate the disease. If the case be one of peptic asthma simply, regulating the diet and avoiding the drinking of such fluids and eating of such foods, and quantities, as are known by experience to bring on an attack, will be sufficient to eradicate the disease.

It is well to bear in mind, however, that the tendency of any kind of asthma is to become bronchitic. When this happens, topical remedies are no longer available. In bronchial asthma we treat the chronic bronchitis. For this reason iodide of potassium is the remedy, with or without arsenic. If the drugs are well borne, they should be persisted in for a long time, say two years. (℞ Pulv. potass. iodidi, ℈ iv.; Fowler's solution of arsenic, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ℥ i. ter die after meals.) In

many quack remedies and so-called sure cures for asthma, the iodide of potassium has been found to be the chief ingredient. Muriate of ammonia may also be given in alternation with iodide of potassium. The dose of the muriate should not be more than two to five grains ter die, and the iodide may be increased from five to ten grains ter die.

Naso-pharyngeal asthma can be reached directly through the nares. Polypi are to be extracted, naso-pharyngeal inflammation to be cured by chromic-acid applications, galvano-cautery, and the like, and the inferior turbinated bone may be extracted if necessary. The cure will be radical if the patient is seen in time, and has not already got a bronchitic asthma which would be out of reach.

Meantime, in old cases at least, the chronic bronchitis must not only be treated by iodide of potassium as already indicated, but the patient should also change climate, if necessary, in order to eradicate the bronchitis, as already mentioned when speaking of that disease.

Pulmonary Emphysema.

Etiology and Pathology.—Pulmonary emphysema is abnormal inflation of the lungs, and is of two classes, interstitial and vesicular. In the first, air escapes through rupture into the interstitial pulmonary tissue; in the second, the air cells are abnormally distended.

Interstitial emphysema is also called inter-lobular, extra-vesicular, and extra-alveolar emphysema, and occurs from rupture of the walls of the air cells, as in the expiratory efforts of violent coughing, in whooping-cough for example, also from parturient efforts, blows, falls, and wounds of the lungs from various causes. Or it may occur in connection with softening and breaking down of tubercle. The air escapes into the connective tissue of the lungs, between the lobules and under the pleuræ. Sometimes it passes through the posterior mediastinum into the subcutaneous tissues of the neck, face, and sides, where it crepitates under the hand during palpation. It is impossible to make a diagnosis unless the air reaches the subcutaneous tissue, and in no case is there any special treatment for it. The escaped air soon becomes absorbed.

Vesicular emphysema, or alveolar emphysema, consists of two varieties—vicarious and general. Vicarious, complimentary, or compensating emphysema affects one lung or part of a lung from overwork due to crippling of the other lung or part of a lung.

In old pleurisy, for instance, where extensive effusion or adhesions renders one side almost immovable, the other lung becomes vicariously emphysematous from overwork. In lobular

pneumonia or collapse of some air cells, other air cells near by may become emphysematous in the same way. Even in acute lobar pneumonia, the unaffected lobes of the same side may become temporarily or acutely emphysematous to a certain extent. In pulmonary consumption also, crippling of certain areas of lung tissue may give rise to slight emphysema of others; not marked, however, as respiration in phthisis is usually shallow and rapid, and the volume of blood much diminished.

All vicarious emphysema is evidently brought about by over-inspiration. There is no obstruction to expiration necessarily, and the patient endeavors to inhale as much air as if both lungs were intact. Hence inspiration is overdone, with consequent abnormal distention of the remaining vesicles. The resulting vicarious emphysema will be acute or chronic according to the condition that gives rise to it.

The second class of vesicular or alveolar emphysema is the general or substantive form, and this may be of two varieties—small-lunged, and large-lunged. Small-lunged, atrophous, phthisical, or senile, vesicular emphysema is usually found among those well advanced in years, and sometimes follows large-lunged emphysema. The volume of the lungs becomes much reduced, owing to atrophy of the inter-cellular tissue, though the air cells have become larger, in many cases, by coalescence. This condition is simply one belonging to old age. In other cases emphysematous cells are scattered about in both lungs in old cases of fibroid phthisis, but they are generally vicarious.

General large-lunged or hypertrophous vesicular emphysema remains for consideration.

It is a very serious disease and occurs in men more frequently than women, the former being more exposed to the causes; and in northern, cold, changeable climates than in warm regions of a uniform temperature, owing, no doubt, to the greater prevalence of bronchitis and asthma in the former. Owing to the length of time required to produce the disease, it is rarely seen before thirty years or middle life. Fat people appear to be more predisposed to it than thin. Heredity undoubtedly plays an important part among predisposing causes.

General hypertrophous emphysema is brought about in one of three ways, given the hereditary predisposition, which consists in an inherent weakness of the walls of the air cells and lung tissue, by which they yield more readily than in other cases. The three ways referred to are (1) obstructed forcible expiration, (2) forcible inspiration, and (3) deformity of the chest.

Obstructed forcible expiratory effort is by far the most frequent cause. For this reason it is found among laborers who are engaged habitually in heavy lifting or straining. In this act the

glottis is closed, and the abdominal muscles contracted upon the intestines with great power, which forces the diaphragm up and compresses the air into the upper lobes of the lungs, so that in such cases the upper lobes are chiefly affected—particularly, according to Flint, the left. In the same way players on wind instruments and persons affected with chronic bronchitis, especially the dry bronchitis associated with gout, in which violent fits of coughing habitually occur, may have the disease. The act of coughing simply consists of more or less sudden and violent expiratory efforts with the glottis closed. Children not infrequently have more or less temporary general emphysema from whooping-cough.

Secondly, general hypertrophous emphysema may in some cases be due to forcible inspiration. Here a chronic bronchitis extending to the smaller tubes precedes the emphysema instead of being developed afterward. Inspiration being a greater force than expiration as far as the air cells are concerned, the air passes in beyond the mucous obstruction in the tubes more easily than it passes out, so that by this valve-like operation the air accumulates in the air cells and distends them. In such cases the lower part of the thorax is enlarged as well as the upper. These cases occur in those who work among irritating gases, and are also associated with asthma.

Finally in the third place, according to Freund, the characteristic barrel shape of the chest occurs first and the emphysema second, the lungs being simply distended to fill up the vacuum thus formed. Such cases, however, common in Germany, are very rare in America, if indeed they ever occur. In some cases of deformity of the chest—due to rickets, for instance, or curvature of the spine from some cause—a local emphysema may occur, one lung or part of a lung becoming distended to fill out one side or portion of the thoracic cavity enlarged by bulging.

Whatever be the mode of development in any particular case, heredity, as already stated, is probably the great predisposing cause.

Symptoms.—As bronchitis coexists with emphysema in the great majority of cases, cough and expectoration are present. The patient is better sometimes than at others according as the weather be favorable or not. In time dyspnœa becomes noticeable, and is more and more distressing as the disease progresses.

There are three principal causes of the dyspnœa of emphysema—(1) rigid dilatation of the thorax, (2) loss of capillary area in the lungs, and (3) crippling of the diaphragm.

In the first place, rigid dilatation of the thorax is due to loss of resiliency of lung tissue. The costal cartilages, also, have become permanently elevated, everted, and hardened, the spaces between

them being widened. They have lost their elastic recoil, and these causes taken together fix the chest in a state of rigid dilatation. On account of this, air is not expelled properly, and impure air, therefore, accumulates in the lungs and causes dyspnœa.

Secondly, the loss of capillary area is a factor in the production of dyspnœa in this disease. Many capillary blood-vessels in the lungs become obliterated and ruptured by over-stretching. Indeed, many of the alveolar septa, on which clusters of these capillaries hang, undergo wasting and perforation, and finally disappear. From loss of capillary area, the blood is brought in less quantity in contact with the air in the cells, impure as it is. Moreover, as the blood now has fewer channels left for it in which to pass through the lungs, the right ventricle of the heart has more work thrown back on it, and hence it becomes enlarged.

Lastly, crippling of the diaphragm is probably the most important factor in the production of dyspnœa in this disease. The volume of the lungs being increased, sometimes enormously, the diaphragm is permanently pushed down, as is also the heart. Owing to more or less gastro-intestinal catarrh from passive hyperæmia due to obstruction to the venous circulation, there is always more or less dyspepsia, with gas in the stomach. The diaphragm, the most important muscle of respiration that a man possesses, is thus put between two splints. From want of use it becomes atrophied.

As the disease progresses, signs of cardiac failure begin to appear. Owing to obstruction to the pulmonary circulation from capillary obliteration, the right ventricle becomes dilated and its walls hypertrophied. Presently hypertrophy ceases to compensate for dilatation, the tricuspid valves become relatively insufficient from mechanical separation due to enlargement, and then jugular pulsation and cardiac dropsy appear. The face becomes more or less cyanotic. Dyspnœa is extreme, and the patient dies of heart failure or œdema of the lungs. Sometimes death is due to some intercurrent disease. In some cases the kidneys become affected. Not infrequently albumin to a slight degree is found in the urine owing to renal congestion. The liver is in a state of chronic congestion and pathologically becomes what is termed the nutmeg liver.

Physical Signs.—On inspection, the countenance is seen to be more or less cyanotic in proportion to the extent and progress of the disease. In the latter stages, jugular pulsation, due to tricuspid insufficiency, may be observed at the root of the neck, especially on the patient's right side. As obstructed forcible expiration is the most frequent cause, so the upper intercostal spaces are usually seen to be widened, owing to the fixed elevation and eversion of the costal cartilages and ribs. The upper part of the

sternum is prominent, bulging forward, so as to increase the antero-posterior or sterno-vertebral diameter. The shoulders are elevated and brought forward owing to habitual dyspnœa, and the spinal column is more or less anteriorly curved. The whole makes up the so-called barrel-shaped chest. Where the disease has been caused by forced inspiration, the lower portion of the thorax is also enlarged with widening of the lower intercostal spaces also.

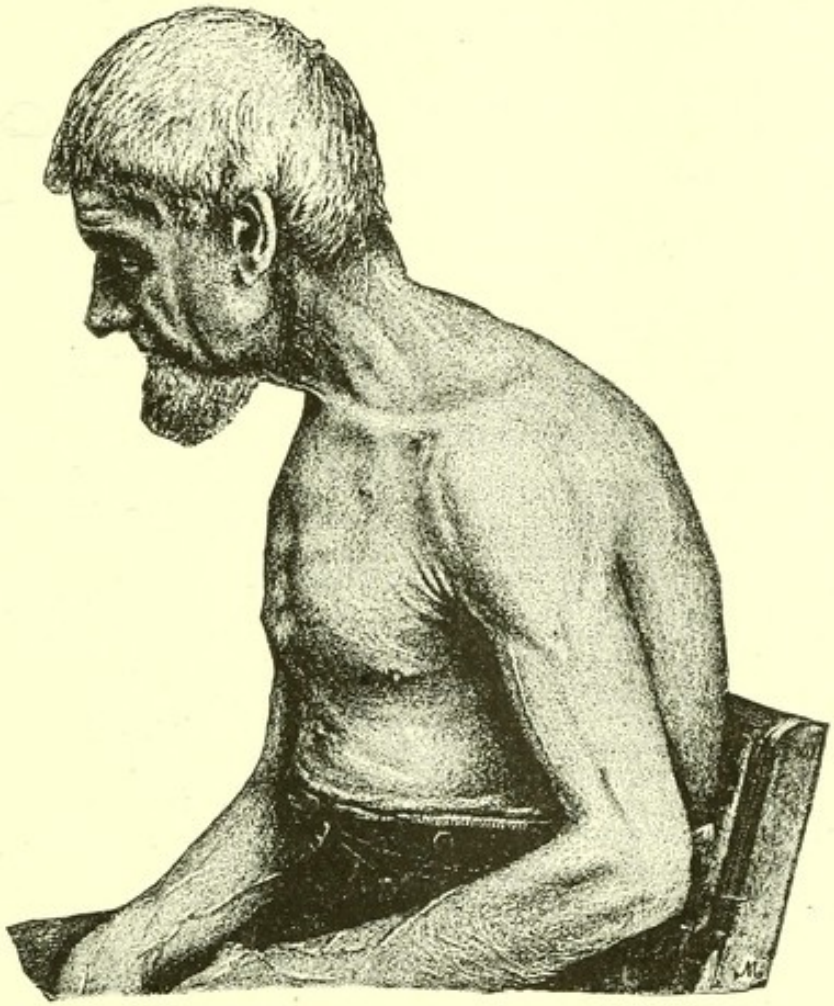


FIG. 11.—GENERAL HYPERTROPHOUS VESICULAR EMPHYSEMA. (From the Author's "Physical Diagnosis.")

Epigastric pulsation, due to enlarged and lowered right ventricle, is usually noticeable. The apex beat is generally carried downward and outward, but frequently cannot be found, being buried under lung tissue. During forced respiration the thorax moves up and down more or less like a fixed case, instead of expanding and contracting as in health. During the effort of deep inspiration the supra-clavicular spaces may be drawn in, the lungs not expanding any more, while the thoracic walls are raised up. During violent coughing a tumor is sometimes seen to rise up from each of the depressed supra-clavicular fossæ. This, according to Niemeyer, is due to the sudden filling up of the sinuses of the jugular veins during coughing, which immediately

become empty when the cough ceases. It is more probably due to lung tissue suddenly distended upward during violent coughing.

The lungs, owing to distention of the air cells, become more positive refractors or diffusors of sound than in health. Hence on palpation the vocal fremitus is usually diminished, and sometimes even absent. Moreover, owing to bronchitis, which is almost invariably present in emphysema, either as a cause of the disease or result of the obstruction to the pulmonary circulation, the bronchial tubes may be more or less obstructed with mucus, thus rendering them imperfect conveyors of sound. Rigidity of the chest walls and loss of resiliency of lung tissue also lessen the vibrations.

If the bronchitis gives rise to such complications as peri-bronchial thickening, with spots and threads of interstitial induration, the fremitus will be increased over corresponding localities, on account of the more homogeneous and better conducting medium for the voice sound (see Solidified Lung Tissue).

Epigastric pulsation is usually felt, and sometimes the apex beat of the heart is displaced down and out. According to some authors it is carried inward toward the epigastrium, but it is difficult to see how it could get there unless the heart be raised up. The cardiac pulsations, and consequently the radial pulse, are often intermittent in this disease, owing perhaps to the extra work thrown on the heart, so that it has to rest every now and then. Dyspepsia, due to gastric venous congestion, and acting reflexly along the pneumogastric nerve, may also cause it.

Resonance is exaggerated on percussion, especially over the upper lobes in front and particularly on the patient's left side. Flint terms this resonance vesiculo-tympanitic; that is to say, it is neither purely vesicular nor tympanitic, but a mixture of the two. Biermer, of Zurich, Switzerland, calls it band-box resonance. This is especially the case over the lower posterior and left lateral regions. The pitch of the percussion note in this disease is, according to some authors, high, while others maintain that it is low. The truth is the pitch varies in different cases according to the tension of the walls and the volume of air contained. If the walls are tense without much increase in volume of air, the pitch will be high. If volume is greater in proportion to tension, the pitch will be low. But the quality will be the same in all cases. Variations in pitch, while the quality is the same, may be simply illustrated in a number of ways. The base drum, for instance, yields a lower-pitched tympanicity than the snare drum, yet the quality of tympanicity is the same for both. Drums of the same size with equal tension elicit tympanicity on percussion, and the pitch of the note will be the same for all. But if the tension varies, the pitch will differ accordingly, greater

tension producing higher pitch than if the tension be diminished. The same drum will give a higher or lower pitched note on percussion, according as the head is tightened or loosened. The quality of the note in every case, however, will be tympanitic.

The superficial area of cardiac dulness is diminished or may be absent altogether, only deep dulness on forcible percussion remaining.

In certain cases of atrophous emphysema in advanced life, with hardened costal cartilages and peri-bronchial thickening from long-continued bronchitis, the percussion note in some places may be dull or even wooden in character, especially if the percussion be gentle.

On auscultation, it will be observed that, the lungs being more positive refractors of sound even than in health, the respiratory murmur will be weakened; and if the bronchial tubes are, in addition, obstructed by mucus owing to the bronchitis usually present, the respiratory murmur may be absent. Not unfrequently it is obscured by bronchial râles of various kinds. When the murmur is audible, the inspiration is somewhat shorter than in health by being deferred, that is, the first part of inspiration is not heard, being too feeble. It is somewhat lowered in pitch usually and is continuous with expiration, which is often prolonged, not so much from obstruction as from the weakening of the expiratory forces. The diaphragm is permanently depressed, the pulmonary tissue has lost its resiliency and the costal cartilages their elastic recoil. These expiratory forces have become so weakened, therefore, that expiration has to be performed chiefly by contraction of the muscular coats of the bronchial tubes, which are non-striated or involuntary muscular tissue, and have become more or less hypertrophied. Consequently expiration is prolonged, but otherwise it is relatively the same as in health, being lower in pitch than inspiration and blowing in quality. Should spasm of the tubes exist due to asthma, with which the disease is frequently associated, the expiration will be about four times longer than inspiration, otherwise it will not be so much prolonged.

Owing to the distended condition of the lungs, the heart sounds are usually muffled and feeble. But on account of hypertrophy of the right ventricle, the second sound of the heart may sometimes be heard more distinctly (accentuated) over the pulmonary than the aortic inter-space. As dilatation of the ventricle progresses, however, the accentuation becomes less. Should tricuspid insufficiency occur, the corresponding murmur may be heard over the ensiform cartilage (see Tricuspid Regurgitation).

Bronchial râles of various kinds, as already stated, may be present in varying quantity.

Pectorophony (vocal resonance) is diminished, as a rule, for the same reasons that the fremitus is less. When the vocal resonance and fremitus are increased or vary, it is due to some complication, as stated when speaking of palpation.

Diagnosis.—Pneumothorax, or air in the pleural cavity, is the only disease that might be mistaken for emphysema, but even here a careful attention to the physical signs and history of the case renders the diagnosis usually easy. General vesicular emphysema affects both lungs, whereas pneumothorax is nearly always unilateral. Emphysema is developed gradually, pneumothorax comes on suddenly. In the latter disease exaggerated respiratory movements are observed on the unaffected side, while these movements on the affected side are diminished or almost entirely absent, with more or less bulging on that side. In general emphysema there are the barrel-shaped deformity of the chest, with the thoracic walls moving up and down as a solid case during respiration. In general emphysema the heart is displaced downward and usually outward, with epigastric pulsation due to the lowered and enlarged right ventricle. In pneumothorax the heart is displaced laterally, as a rule, and in a direction opposite to the pressure. Percussion yields tympanicity over pneumothorax, whereas the resonance is only exaggerated (vesiculotympanitic, band-box) and distributed over both sides of the chest in general emphysema. On auscultation, the respiratory murmur is changed in rhythm in emphysema, and weakened, but in pneumothorax it is usually absent over the affected part. Pneumothorax from any cause is always an acute affection, coming on suddenly and lasting only a few hours or days. Effusion then takes place giving rise to pneumo-hydrothorax (or pneumopyothorax), to be detected by the splashing sound heard on succussion. Emphysema is more slowly developed, is usually chronic, and, for these reasons and the physical signs already mentioned, vicarious emphysema affecting one side is readily distinguished from pneumothorax.

Pleurisy, pneumonia, and hydrothorax, although causing dyspnœa, also yield dulness on percussion and other physical signs altogether different from those of emphysema.

In phthisis there is also dyspnœa, but the signs of consolidation of lung tissue are entirely different from those of emphysema.

Prognosis.—The prognosis of chronic emphysema must be regarded as unfavorable. The disease varies in its course and duration in different cases. It is, however, incurable. And although it rarely causes death of itself, it, however, leads to other complications that place the patient in an unfavorable condition. Crippling of the heart is a serious result. The patient besides having the liver and kidneys congested is also liable to œdema of the lungs. Altogether it is a very serious disease.

Treatment.—For the emphysema itself, the pneumatic cabinet gives the best results. The benefit gained by its use is dependent upon the pulmonary gymnastics, the exercise given to the chest walls and developing the weakened expiratory forces. It resembles passive motion applied to an anchylosed joint. Hill-climbing would do the same thing, as for pleuritic adhesions, but in emphysema the patient is incapable of performing such exercise, owing to the great dyspnœa and crippling of the heart.

Accompanying conditions are also to be treated. Of these, chronic bronchitis, which is usually present, demands attention, as has already been described, and to which subject the reader is referred. The pneumatic cabinet is also useful in this connection, the treating of the bronchitis.

The dyspepsia due to passive gastro-intestinal hyperæmia also needs attention from time to time. As a heart tonic, digitalis is one of the best. The tincture may be given in combination with some cough mixture, or remedy for the dyspepsia, according to which is the more necessary for the time being. It often gives relief when mixed with rhubarb and soda. (℞ Tinct. digitalis, ʒ i.; pulv. sodii bicarb., pulv. rhei, āā ℈ ij.; aquæ, ad fl. ℥ ij. M. Sig. ʒ i. ter die.) Should cardiac dropsy occur, the infuson of digitalis with acetate of potash may be given. (℞ Infusi digitalis, ℥ vi.; pulv. potass. acetat., ʒ ij. M. Sig. Tablespoonful ter die.) In case the digitalis is not well borne, small doses of the tinct. strophanthus may be used instead. In all cases injurious influences, such as would be likely to increase the bronchitis or operate against the patient's welfare in any way, should be removed if possible. The diet should be nutritious as well as easily digested, and the patient's habits should be regular and within proper bounds.

Atelectasis.

Etiology and Pathology.—Atelectasis, apneumatosis, or pulmonary collapse is collapse or imperfect dilatation of the pulmonary air cells, and is the very opposite condition to emphysema.

Atelectasis is usually situated at the periphery and not the interior of the lungs, but otherwise the site and extent of area differ according to the cause in each particular case. The disease may be congenital or acquired.

Congenital Atelectasis.—In this case the fœtal lungs are in a physiological state of atelectasis, but this disappears as soon as the child is born and breathes freely, all the conditions being favorable. Anything, therefore, that interferes with the respiration of the child at birth may cause more or less congenital atelectasis. Among these causes may be mentioned premature birth,

in which case there is not only weakness of the muscles of respiration, but also a want of irritability of the respiratory centre. Accidental plugging of the respiratory tract with mucus, binding the new-born child too tightly so that the movements of the diaphragm are interfered with, and prolonged and complicated labor, including accidents to the cord, may give rise to congenital atelectasis.

Acquired Atelectasis.—This condition may be due to obstruction in the bronchial tubes, compression of the lungs, or it may be marasmic. Atelectasis due to obstruction in the bronchi is sometimes the result, as we have seen, of capillary bronchitis occurring in weak infants. The calibres of the tubes become diminished by the swollen mucous membrane, and furthermore obstructed by inflammatory exudation. Owing to weakness of the inspiratory muscles of such feeble infants, the obstruction is not overcome by inspiration, and the air in the cells becomes absorbed, the oyxgen first, and then the carbonic acid. Collapse of the air cells results. But where the child is strong enough, or among adults, emphysema results instead of atelectasis. In the latter case inspiration would be strong enough to overcome the obstruction, but the air could not escape—expiration being weaker than inspiration, with regard to the air cells. In these cases of acquired atelectasis, the collapse of air cells is found on both sides over the lower and posterior parts of the lungs, and extending usually in a narrow space up by the sides of the spinal column, disappearing toward the apices. Other causes of obstruction are blood clots or fibrinous exudations in the tubes, bronchial stricture, and pressure on a tube by enlarged lymphatics or aneurismal or other tumors. The atelectasis would then occur in areas corresponding to the distribution of the obstructed tubes.

Secondly, acquired atelectasis may be due to compression of the periphery of the lungs, as in pleurisy or pericarditis, with effusion, enlargement of the heart, aneurismal or other tumors, hydrothorax, and deformities. Here the site of the atelectasis will, of course, depend on the cause in each case.

Finally, we may have what some authors term marasmic atelectasis. Whatever diminishes the irritability of the respiratory centre, and weakens the muscles of respiration, will contribute to the atelectatic state. Hence we sometimes find it in typhoid or other prolonged and wasting fevers, paralysis, and brain affections. In such cases the position of the body should not be allowed to remain unchanged during too great a length of time. Otherwise certain parts of pulmonary tissue, from want of respiratory movement, become more or less devoid of air, which has become partly or wholly absorbed leaving atelectasis. The most dependent portion of the lungs are the most frequently affected

in marasmic atelectasis, so that this form may also be termed hypostatic atelectasis. The symptoms of any form of atelectasis are those of the cause producing it.

Physical Signs.—First, with regard to congenital atelectasis. On inspection there are observed retraction of the epigastrium, and sinking in of the intercostal spaces on inspiration. This is because the lungs fail to expand sufficiently to fill up the thoracic cavity during inspiration, and hence the yielding portions of the chest walls are sucked in by that act. The breathing is rapid and shallow, with the interval between inspiration and expiration, instead of between expiration and inspiration as it is in health.

Palpation shows no increase of vocal fremitus as a rule, the collapsed air cells still acting as a refracting medium of sound, thus differing from solidification due to inflammation or compression when it conducts sound with corresponding increase of vocal fremitus.

On gentle percussion, there is some dulness, but not as much as in case of solidification. If atelectasis be extensive, slight tympanicity from bronchial tubes may result.

On auscultation, the respiratory murmur is weakened or suppressed, instead of being bronchial as would be the case in solidification from inflammation or compression. This is also due to the fact that the collapsed cells still refract sound instead of conducting it. Hence also pectorophony or vocal resonance is also diminished or weakened. Occasionally, according to Walshe, there is a little dry rhonchus, probably due to the bronchitis. Secondly, in acquired atelectasis, the physical signs depend on the cause. In obstruction or marasmic atelectasis there would be the signs already mentioned for congenital atelectasis, with the addition usually of various râles owing to the bronchitis present. Obstructions would be an additional cause for weakened or diminished pectorophony, fremitus, and respiratory murmur.

In compression atelectasis, however, the physical signs are more like those of solidified lung tissue, as in lobar pneumonia. Palpation in such cases, therefore, shows increased vocal fremitus over the compressed lung, dulness on percussion, and on auscultation bronchial breathing and bronchophony. The physical signs of the cause of the compression will also be present, as pleurisy with effusion, aneurism, and so on.

Diagnosis.—Pneumonia is attended with fever, atelectasis is not. Retraction of the epigastrium and intercostal spaces during inspiration are observed in atelectasis, but not in pneumonia. The bronchial breathing and bronchophony of pneumonia are not observed in any but compression atelectasis, and then the

cause of the compression will be apparent. The dulness on percussion in any form of atelectasis except that due to compression is generally very slight and symmetrical. In lobar pneumonia it is unilateral, and in lobular pneumonia a spot of dulness on one side does not generally, according to Loomis, have its exact counterpart on the opposite side, but the dulness is alike on both sides in atelectasis.

Miliary pulmonary tuberculosis, according to Graily Hewitt, may be mistaken for atelectasis, but the former is accompanied by fever and emaciation, and the parents perhaps have a tuberculous history.

Hemorrhagic infarction gives a different etiology, and, besides percussion dulness and râles, there is bloody expectoration.

Compression atelectasis might be mistaken for pleurisy with effusion; indeed, the latter is often the cause of the former. But the effusion takes place at the bottom of the thorax, compression of the lung above. Over the effusion there is a well-marked line of dulness or flatness, with diminution or absence of the respiratory murmur, vocal fremitus, and resonance; and these signs often change with position of the patient. Over the compressed lung the fremitus and resonance would be increased as in solidified lung tissue. The breathing, instead of being absent, also, would be bronchial and there would be bronchophony. To set all doubt at rest, exploratory puncture with the hypodermic needle may be resorted to.

Prognosis.—In case of a small area of atelectasis the patient usually recovers. Where, however, the atelectasis is extensive and persistent, the outlook is bad, and in such cases children generally die. Where the atelectasis is due to compression, the prognosis depends upon the cause. If the latter can be removed, the sooner it is done the more hope there is of complete restoration of the compressed lung.

Treatment.—When a child is born and does not breathe well, it should be gently spanked and dipped alternately in warm and cold water. As soon as it begins to cry loudly, all danger of atelectasis is over. Sometimes artificial respiration has to be performed. The diaphragm should not be hampered, in its action, by tight bandaging.

But where the atelectasis has been acquired, there is little to be done but treat the original cause. When due to obstruction or compression, the cause should be sought for and removed if possible. Thus, in pleurisy with effusion, for instance, the fluid may be drawn off according to the rules laid down elsewhere.

Congestion of the Lungs.

Etiology and Pathology.—Congestion of the lungs or pulmonary hyperæmia is excess of blood in the lungs, and it may be one of three varieties—active, passive, and hypostatic.

Active congestion, hyperæmia, affluxion, or fluxion of the lungs may affect any part of the lungs. It may be due to direct irritation of lung tissue either from the action of cold, or inhalation of irritants or anything that will cause inflammation. Or it may be due to excessive heart's action from any cause, like hypertrophy, mental emotion, stimulants, or violent efforts. It also occurs as a collateral fluxion, some capillaries being over distended due to obstruction in others, as seen in the immediate vicinity of inflammatory foci, as pneumonia, for instance. It may also be caused by rarefaction of air in the lungs, as occurs in croup on account of violent efforts at inspiration with the glottis obstructed.

Passive congestion of the lungs may be due to mechanical cause, as in mitral obstruction or regurgitation. In the former case the blood is prevented from escaping from the lungs, and in the latter it is regurgitated back upon the lungs. In either case the pulmonary capillaries are over-distended. This form of congestion often leads to brown induration of the lungs or cardiac pneumonia so-called. The liver also becomes congested, and in time what is known as the nutmeg liver results. Passive gastro-intestinal hyperæmia and congestion of the kidneys also follow. Besides such mechanical obstruction due to valvular lesion, enfeebled heart's action will also favor the occurrence of passive congestion of the lungs, as is observed in typhiod fever, puerperal fever, pyæmia, and certain centric nervous diseases. In these cases the left heart, having more work to do than the right, fails to empty the pulmonary capillaries as rapidly as they are filled. Hence they become congested. This form of congestion is also known as splenization of the lung, and is associated with interstitial pulmonary œdema.

Hypostatic congestion of the lungs is a stasis of the under part, or a congestion affecting the most dependent parts, due to retention of the body in one position too long as may occur in typhoid fever, paraylsis, and fractures, especially among the aged. As the patient generally lies on the back, hypostatic congestion is usually found posteriorly and bilaterally; that is, in both lower lobes. It is in reality a passive congestion, but has an additional cause for its production, which is, as already stated, the retention of the body in one position too long. Hence, in such cases, the necessity for shifting the position of the patient at times.

Symptoms.—Dyspnœa and cough are the chief symptoms of

congestion of the lungs. The expectoration is watery and tinged with blood. In some cases cyanosis is observed. The patient generally sits up to breathe more easily, but in spite of this the breathing is often labored and even panting. Sometimes there is a feeling of tightness across the chest as if suffocation would occur. Fever may be present to some extent, but it is usually absent. In other cases there are no symptoms, and the case may readily be overlooked. Such cases occur in the course of typhoid fever, for instance, where irritability of the respiratory centre has become so much diminished that the patient manifests no symptom of the real condition. Only by shifting the position from time to time can the congestion be avoided, and it is to be made out by physical examination only.

Physical Signs.—These are similar to those of lobar pneumonia in the first stage and before any exudation has taken place.

On inspection, dyspnœa is usually observed, and it will be marked in proportion to the amount of congestion. Owing to want of irritability of the respiratory centre in some cases, as in typhoid fever or other protracted and severe illness, dyspnœa may not be noticeable. In both passive and hypostatic congestion of the lungs, more or less cyanosis is often observed. The patient prefers the sitting to the recumbent posture usually, as breathing is easier in that position.

On palpation, the vocal fremitus is normal or diminished. Exactly why fremitus should be diminished or normal in pulmonary congestion is difficult to explain satisfactorily. It is probably on account of the air cells being in a somewhat emphysematous condition. The mucous membrane of the air cells is somewhat tumefied and the entrance into the air cells is smaller than normal. But as inspiration is a greater force than expiration so far as the air cells are concerned, the air enters more readily than it escapes, as in asthma. For that reason there is temporary emphysema of the congested part, with corresponding diminution of the fremitus, if indeed it be affected at all.

On percussion, the resonance is normal, or if there be any change it is slightly exaggerated, as might be expected, from the slightly emphysematous condition of the air cells. As rare exceptions, tympanicity and cracked-pot resonance may be obtained, but would not be due to the congestion, but to the exceptional and marked tension of the pulmonary tissue with very thin chest walls. As a rule, the percussion resonance is either normal or slightly exaggerated, but not dull as in œdema and solidification.

On auscultation, the respiratory murmur is normal or usually weakened, as might be expected in an emphysematous condition. Expiration is sometimes slightly prolonged. Pectorophony is normal or diminished, like the fremitus. The only adventitious

sound present and due to the congestion would be a very fine sibilant râle heard on expiration, and this is generally absent. It is really not present unless the congestion extends upward and affects the finer bronchi as well as the air cells. Any other adventitious sound would indicate some complication, as œdema or the occurrence of inflammatory exudation, both of which would give rise to the crepitant râle to be heard at the end of inspiration.

Diagnosis.—This is based on the sudden occurrence of dyspnœa and anxiety, with the positive and negative physical signs enumerated. There are slightly increased circular measurement of the chest, due to moderate distention of air cells, slightly exaggerated percussion resonance, and the absence of signs of pleurisy or pneumonia.

Prognosis.—Pulmonary congestion is a serious affection and requires prompt action. Though the patient may escape repeatedly, yet, on account of the original cause, in passive congestion there is always danger of its recurrence. In active congestion the patient usually recovers quickly or else some serious disease may follow, as pneumonia or excessive hemorrhage.

Treatment.—This differs according to the kind of congestion we have to deal with. In active congestion of the lungs the indications are to relieve the pressure in the pulmonary capillaries without delay. For this purpose an active purge should be given at once, and cups be placed all over the chest where space can be found, especially on the back. The best purge is about twenty grains of calomel with ten of jalap if the patient be vigorous. A drachm of pulvis purgans is also an excellent remedy. In place of these a half-grain of elaterium or a drop of croton oil may be given, but the calomel and jalap are the most trustworthy. The cups should be applied with fire if intended to be efficacious. Those applied by means of a rubber ball attached to one end are of little use in these cases, as the suction force is usually small. Wet cups are unnecessary. Bleeding from the arm may do good in some cases, but the cathartic and dry cups are usually sufficient.

So far as counter-irritation is concerned, cups have already been referred to as being most useful. Blisters are rarely if ever indicated; but the application of mustard, with its rapid counter-irritant effect, often aids greatly in bringing relief. Extensive applications, however, are alone of use. A small mustard plaster to the chest, for instance, is a waste of trouble and time. The whole chest should be covered with a flannel wrung out of mustard water, so as to redden a large area. In many instances I have used a newspaper. Separate the leaves out and place it on a table. Then sprinkle powdered mustard over it and with

the fingers scatter some drops of water until the paper is damp. Fold it up and wrap it over the chest. In a few minutes the patient is sensible of an outward burning feeling, much to the relief of the hitherto inward tightness and oppression.

In passive congestion, cathartics are also indicated, especially if œdema of the lung complicate the situation. If the patient be feeble, however, Fothergill's pills, which unload the liver and cause the skin to act promptly, as well as being diuretic, are indicated. (℞ Calomel, pulv. scillæ rad., pulv. digitalis, āā gr. vi. M. ft. pil. No. vi. Sig. One every three hours until they purge.) In some cases these pills are to be followed by a saline cathartic in order to avoid salivation, and this must be watched for and avoided. In passive congestion, digitalis is an indispensable remedy. The infusion freshly made, perhaps, is the best preparation for the time being. It may be combined with acetate of potash and sweet spirits of nitre. (℞ Pulv. potass. acetat., spts. æther. nitrosi, āā ℥ ss.; infusi digitalis, q.s. ad ℥ vi. M. Sig. Tablespoonful ter die.) This treatment should be followed up for several days or more until dyspnœa ceases.

Meantime stimulants, for passive congestion, are not infrequently indicated; while relieving the congestion by cathartics and the like, the patient's strength is to be looked after. A feeble heart must be supported, otherwise congestion soon becomes œdema or inflammation. Milk punch moderate in strength and quantity should be given, both as an article of food as well as a cardiac stimulant. Particularly is this treatment indicated in typhoid fever and in many cases of grippe, such as we have experienced lately.

In hypostatic congestion, besides the treatment already indicated, moving and shifting the position of the patient is also of the first importance, both as a prophylactic and curative method.

The treatment of brown induration and splenization of the lungs requires no separate mention. The causes of these conditions are to be ascertained and the treatment directed accordingly.

Œdema of the Lungs.

Etiology and Pathology.—Œdema of the lungs, dropsy of the lungs, or pulmonary œdema is the transudation of serum into the air cells. In some cases the fluid extends into the smaller bronchi, and in others the interstitial tissue may become affected. As a result of the last condition, pulmonary splenization, as it is termed by Loomis, occurs.

The transuded fluid is colorless usually, but sometimes it is rose-colored from being tinged with blood.

Œdema of the lungs is not a primary affection, but is al-

ways secondary to, and symtomatic of, some other condition, general dropsy, for instance, or congestion from some of the causes already stated. As a part of general dropsy, transudation of the watery parts of the blood takes place, not from the pressure of congestion so much as from the morbidly increased permeability of the blood-vessels.

The location of the œdema will be influenced by the cause in each case. It may be confined to a small spot at any part of one lung, or it may extend over a lobe or entire lung, or even both lungs. Generally, however, it is found low down posteriorly on both sides, as the causes which place it there are most frequently passive and hypostatic congestion, and also because it is more readily discovered there than in other localities. It may evidently occur in both sexes and at all ages.

Symptoms.—Dyspnœa is the chief symptom of œdema of the lungs. In many cases there is no fever whatever. The occurrence of fever would, in fact, be an indication of inflammation or some complication, rather than the disease in question. The pulse, however, is usually feeble. Sometimes it is also increased in frequency, though not necessarily so. The dyspnœa generally comes on suddenly, as the œdema itself is usually of sudden advent. Respiration is often labored, the respiratory movements are increased in frequency, and the patient often complains of a feeling of suffocation. These sensations are all increased on exertion or in attempting to walk up hill or against the wind. The cough is not infrequently attended with watery and blood-stained expectoration. Cyanosis and coldness of the surface and extremities are not infrequently present.

Physical Signs.—These are as follows. Inspection, as in congestion, shows more or less dyspnœa and cyanosis, according to the extent of the œdema. The dyspnœa is more urgent than in congestion for the same amount of lung tissue involved. The patient usually prefers the sitting posture.

On palpation, the vocal fremitus is generally unchanged, as the air cells still contain some air. The fremitus may even be weakened, as in congestion. According to Walshe, however, the fremitus, in well-marked cases, may be slightly increased.

Percussion elicits more or less dulness as a rule. Before the œdema is well marked, the air cells may be slightly more distended with air than before, as in congestion. For this reason the percussion note may be exaggerated early in the disease. But as the cells become more filled with fluid and contain less air, the percussion note becomes duller. Tympanicity and cracked-pot resonance are among the possibilities in this disease, as elsewhere.

On auscultation, the respiratory murmur and pectorophony

over the affected part are normal or weak, as in congestion. In some well-marked cases, however, it is increased. In these the œdema, becoming extreme, approaches solidification.

Adventitious sounds in œdema are loud, liquid, crepitant râles, and they are heard over the site of the pulmonary œdema, and they are its chief physical sign. These crepitant râles of œdema are loud, liquid, bubbling râles, and they are made in the air cells. They are not intra-pleural râles. In some cases sub-crepitant râles are heard also, but they simply indicate that the œdema has extended up into the smaller bronchial tubes.

Diagnosis.—From congestion of the lungs, œdema is distinguished by the facts that in congestion we have extra resonance on percussion, in œdema there is more or less dulness. In congestion the crepitant râle when heard is much finer and not so liquid and loud as in œdema. This crepitant râle in congestion is heard only on inspiration, in œdema it is sometimes heard on both inspiration and expiration.

Hydrothorax is distinguished from œdema by the fact that, though in both there is more or less dulness on percussion bilaterally, yet in hydrothorax the line of dulness will often change with position of the patient. The dulness in hydrothorax is also much more marked than in œdema, and it may even be flat. Nor will crepitant or other râles be heard over the seat of the hydrothorax. Respiratory murmur, pectorophony, and fremitus are also diminished or absent in hydrothorax.

Capillary bronchitis gives rise to more or less fever, and the sputa are different, being more tenacious and scant than in œdema. Moreover, in capillary bronchitis the percussion resonance is exaggerated generally instead of being dull.

Prognosis.—Œdema of the lungs, from whatever cause, is to be regarded as a serious affection. As a complication suddenly coming on in the course of some disease, while the patient may be otherwise progressing favorably, it may be the cause of sudden death. The prognosis, therefore, as regards the immediate future, is always uncertain, and largely depends on the original cause of the œdema. In chronic cardiac disease, the patient may get rid of the œdema for the time being, but, like congestion, it is likely to return again. In fact, what has been said of the prognosis in congestion of the lungs equally applies here.

Treatment.—The treatment of œdema is similar to that of congestion of the lungs, to which the reader is referred. The general health is to be attended to and the pulmonary circulation regulated by cardiac tonics and such as relieve hepatic and gastro-intestinal congestion as already indicated.

Pneumonia.

Pneumonia or pneumonitis signifies inflammation of lung tissue, and may be one of three varieties—(1) lobar, (2) lobular, and (3) inter-lobular or interstitial. Each of these forms is also known by other names, as will be fully set forth. The so-called hypostatic pneumonia usually begins as a lobular affection, but it may extend so as to involve a whole lobe or more. It is sequential to the condition known as hypostatic congestion, to which the reader is referred. Other varieties are mentioned by some authors, but the above-named are sufficient to include them all.

Acute Lobar Pneumonia.

Etiology and Pathology.—Acute lobar pneumonia is the inflammation of the lining membrane of the air cells of a lobe of the lungs. In some cases the inflammation may extend up into the bronchioles, the reverse process of what occurs in lobular pneumonia.

It is commonly an acute disease, although in rare cases it may become subacute or even chronic.

From the fact that a whole lobe is usually involved, it is called lobar pneumonia. But from the character of the exudation it was termed by Rokitansky croupous pneumonia. According to Virchow and others, however, this term should only be applied to those forms resulting from or associated with laryngeal croup, but in the ordinary form it should be termed fibrinous pneumonia, as the exudation is fibrinous rather than croupous.

On the other hand, Hoffman, Flint, and some French authors regard neither of these terms as correct, but suggest pneumonic fever as the true definition. The disease is known in New England and other parts of the United States of America as lung fever. Again, owing to its affecting the parenchyma or secreting membrane of the lung, it is sometimes called parenchymatous pneumonia.

The disease may be primary or secondary. The acute primary form is regarded by some as an infectious disease, or a specific fever, of which the lung inflammation is only a local manifestation. By others it is maintained to be a local inflammation of the lung, with resulting symptomatic or secondary fever. While both sides of this question have their advocates, it is becoming more and more to be regarded as an infectious disease.

The lower lobe of the right lung is most frequently the seat of the disease, as is well known. The reason for this is yet a subject for dispute. Advocates of the infectious theory say that, the right primary bronchus being larger than the left, pneumococci

are drawn into the right lung in greater abundance than into the left, and naturally drift downward toward the most depending portions. On the other hand, in phthisis the bacilli are affirmed to attack the upper part of the lungs rather than the lower lobes.

The order of frequency with which the different lobes are attacked is as follows: Lower lobe of right lung, lower lobe of left lung, middle lobe of right lung, upper lobe of right lung, upper lobe of left lung. Or it may extend from one lobe to another on the same side, or it may attack two lobes on different sides. In the latter case it is said to be double pneumonia.

In cases where an upper lobe is attacked primarily, it is generally among the aged or those addicted to intemperance, especially just after or during a debauch and termed by Huss pneumonia potatorum, or drunkard's pneumonia. Exposure incident to the intoxicated state, added to the debilitated condition caused by hard drinking, may in some measure account for it.

Acute lobar pneumonia affects both sexes at all ages, but men more frequently than women, owing chiefly to difference in habits, occupations, and mode of life. In more than 3,000 cases collected by Barry, nearly five times more men than women were affected. The proportion is usually estimated at about three to one. According to Schramm, this proportion is reversed in old age. However this may be, it appears that the difference is not so marked at those ages when the sexes live under similar conditions.

In regard to age, according to Grisolle, the late Dr. Wilson Fox, and others, although lobular pneumonia, when it does occur, is found chiefly among children and old people, yet these two classes are subject to lobar pneumonia as well. Lobar, croupous, or fibrinous pneumonia is, according to the same authors, very frequent in infancy, especially during the first two years of life, less common between infancy and twenty years of age, quite frequent from twenty to forty, less so from forty to sixty, and very frequent after sixty years of age. According to Loomis, nine-tenths of all deaths after the sixty-fifth year are caused by lobar pneumonia.

Lowering vitality from any cause, such as improper and insufficient food, exhaustion from overwork, intemperance, or previous illness, and living in ill-ventilated and damp apartments, predispose to it. One attack also predisposes to a second or more, although subsequent attacks are generally not so severe as the first.

Cardiac diseases that obstruct the pulmonary circulation favor an attack. The disease is more common in variable climates than in those of uniform temperature also, and hence is not met with in the tropical or polar regions so much as in the temperate,

and for the same reason also it is more prevalent at certain seasons of the year. Exposure to wet and draughts of cold appears to act as an exciting cause in some cases.

Inhalation of chemical irritants, injuries, and foreign bodies in the air passages may also act as exciting causes in a small proportion of cases. Tilton found that in 320 cases only 4.5 per cent were connected with traumatism.

Secondary lobar pneumonia occurs as an intercurrent affection in the course of some exhausting disease, as chronic malaria, Bright's disease of the kidneys, diabetes melitus, and also in such diseases as measles, scarlet fever, small-pox, erysipelas, typhoid and typhus fever, rhemuatism, and pyæmia.

Pneumonia is also not infrequently secondary to the grippe, to which scourge the whole world has been subject during the past two years. Pneumonia has been a very serious complication, but it has usually been of the lobular (catarrhal or broncho) variety rather than lobar, but with a decided tendency to spread, however.

Hypostatic pneumonia usually begins as a lobular pneumonia, but has a decided tendency to spread and involve a whole lobe or even more. It usually succeeds hypostatic congestion and hence is found in the most dependent portions of the lung, and bilaterally. It is generally due to imperfect cardiac function from valvular lesion, or cardiac enfeeblement from some cause, and hence is seen in typhoid fever or other exhausting disease with the body in one position for too great a length of time. It also occurs among the aged and infirm, or it may follow excessive loss of blood from injuries, parturition, and the like.

On the other hand, according to Flint and other observers, acute lobar pneumonia rarely affects the lungs in general vesicular emphysema, probably on account of loss of capillary area with diminished circulation of blood in the lungs in that disease.

Certain pathological changes take place in the affected portions during an attack of acute lobar pneumonia, and these differ according to the stage of the disease. These stages differ in different cases, but on the average consist of three that are usually quite well defined.

In the first stage, which usually lasts about twenty-four hours, there is congestion of the lining membrane of the air cells.

In the second stage, the stage of red hepatization, which lasts usually until about the fifth to the eighth day, the affected air cells become obliterated by being filled up with a fibrinous inflammatory exudation. This stage usually terminates by crisis as marked by rapid fall of temperature in favorable cases, to be followed by lysis or breaking up of the inflammatory exudation.

The third stage, or that of gray hepatization, follows the crisis

which marks the end of the second stage, about the fifth to the eighth day, in average cases. When the crisis of the second stage is followed by the lysis of the third stage the case goes on, if favorable, to resolution, which is, in reality, the fatty degeneration of inflammatory products, and their subsequent liquefaction and absorption.

Symptoms.—Regarding the period of incubation in this disease little is known. Flint regards it as averaging about two days, others a few hours, and some as long as two or three weeks.

It usually begins with a chill that is well marked and lasts from a half-hour to several hours. Niemeyer states that only two other diseases are attended with such a severe chill, and they are intermittent fever and pyæmia. The chill, however, is usually absent in children and the aged. In the former convulsions may occur instead of a chill. In the case of drunkards also, the chill, as well as such subjective symptoms as cough and dyspnœa, may be entirely wanting, the real condition being determined only by physical examination. There are other severe cases also when the chill is wanting, and in all such, as observed by me, the prognosis was unfavorable.

During the chill, or soon afterward, more or less sharp pain is felt near the nipple of the side affected, due in some cases, but often purely neuralgic in character, to a certain amount of pleurisy. It often extends back to the lower angle of the scapula in either case.

Cough is present early. The sputa are not much changed at first, but in a few hours, or a day, they are characteristic, being rusty or brick-dust colored, and adherent to the vessel. The color is due to blood that is intimately mixed with the matter expectorated; and according to the amount of blood and the changes it has undergone, the color of the sputa is sometimes yellowish, pink, or prune-juice. Generally, however, it is rusty colored.

Fever sets in at once, the thermometer under the tongue going up to 103° F., 104° F., or even higher, according to the severity of the attack.

The pulse usually full, sometimes hard, rises to 100 or 120 per minute, and the respirations are increased in frequency, the breathing becoming often panting and shallow.

The number of the respirations is out of all proportion to the pulse, being 40 to 50 per minute in adults, while the pulse may not be more than 80 to 100. Among children suffering with this disease, the respirations may become 100 to the minute. This is accounted for partly by the pain and partly by the large amount of affected lung tissue subtracted from the normal breathing area, and is characteristic of lobar pneumonia.

The skin is hot and dry, and the aspect of the countenance varies. Sometimes the cheeks are red, in others the face is pale, and again there is more or less cyanosis, especially in those cases complicated with pleurisy.

The tongue is furred, usually white and dry. At first the patient lies on the affected side to allow free respiratory movements on the unaffected side. In a short time, however, the dorsal decubitus or half-sitting posture is preferred.

In favorable cases the pain subsides in a few days, the cough becomes loose, expectoration is more abundant and yellow, herpes often appear about the mouth, and the fever shows no tendency to rise. On the contrary, the temperature will in many cases drop and rise again several times, being rather intermittent than regularly remittent. The pulse, however, is now not so strong, from the fact that the left ventricle does not receive blood so readily on account of the obstruction in the lungs. From the fifth to the eighth day the true crisis occurs, as evidenced by the sudden fall in the temperature accompanied with profuse perspiration. The patient is now able to obtain refreshing sleep, and the pulse becomes slower. As resolution progresses, all the symptoms rapidly subside. Indeed, there is no disease, perhaps, where convalescence, when once begun, goes on so rapidly as in lobar pneumonia.

During the stage of solidification the chlorides in the urine are diminished or absent. This is readily shown by first adding a few drops of pure nitric acid to about two drachms of the patient's urine in a test-tube to prevent the precipitation of the phosphates with the chlorides. Then add gradually a few drops or more of a solution of nitrate of silver, ten grains to the ounce. If chlorides are present, a white precipitate of chloride of silver is thrown down, which is soluble in caustic ammonia, but reprecipitated by the addition of nitric acid in excess.

In unfavorable cases the respirations become more frequent, the pulse more and more feeble and rapid, expectoration is imperfectly performed or ceases altogether, the temperature ranges high with no tendency to fall, often delirium sets in, and the patient gradually dies from exhaustion. Sometimes œdema of the lungs and suffocation hasten the fatal termination. Or death may suddenly occur due to heart failure, even though the case be apparently progressing favorably. Indeed, heart failure is one of the dangers in this disease, for the heart has to bear the brunt of the attack.

Gastro-intestinal catarrh and congestion of the liver, that are often present, give rise to distress in the stomach and bowels, attended with nausea and even vomiting. Though the bowels are generally constipated, diarrhœa sometimes occurs, the stools being

clay-colored and fetid, or dark from intestinal hemorrhage. This condition is due to the extra work thrown on the right ventricle of the heart, with consequent venous stasis in the liver and gastro-intestinal tract. This is a very serious condition, as it interferes with nutrition and supporting treatment. It is found more particularly in asthenic cases with enfeebled heart, or one crippled by previous disease.

The kidneys also are congested in some cases, and slight albuminuria may occur. It is of little significance as compared with the passive hyperæmia of the gastro-intestinal tract.

Jaundice sometimes occurs, either coincidently or from congestion of the liver as already stated. In severe cases it may be the so-called hematogenous jaundice; that is to say, the skin is discolored by the coloring matter set free from disintegrated red corpuscles of the blood, and not by bile that has been reabsorbed owing to obstruction to its escape. In some cases the jaundice may be due to a gastro-duodenal catarrh or perihepatitis. The latter is especially liable to occur in pneumonia of the right lower lobe, on account of proximity of the organs. In any case jaundice is to be regarded as an unpleasant symptom. If it be hematogenous it denotes a very severe and asthenic case, and if hepatogenous the bile acids in the blood act as poisonous cardiac depressents.

Hiccough sometimes occurs and may be a distressing symptom. It is due to diaphragmatic pleurisy or else is a reflex symptom.

Delirium, when it occurs, may not possess any special significance, unless there be also high temperature or the typhoid condition. Typhoid pneumonia, however, does not signify typhoid fever with pneumonia as a complication, but simply pneumonia with a typhoid condition of the patient. Delirium also is often present in case of drunkards.

Gangrene, should it occur, would be indicated by the fetid prune-juice expectoration and signs of collapse.

Abscess of the lung may form, but is of very rare occurrence. It is accompanied by sudden and copious purulent expectoration. Flint found it four times in one hundred and thirty-three cases, and of these two recovered. According to the late Dr. Wilson Fox, abscess occurred about once in fifty cases.

Pleurisy, with more or less effusion, and bronchitis of the larger tubes sometimes occur. Dry pleurisy and extension of inflammation into the smaller bronchi in the affected portions are so common that they may be said to be a part of the disease.

Secondary pneumonia occurring in the course of infectious and exhausting diseases, and in heart disease, is usually of the hypostatic form, and hence is lobular rather than lobar, but its ten-

dency is to spread so that, according to Reynolds, a whole lobe may become involved. It rarely begins with rigors, and even cough and expectoration may be absent. It is always a more or

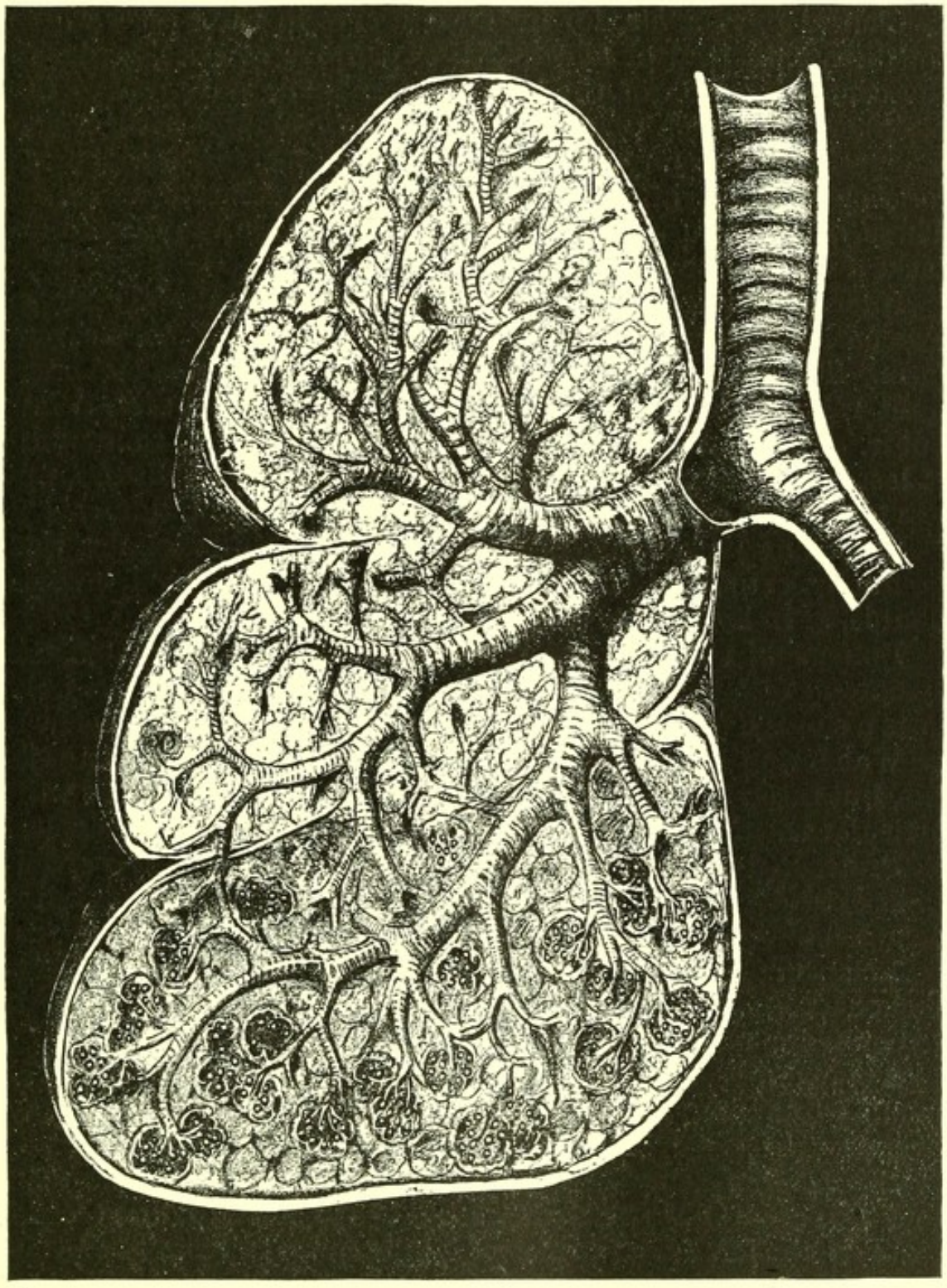


FIG. 12.—FIRST STAGE OF ACUTE LOBAR PNEUMONIA. Lower lobe of right lung, showing the crepitant râle in the air cells.

less serious affection. The only evidences of pneumonia in these cases are a moderate rise in temperature and increased dyspnœa. The diagnosis can only be made out by physical examination.

Hence the importance of such examination from time to time during the course of such diseases.

Besides the regular forms and order of symptoms mentioned, certain irregular forms of pneumonia may occur.

Central pneumonia, for instance, occurs in those cases where the disease, instead of affecting a whole lobe at once, begins in the central portion of the lobe and gradually advances to the periphery. In such cases the sputa are invaluable in making a diagnosis, for the physical signs may be obscured for as long as forty-eight hours after the chill, should the latter even occur. These cases are usually more severe than where the disease attacks a whole lobe quickly.

Intermittent pneumonia sometimes occurs in malarial regions. The patients are usually subjects of intermittent fever of a severe form. The stage of engorgement comes on with cough and crepitant râles, preceded by a severe chill, and goes off after a few hours. Then it recurs at regular intervals for several times until at last red hepatization follows. It is a very serious disease, unless recognized early and modified by large doses of quinine.

Spreading pneumonia begins by affecting a few lobules, and gradually extending to the whole lobe, and may even become double, as in hypostatic pneumonia.

Ephemeral and abortive pneumonia are those in which the symptoms disappear in a few days. In the former the fever only lasts a single day, and in neither case is red hepatization reached.

Wandering pneumonia attacks different localities of lung tissue, but rarely goes beyond the congestive stage. It occurs with articular rheumatism, but is more frequent in epidemic erysipelas.

Protracted pneumonia occurs in those cases where the symptoms extend into the second or third week, and resolution is not completed for even a longer period.

Relapsing pneumonia is that form in which the patient is attacked a second time soon after resolution sets in, either in a different or the same lobe.

Apyrexial pneumonia has also been reported; that is, pneumonia without any fever. Such cases must be rare, if indeed they ever occur.

Besides the complications already mentioned, endocarditis may also occur, but pericarditis is said to be more frequent, especially if the left lung be affected. Ambliopia, meningitis, hemiplegia, coma, and other symptoms referable to the nervous system sometimes occur in the course of this disease.

Physical Signs.—In the first stage the only physical sign present that is characteristic of the disease is the crepitant râle. It is made in the affected air cells and heard at the end of inspiration. Sometimes it is closely imitated by intra-pleural sounds.

Very often it happens that the patient is already in the second stage by the time the physician arrives, in which case the crepitant râles have disappeared.

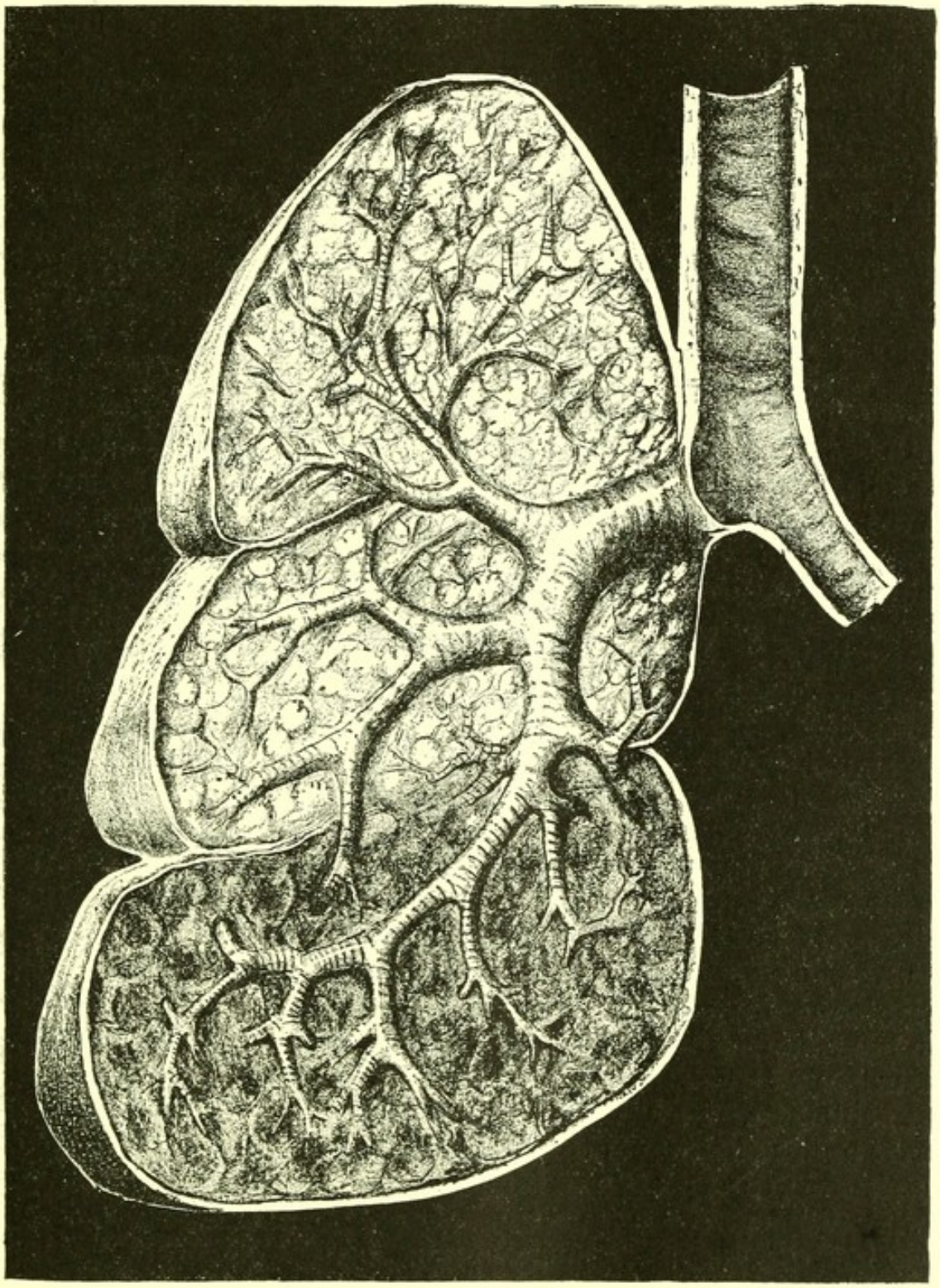


FIG. 13.—SECOND STAGE, ACUTE LOBAR PNEUMONIA. Lower lobe of right lung. Red hepatization or complete solidification; bronchial breathing and bronchophony; vocal fremitus markedly increased.

Second Stage.—Here we are dealing with red hepatization or complete solidification of lung tissue.

On inspection, the respiratory movements are observed to be

increased in frequency, being shallow and panting. Respiratory movements on the affected side are restrained, but increased on the other side. This is particularly noticed if the patient takes a deep breath. Diaphragmatic breathing will be prominent unless restricted by pain.

Palpation shows marked increase of vocal fremitus over the affected lobe, the solidified lung tissue being a much better vibratory medium than the air cells. Should there be obstruction in the bronchi leading to the part from stricture, pressure, or other cause, so that the voice would be excluded from that part, the fremitus might be diminished or even absent. The same is true if pleurisy with effusion exist over the solidified lung, so as to intercept the voice sounds.

Percussion in the second stage elicits marked dulness over the solidified lobe as a rule, and the line of dulness does not change with position of the patient. In some cases tympanitic resonance may be obtained over the solidified lung, especially in children or in the upper lobes in adults in case they are the seat of the disease. In the former case the tympanicity would come from an empty stomach or transverse colon, and in the second from the trachea—the percussion blow in each case being extended to these hollow viscera. In other cases tympanicity may be elicited from the air-distended bronchial tubes, the air cells having become obliterated. Dulness is, however, nearly always the case. Exaggerated resonance over lung tissue adjacent is sometimes obtained, as it is doing extra work and is, for the time being, vicariously emphysematous.

Auscultation, second stage, enables us to hear bronchial breathing over the solidified lung. All the air cells are filled up with inflammatory exudation, so that the breathing has entirely lost its vesicular quality. The vocal resonance also is heard to be so near, concentrated, and distinct that it is termed bronchial voice or bronchophony. In some cases the articulate words may be heard, in which event it may be called bronchial pectoriloquy or bronchiloquy. No adventitious sounds are present in the second stage unless the case is complicated. The second sound of the heart over the pulmonary interspace is sometimes accentuated owing to the pulmonary obstruction.

Third Stage.—In this stage, of gray hepatization or resolution, in favorable cases, there is a gradual return to the normal physical signs. At first they resemble those of the second stage, but soon inspection shows a return of the normal respiratory movements. On palpation, the vocal fremitus is found to diminish until it becomes normal, and marked dulness on percussion gradually yields to normal resonance. On auscultation, bronchial breathing first becomes vesiculo-bronchial, and then normal, and

bronchophony yields to exaggerated vocal resonance, which subsequently becomes normal.

Subcrepitant and crepitant râles are usually present until res-

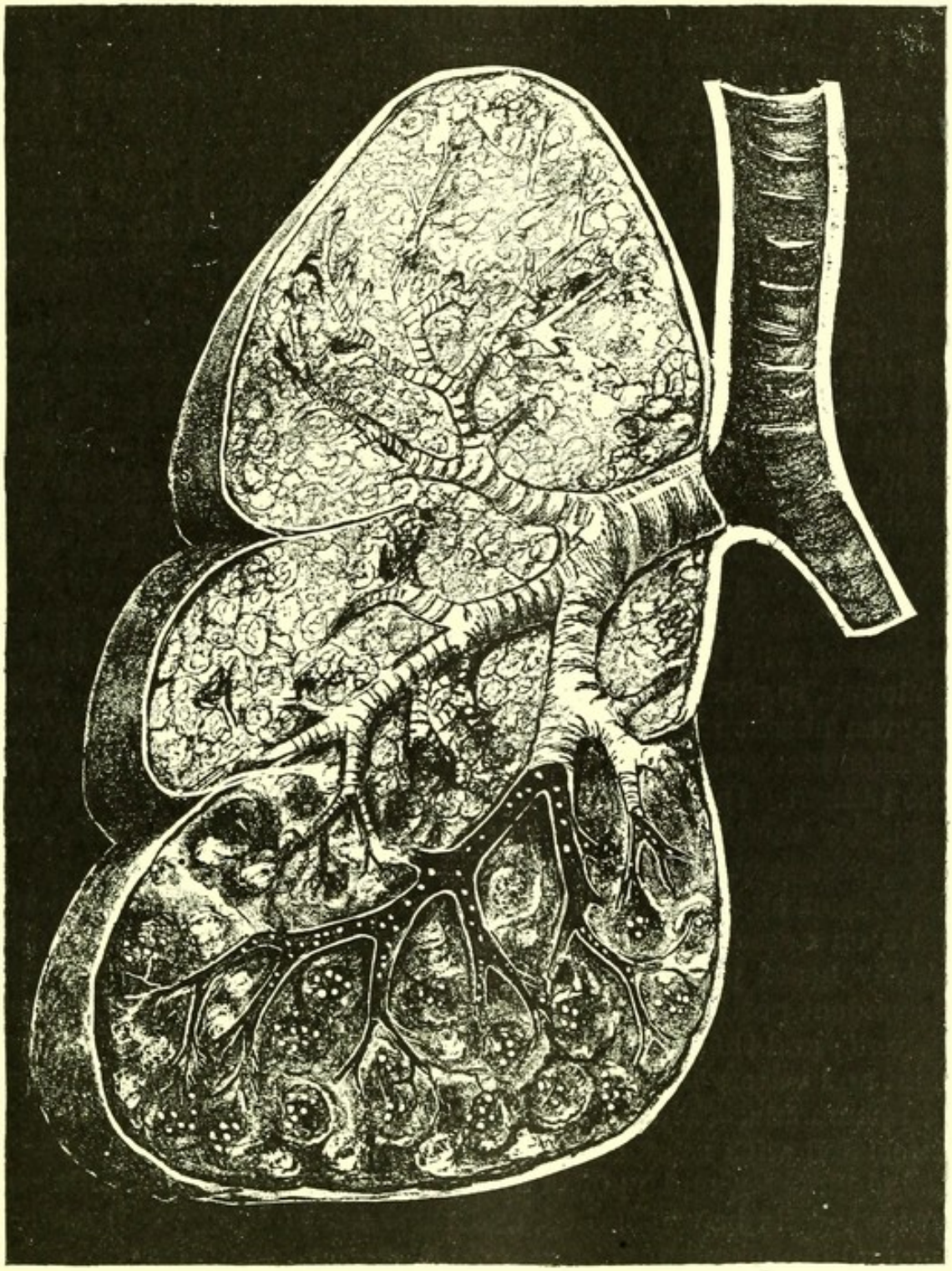


FIG. 14.—THIRD STAGE, ACUTE LOBAR PNEUMONIA. Lower lobe of right lung. Gray hepatization or resolution; crepitant râle (râle redux) and subcrepitant râle.

olution is complete. They are due to liquefaction of the inflammatory exudation, and the crepitant râle is naturally heard first. This is also called the râle redux or râle that has come back,

having been present in the first stage and having disappeared in the second.

Abscess and gangrene are rare terminations. In both there would be signs of a cavity with symptoms of general collapse. They are attended respectively with profuse expectoration of pus or a fetid substance resembling prune juice.

Diagnosis.—Central pneumonia with normal peripheral cell tissue renders the dignosis difficult for the first few days. Such cases are rare, but the history of the case, and above all the character of the sputa and rise of temperature would be of great service in coming to a conclusion. Acute pleurisy with effusion gives very different physical signs from pneumonia; otherwise a positive diagnosis could not be made.

In general terms, it is to be understood that in pneumonia the solidified lung tissue acts as a more perfect vibratory medium for the direct transmission of sound than normal vesicular tissue, by which sound is refracted. Pleurisy with effusion, on the other hand, and, to a lesser degree only, thickened pleura, acts as an interrupter or, as Tyndall might put it, an interceptor, of sound, as a diaphragm or partition placed between the examiner and the patient's voice sound. Consequently, while in pneumonia the vocal resonance or pectorophony and fremitus are both markedly increased, with bronchial breathing and bronchophony, or bronchiloquy, in pleurisy those physical signs are usually diminished or even absent altogether. The line of dulness in pleurisy with effusion increases downward and often changes with position of the patient. In cases of doubt the hypodermic syringe as an aspirator would settle the question, but this step is rarely, if ever, necessary.

Œdema and hypostatic congestion afford loud liquid crepitant râles on auscultation, but these râles are then bilateral, and chiefly heard posteriorly and low down, or wherever the most dependent portions happen to be, according to the position of the patient; and the sputa, although often blood-stained, are abundant and watery instead of being the viscid, rusty-colored sputa of pneumonia. These affections also, besides being frequently associated with some other disease, are also unaccompanied by the chill, fever, and pain of pneumonia, there is slight dulness instead of its being marked, and there are no bronchial breathing and bronchophony.

Lobular pneumonia is distinguished from lobar pneumonia by the fact that one or more lobules are affected instead of a whole lobe. Lobular pneumonia is also preceded by capillary bronchitis and is always a secondary disease to such bronchitis.

Inter-lobular pneumonia, also called interstitial or chronic pneumonia, is simply fibroid phthisis, to which the reader is re-

ferred. It is a chronic disease with bronchiectasis, and needs no further mention here.

Acute phthisis may at first be difficult to distinguish from a severe case of acute lobar pneumonia, but the recurrence of chills, hemorrhage, the rapid emaciation and tuberculous history of the case make the diagnosis easy in most cases. In chronic phthisis, on the other hand, the mode of onset and slow progress of the disease render the diagnosis easy to be made. Moreover, while lobar pneumonia usually attacks the base of the lung, phthisis nearly always affects primarily the apices.

Tumors of various kinds, aneurismal, carcinomatous or syphilitic, as well as enlargement of the spleen or liver, may give more or less signs of solidification within the thoracic cavity; but the absence of the characteristic sputa of lobar pneumonia, as well as the general symptoms of that disease as already related, will usually lead to a correct diagnosis. The pectorophony and fremitus will be diminished or absent, and bronchial breathing and bronchophony or bronchiloquy will be wanting usually over enlarged liver or spleen.

Hemorrhagic infarction may be attended with crepitant and subcrepitant râles, but it usually comes on suddenly and in connection with old heart disease or pyæmia. Sudden dyspnœa occurring in those diseases, with a small circumscribed area of dulness surrounded by râles, without notable increase of temperature, the expectoration being dark colored if any, would indicate infarction.

Symptoms of typhoid fever, meningitis, and delirium tremens, occurring in a stranger especially, might be the cause of overlooking pneumonia. Hence the great importance of a physical examination when such symptoms are observed in children, old people, drunkards, or strangers whose habits and previous condition are unknown.

Secondary and hypostatic pneumonia are almost certain to escape detection unless a physical examination be carefully resorted to.

Prognosis.—Age has the most important bearing. According to Walshe, the disease is almost always fatal in the newly born and after seventy. Between six and twelve nearly all recover. From sixteen to twenty about one in fifteen die. From twenty to seventy, according to the same author, about one-fifth to one-seventh die. It is probable that the mortality after sixty is much greater than that given. Even after fifty, pneumonia is perhaps more frequently fatal than in the figures just given. The character or grade of the epidemic, if there be one, has much to do with it. At one time nearly all die, at another many recover. It is said to be more fatal among women than men, and intemper-

ance certainly lessens the chances for life to a marked extent. It is more dangerous in the upper than lower lobes, for the fact that it usually occurs in the upper lobes among those broken down by intemperance or otherwise. Double pneumonia, of course, is more fatal than single.

Complications also render the prognosis more or less unfavorable according to their gravity. In case of pregnancy, the woman aborts or miscarries as a rule. In twenty-six cases of pregnancy collected by Chatelain, there were ten abortions and nine miscarriages.

An increase of the temperature above 104° F., according to Flint, always denotes a severe attack, and is unfavorable in proportion as it rises higher. This rule does not, however, invariably hold good. According to Strümpell and others, and my own observation, fatal cases may have a temperature but little above normal, whereas those with a temperature of 105° F. may recover. The higher the temperature, however, the more grave the prognosis as a rule. A temperature of 107° F., however, is not necessarily fatal.

Organic disease of the heart, especially mitral lesions, greatly lessens the chances of life.

The occurrence of marked cyanosis, with rapid and labored breathing, abscess, or gangrene, are all very unfavorable, though not necessarily fatal.

In all cases of secondary lobar pneumonia, the prognosis is very unfavorable, though it is not always a fatal disease.

Treatment.—Heart failure and exhaustion being generally the causes of death in this disease, barring some intercurrent accident, it is easily understood at the outset that depressing treatment of any kind is out of the question. For that reason blood-letting and, as a matter of course, antimony are to be excluded from the list of remedies in nearly all cases. Certainly neither of these remedies should be used without a consultation. Aconite is given, in minute doses, it is true, by some, it is said, to increase suction power of the left ventricle, thereby drawing blood from the lungs and thus relieving congestion, rather than trying to drive blood through the lungs by means of alcohol and digitalis. But pneumonia is a disease in which there is no time allowed for such fine theories. The patient's life is in danger, and aconite is a dangerous remedy and had better be left out. The same is true of veratrum, and general blood-letting is not usually practised at the present time. Local blood-letting does no good, and for that reason leeches and wet cups are abandoned. Blisters not only do no good in any stage of acute lobar pneumonia, but they do harm by irritating and rendering the patient uncomfortable and increasing fever. In chronic pneumonia or protracted cases, it is

different. Here blisters in moderation are of service by stimulating resolution.

The patient, throughout the attack, should be in a well-ventilated apartment at a temperature of about 75° F.

In the early stages of pneumonia, when pain is severe and interferes with deep inspiration, as well as keeping the patient awake and adding to exhaustion and shock, large, thick, hot flaxseed poultices, as hot as the patient can bear them, and put up so that the bed and clothing cannot get damp or wet, act better than anything else for relief. They should be renewed about every two hours and kept up for two to four days, until the patient ceases to complain of pain and breathes more easily.

Dry cups may be applied freely over the affected part—especially if there are signs of the disease spreading, or râles are heard elsewhere than over the affected lobe. In these cases eight to twelve cups may be applied, by means of fire rather than the rubber-bulb attachment, over both sides posteriorly once every other day or even oftener, care being taken not to abraid the skin any more than possible.

For headache, which is sometimes intolerable, the ice cap is the best remedy. A large rubber bag about one quarter filled with finely cracked ice and applied to the head, is a great comfort to the patient and helps to lower temperature. The patient can change it about at pleasure.

The bowels are usually constipated to start with, and to relieve this condition a small dose of calomel combined with the bicarbonate of soda should be given at bed-time. (℞ Calomel, gr. iij.; sodii bicarb., gr. v. M. ft. cht. Sig. Take at bed-time.) If the bowels do not move by next morning, a Seidlitz powder or other mild saline cathartic may be given so as to make sure that the calomel is eliminated; otherwise sore mouth or even salivation might follow.

The next point now is in regard to the temperature. The poultices have been thoroughly applied, also the cups if necessary, the ice-cap is to the head, and the calomel has been given and got rid of by the bowels moving, all during the first day or two or as early in the disease as possible. Yet the temperature does not go down. What is to be done?

In malarial regions or if the patient be the subject of real malarial fevers, then quinine should be given. The earlier in the disease, the better. For the first few days, in such cases, quinine should be pushed while the patient is able to stand it, not as an antipyretic, but purely as an antiperiodic remedy against real and not supposed malaria. Fifteen grains can be given morning and noon to such patients for the first three or four days. If by that time quinine does no good, it may be stopped and an antipyretic instead of antiperiodic may be tried.

Quinine does not reduce the temperature of pneumonia. Instead of it, various remedies have been tried at different times. Of these I prefer antifebrin.

Antifebrin is a safe remedy if used cautiously. If the patient's temperature goes up to 103½° F. or more, it may be given in three- to five-grain tablets, in the afternoon preferably. It may be given at, say, 1, 4, and 7 P.M. By bed-time the patient's temperature is a degree or two lower. There is also some perspiration. Head symptoms such as those caused by large doses of quinine are absent. We therefore get a greater reduction of temperature, with perspiration, and without head symptoms, than we could possibly have done with enormous doses of quinine sufficient to render some patients absolutely delirious.

Phenacetin is used by some instead of antifebrin, but it requires a larger dose and I do not see that it is safer or does more good. Antipyrin is a good remedy except that with some it depresses the heart, and for that reason antifebrin is to be preferred.

Digitalis may be used along with the antifebrin as soon as indicated. Three drops of the tincture may be given in water every three or four hours, or else it may be given in milk punch or other drink. The infusion of digitalis is claimed by some to be a specific, but this statement, like all others of that kind, lacks proof. There is no specific against pneumonia, but each case has to be worked over according to the conditions present.

Alcoholic stimulants are generally indicated before the attack is over. In some cases alcohol is not indicated until the third stage or during convalescence. In others it is indicated from the commencement, especially if the patient have been addicted to alcohol or opium or other cardiac stimulant. Delirium is apt to occur early in these cases, and it is the note sounded for giving alcohol if this has not been already done. The alcohol may be given with a little water separately, or as milk punch or egg-nog. At first a small quantity of whiskey or brandy is usually sufficient, but it may be increased to a tablespoonful or even more every two or three hours.

Delirium and brown, dry tongue, with hot skin and thready pulse, all often disappear on the judicious administration of alcoholic stimulants.

Opium would be an excellent cardiac stimulant, and of course is to be given freely to those addicted to its use, but otherwise it binds up the bowels, furs the tongue, and masks the true condition, so that it is best to omit it altogether, unless insomnia and pain require its administration. Even then alcohol is often much better.

A brown, dry tongue is usually the surest guide for giving stimulants. They should be given in moderation, as above stated,

until the tongue becomes moist, and it should be kept in that condition. Whiskey or brandy is the best alcoholic stimulant, being of a fixed strength. The diet should be nutritious and easily digested. Milk is the best article of food. Should it not be digestible, it may be peptonized. Three to six ounces may be given every three hours according to the age and condition of the patient. Instead of milk, beef tea, mutton broth, and the like may be used, or alternated with the milk.

The patient should not be allowed to rise up suddenly or take much exercise while in an exhausted state, for fear of heart clot or cardiac failure. To avoid the former, it has been claimed that the carbonate of ammonia is effective. But further than being a transient and very diffusible stimulant, the carbonate of ammonia is rarely if ever needed. Much importance was attached to the use of the oil-silk jacket some years ago, both as a preventive against taking cold and to promote diaphoresis. Its value was always more theoretical than actual, and it has gradually become obsolete with most practitioners.

The application of cold compresses to the chest, and even the ice bag are recommended by some, but I have not tried them sufficiently to express any opinion from experience.

The administration of iodide of potassium in the third stage is also recommended in order to clear up the lung, but it is probably better to spare the stomach and encourage the appetite by bitter tonics if necessary, rather than attempt to hasten resolution by the iodide.

Lobular Pneumonia.

Etiology and Pathology.—Lobular pneumonia is catarrhal inflammation of the lining membrane of the air cells of one or more lobules.

As it is usually secondary to capillary bronchitis and due to extension of the latter into the air cells here and there in spots, it is also called broncho-pneumonia, and because the inflammation is catarrhal in character it is known as catarrhal pneumonia. From the fact also that it affects children more frequently than it does adults it is called by some infantile pneumonia. This does not imply, however, that lobar pneumonia does not also attack infants, for it is more common among them, according to many authors, than lobular pneumonia. Lobular pneumonia also attacks the aged, so that it is met with during the extremes of life. It also occurs among those having enfeebled heart from any cause, as in the course of typhoid fever. It is not infrequently met with, in connection with capillary bronchitis, during the course of such acute infectious diseases as measles, scarlet fever, diphtheria,

small-pox, and typhoid fever, and it is sometimes secondary to pyæmia.

Hypostatic pneumonia occurring in the course of exhausting diseases, as already remarked when speaking of lobar pneumonia, is of the lobular variety, with a tendency to spread, however. From what has been said, lobular pneumonia may occur on one side or it may be scattered over both lungs. It affects both sexes at all ages. It is more prevalent in cold, damp, and changeable weather. The difference between lobular and lobar pneumonia was first pointed out by Barthez and Rilliet in 1838, although its true pathology was not clearly shown until 1844, when Legendre and Bailly first proved it. Until then it was frequently confounded with atelectasis.

Symptoms.—The symptoms of this disease are not well marked, and its approach is insidious, being often obscured by the original affection, to which it is merely secondary. Hence the necessity of repeated examinations in the course of the above-mentioned diseases. The chill and characteristic sputa of acute primary lobar pneumonia are wanting.

Generally, however, the disease may be suspected if, in the course of capillary bronchitis and the like, a sudden rise in temperature to 103° or 104° F. occurs, along with increased dyspnœa and painful cough. The rise in temperature, however, is the most significant. The severity of these symptoms will depend more or less upon the number of foci of inflammation, and their extent. The fever is generally remittent in character, being a little higher in the evening than in the morning.

The dyspnœa in children sometimes becomes extreme, and the number of respirations may increase in frequency to as many as one hundred per minute. The movements of the alæ nasi in children are always exaggerated, expiration being often accompanied by a groan or moaning. The pulse also is increased in frequency, but in proportion as a rule to the number of respirations.

The cough may not be attended with any expectoration, the patient being generally too feeble or indifferent. Sometimes a viscid material that may be streaked with blood, but not rusty-colored, may be forced up by vomiting, which is apt to occur. The chlorides, according to Bednär, are generally present in the urine.

This disease does not end suddenly by crisis, but gradually by lysis, and is prone to become subacute or even chronic. In the latter case it acts as a predisposing cause of phthisis.

Physical Signs.—Inspection generally shows in children panting and shallow breathing, inspiration being short, and expiration slightly prolonged. The movements of the alæ nasi are exaggerated. The upper part of the chest heaves, the lower portion

and abdominal walls being sometimes drawn in on inspiration. Cyanosis may be observed in some cases. On palpation, increased vocal fremitus may be detected if there is sufficient area of consolidation, otherwise it will be unchanged. Rhonchal fremitus due to the bronchitis is sometimes felt.

Percussion elicits dulness in proportion to the amount of consolidation. The dulness is over the seat of the disease, which is generally posterior and bilateral. It is not, however, symmetrically bilateral, as in atelectasis. Sometimes extra resonance due to vicarious emphysema of unaffected cells obscures the dulness. The percussion, as a rule, should be gentle, otherwise it would mislead.

On auscultation, bronchial breathing and bronchophony may be heard if there be sufficient area of consolidation. The crepitant râles are hardly ever heard, as they are obscured by the presence of the louder bronchial râles, due to the bronchitis.

Diagnosis.—The disease, if confined to one or a few small foci, may entirely escape detection. If, however, in the course of capillary bronchitis, there is a sudden rise in temperature with increased dyspnœa, it is fair to infer that lobular pneumonia to some extent has occurred, even if the usual physical signs are wanting.

Lobar pneumonia is distinguished by the fact that the physical signs in that disease extend over a whole lobe, besides its beginning usually with a chill and attended with the characteristic sputa. In lobular pneumonia the physical signs are limited to a smaller area, if indeed any are found at all, the chill is generally absent, and there are no such sputa.

In atelectasis due to capillary bronchitis, the fremitus is not increased, and the dulness on percussion is not so well marked as in lobular pneumonia. If a spot of dulness on one side does not correspond to one on the other side, according to Loomis, it is in favor of lobular pneumonia. Instead also of bronchial breathing and bronchophony, in obstructive atelectasis, the respiratory murmur and vocal resonance are diminished, if changed at all. Subcrepitant râles are not heard generally over collapsed lung in atelectasis, but nearly always in lobular pneumonia. In atelectasis the temperature does not rise; in lobular pneumonia it does. Finally, the cells may suddenly become inflated in atelectasis by change of position or deep inspiration, which would be impossible in pneumonia.

From phthisis, chronic lobular pnuemonia is distinguished by the facts that phthisis usually begins at the apices, usually gives the history of heredity, is sometimes attended by hæmoptysis, the sputa often contain tubercle bacilli, and the symptoms in general are more severe.

Prognosis.—All authors agree that the prognosis is grave. According to Wilson Fox, it is of much greater gravity than that of the acute primary lobar disease. The extent of the inflammation, number of foci, elevation of temperature, age, general condition, and hygienic surroundings of the patient are among the most important points bearing on the case. Those cases following whooping-cough are said to be particularly severe. The average mortality appears to be about 40%. But sometimes the death rate is much higher. During the first year of life and in old age, death is the rule.

Treatment.—Lobular pneumonia being a secondary disease, one principle is to be observed in the treatment of every case, and that is the avoidance of depressing remedies such as aconite, veratrum, and the like. Neither are leeches and wet-cupping of service. On the other hand, digitalis or strophanthus, alcoholic stimulants, and nutritious diet are indicated from the first.

Regarding external applications, blisters are not to be used unless the disease becomes subacute or shows signs of becoming chronic. Then, in addition to supporting measures, blisters may be used to advantage. Instead of blisters in such cases, the compound iodine ointment may be rubbed over the affected part once daily more or less as required.

Hot flaxseed poultices make the best external application in the case of infantile lobular pneumonia resulting from capillary bronchitis. These poultices should be renewed about every two hours, and put up in oil-silk so as to prevent their wetting the clothing and bed. Among adults cups should be applied freely. Turpentine, modified by the addition of camphorated oil or vaselin, and applied to the chest by gentle rubbing once or twice daily, is often of great benefit. (℞ Spts. turpentine, ℥ i.; vaselin, q.s. ad ℥ iv. M. ft. lin.) Cold compresses, ice-bags, and the like are also recommended, but I have had no experience with them.

For reducing temperature, if this become necessary, quinine should not be thought of unless the patient lives in a notoriously malarious region or else is subject to attacks of that disease. In such a case full doses may be given early, but as a rule the drug is useless for bringing down the temperature of inflammation. In doses large enough to bring down the temperature of pneumonia to any appreciable degree, it becomes a dangerous heart depressant besides increasing head symptoms. Later on as a tonic, in one or two grain doses ter die, it is often helpful in promoting convalescence.

Antifebrin is the safest remedy, as well as one of the best. Phenacetin is also good, but the doses required are just double those of antifebrin. Antipyrin does not require as large a dose

as phenacetin, but is more dangerous as it depresses the heart. From one to three grains of antifebrin may be given in the afternoon for about three times, say at 2, 5, and 8 P.M. In this way the full effect of the drug is had by bed-time, so that the patient rests better than when tossing to and fro with a high fever. The antifebrin may be given here as in other cases either in the form of compressed tablet or as a powder rubbed up with a little sugar, or not, according to taste. It does not dissolve readily, being resinous, and for that reason when given in solution a little alcohol should be added so as to render it soluble.

The tinct. of digitalis is indicated should the pulse become feeble and frequent, and alcoholic stimulants do not improve them sufficiently.

The diet, as has been said, should be nutritious and easily digested. Milk, peptonized or not, as required, is one of the best articles of food. When alcohol is indicated, it may readily be added to the milk so as to make milk punch. If this be not well borne by the stomach, a little barley water with or without a few drops, or more, of whiskey or brandy may be given for the time being. Or else beef tea, mutton broth, or the like may be given instead of milk or alternated with it.

The patient should occupy a well-ventilated room at a temperature of about 70° F. Where convalescence is slow, remedies like cod-liver oil and even a change of climate may become necessary.

Interstitial Pneumonia.

Interstititial or interlobular pneumonia is inflammation of the interstitial connective tissue of the lungs, and is a chronic disease when first observed.

Hence it is also termed chronic pneumonia. Owing to the shrinkage that follows usually, it was termed by Corrigan cirrhosis of the lungs. Other names are sclerosis, scirrhus, and fibroid degeneration of the lungs. Niemeyer states that it is a very common disease, but in many cases, undoubtedly, it has heretofore been confounded with fibroid phthisis, the tubercle bacillus being now found in nearly all cases of what was formerly supposed to be and described as chronic pneumonia. Formerly chronic pneumonia and fibroid phthisis were regarded as identical diseases. After the discovery of the tubercle bacillus, authors made a distinction between them, and even went so far as to attempt to make a diagnosis between the two. Now, however, they are again regarded as identical, but of tubercular origin.

The disease is secondary to some other, notably chronic mechanical bronchitis arising from the inhalation of irritating dust of some kind, although it may also be caused by other forms of

pneumonia and sometimes by pleurisy, the inflammation extending into the interstitial tissue.

The signs of chronic pneumonia, as well as treatment, are described under Fibroid Phthisis, to which the reader is referred.

Pneumonokoniosis—Bronchiectasis.

Pneumonokoniosis is the generic term applied by Zeuker to diseases of the lungs due to inhalation of dust.

Occurring among coal miners, it is called anthrakosis pulmonum. In these cases the affected portions of the lungs become black from inhalation of coal dust. From inhalation of iron dust, as among knife-grinders, it is termed siderosis pulmonum. In like manner the disease may be caused by dust or particles from the handling of cotton, grain, or tobacco, or in such occupations as brush-making, carpet or silk weaving, stone-cutting, jute-bagging, and the like.

This disease first commences as a mechanical bronchitis. If the patient remains at the occupation for a sufficient length of time, the bronchitis becomes chronic. Then follows interstitial pneumonia, which becomes tubercular in many cases. In other cases emphysema with dilated right ventricle of the heart follows.

Bronchiectasis or dilatation of the bronchial tubes is frequently a result of these diseases. The dilatations may be cylindrical or sacculated. It results from shrinkage of inflamed connective tissue. These cavities, however, cannot be distinguished from those occurring in the course of phthisis, even anatomically, according to Niemeyer, but in the latter case the tubercle bacillus is characteristic. The symptoms of pneumonokoniosis and bronchiectasis are those of chronic bronchitis, emphysema, and fibroid phthisis, and need not be repeated here. So far as treatment is concerned, the first indication is to remove the patient from such injurious influences if practicable. After that is done, the treatment is the same as for the diseases mentioned, according to the conditions presented in each case.

Cancer of the Lungs, and Other Neoplastic Growths.

Cancer of the lungs is generally secondary, though it may be primary. The etiology, at present, is unknown, as in case of cancer elsewhere.

Secondary cancer of the lungs follows cancer in some other part, especially where the testicles have been the seat of the primary disease. It affects both lungs and is nodular, the nodules varying in size from a pin's head to a child's head. Encephaloid or medullary is the most common form, although scirrhus, mixed, and other varieties are also found.

Primary cancer infiltrates the pulmonary tissue, instead of being nodular, and affects the upper lobe of the right lung most frequently. Just why this is, does not appear to be exactly known. But if cancer is brought about by long-continued irritation, the right bronchial tube being larger than the left may account for the difference among those who work in arsenic, as among the cobalt miners at Schneebergen. Seventy-five per cent of all the deaths among those miners is due to primary cancer of the lungs. It develops among them at about the age of forty, and after they have been at work in the mines for about twenty years.

All forms of cancer of the lungs are found more frequently among men than women, and usually from twenty to forty years of age. It may, however, affect both sexes at all ages.

Other neoplastic growths are fibromata, lipomata, enchondromata, osteomata, melanotic tumors, dermoid cysts, myxomata, and hæmatomata. They are, however, rarely distinguished during life, as the symptoms they give rise to are very vague.

Symptoms.—The symptoms of cancer of the lungs may also be very vague, if the disease is not extensive. As it progresses, however, there are proportionate pain, cough, dyspnœa, and currant-jelly expectoration, showing that softening of the cancerous tissue has taken place. The patient gradually loses flesh and becomes emaciated, the cancerous cachexia becomes established, and there is œdema of the chest, arms, and face. Enlargement of the superficial veins of the thorax occurs in some cases, owing to pressure. Death occurs in about one year on the average, from exhaustion or some intercurrent disease. Occasionally the fatal termination is hastened by profuse hemorrhage. In some cases the great vessels of the heart, the pericardium, and the heart itself become involved, giving rise to disturbance of the circulation.

Physical Signs.—On inspection, there is noticed retraction of the chest wall over the affected part, with diminution of the respiratory movement on that side, in case of primary infiltrated cancer of the lungs.

Secondary nodular cancer may cause bulging of the chest wall with displacement of the heart. The cancer may also appear externally. The sputa are usually reddish-brown or currant-jelly, and contain cancer cells.

On palpation, the fremitus is usually increased, but pressure on a large bronchus leading to the part may obstruct the voice so that fremitus may be diminished or even absent. Complete displacement of lung tissue by a large tumor would also cause the fremitus to be diminished or even absent.

Percussion elicits dulness proportionate to the extent of infil-

tration or size of the nodules. The outline of the dull area is generally irregular and does not change with the position of the patient. Sometimes the dulness extends across the median line on account of coexisting enlargement of mediastinal glands. If a cavity forms, we would have signs accordingly.

On auscultation, bronchial breathing and bronchophony are usually heard owing to the consolidation due to infiltration or pressure. Obstruction in a large bronchus leading to the part, or displacement of lung tissue by a large nodule, would render the respiratory murmur and voice sound weak. The former might even be absent. Should a cavity be found, the blowing, cavernous breathing might be heard.

Râles are not commonly heard in the case of cancer of the lungs until softening has occurred.

Diagnosis.—Phthisis usually begins in the upper lobes and, like cancer, may affect only one lung. But cancer runs a more rapid course, and dulness may extend across the median line on account of coexisting cancerous mediastinal glands. The sputa in cancer are currant-jelly-like, and contain cancer cells instead of tubercle bacilli. The cancerous cachexia is soon established, and cancer may also appear elsewhere. Pain and dyspnœa occur earlier in cancer and are more prominent symptoms. Râles which are heard in the earliest stage of phthisis are not commonly present in cancer until softening occurs. By that time the cancerous cachexia and other signs already mentioned render the diagnosis easy. The absence of high temperature in cancer also aids in diagnosis.

Chronic pleurisy with retraction gives no inward pressure signs on the trachea and œsophagus. In pleurisy also the fremitus, respiratory murmur, and vocal resonance are diminished or absent. The dulness in pleurisy is much more regular in outline and is generally found at the base of the lungs posteriorly and does not extend across the median line. Pleurisy is also much slower in its progress. Cancer is usually found in front and at the top of the lung. In pleurisy also there may be cough, but little expectoration. The sputa, cachexia, and greater severity of the symptoms in cancer would aid in forming a correct conclusion. If there be effusion, the line of dulness changes with position of the patient. Should cancer give rise to pleuritic effusion, the latter, according to Bowditch, is always bloody, as easily told by the aspirating needle.

Syphilitic pulmonary infiltration would furnish the history of syphilis, other syphilitic lesions would probably be present, and improvement might rapidly follow antisyphilitic treatment.

Thoracic aneurism and cancer of the lungs may both give rise to dulness across the median line, inward pressure signs on the

trachea and œsophagus, and be attended by cardiac displacements and murmurs; but in cancer, besides the cancerous cachexia and sputa, there are often distention of the superficial thoracic veins, with œdema of the chest, arms, and face, which perhaps never occurs from thoracic aneurism. Moreover, in cancer of the lungs there may be evidences of cancer in other parts.

Prognosis.—The disease is necessarily fatal. The average duration is about one year, although it may prove fatal much earlier, or life may be prolonged two years or even more.

Treatment.—This is simply palliative. Symptoms are treated as they arise. Opium in some form should be given to allay pain and cough.

Gangrene of the Lungs. Abscess.

Pulmonary gangrene is mortification or putrefaction of lung tissue, and may be circumscribed or diffuse, affecting a lobule, a lobe, or an entire lung or more.

It occurs more frequently, perhaps, in the course of lobar pneumonia than in any other disease, and for that reason is found more frequently among men than women, and in the lower lobe of the right lung. It may, however, be found in both sexes and at any age.

Its seat is peripheral rather than in the interior of the lung. Lowered vitality from any cause, such as insufficient and innutritious food, alcoholism, and bad hygienic surroundings, predisposes to it. It is therefore found chiefly among the laboring and destitute classes.

Besides being met with in the course of acute lobar pneumonia, as already stated, it may result as an extension from putrid bronchiectatic cavities, or septic particles of food entering the bronchi and undergoing putrefaction. Sometimes it is caused by septic embolism, as may occur in diphtheria, hepatic abscess, epidemic dysentery, and pyæmia, and sometimes it is the direct result of surgical injuries.

As gangrene is preceded by inflammation and is secondary to some other disease during the course of which it occurrs, the symptoms of the primary disease need not be repeated. When, however, gangrene sets in, there are symptoms of collapse. These are usually sudden in their appearance, and vary according to the extent of lung tissue involved. More reliance is to be placed on the symptoms at first than the physical signs, but, until a free communication with a bronchial tube is opened for the expectoration to escape, a positive diagnosis may be impossible. When that occurs, there is no mistaking the character and peculiarly fetid odor of gangrenous sputa. Their color is usually that of prune juice, but this will vary according to the amount expecto-

rated and the ingredients of which the sputa are composed. In case of central gangrene, the sputa may be the only means of making the diagnosis. In some cases the affection may be so slight as to be entirely overlooked.

Shreds of tissue, including elastic fibres, fatty matter, detritus, and bacteria, are found in the sputa. These ingredients at once distinguish it from purulent bronchitis. Slight admixture of blood is frequently observed.

Gastro-intestinal symptoms, such as vomiting and diarrhœa, from swallowing the sputa, are sometimes present. The disease may terminate suddenly in death from collapse, but in other cases it intermits and runs a chronic course for several months or even longer. Septic material may be absorbed into the general circulation, giving rise to a pyæmic fever, with chills, sweats, and the like. In other cases the gangrenous area may be limited and no fever accompany it. Escape of gangrenous matter outwardly, or into the peritoneum or pleural cavity, may happen, but it is very rare. The physical signs of gangrene are chiefly those relating to the sputa already mentioned. After sufficient area of lung tissue is broken down and expectorated, a cavity results, the physical signs of which are given elsewhere.

Diagnosis.—The peculiar fetid and discolored expectoration of pulmonary gangrene, containing, as it does, decomposed bronchial plugs, and shreds of pulmonary tissue, usually enables the physician to distinguish gangrene of the lungs from putrid bronchitis, empyema that has ulcerated into the bronchial tubes, abscess, or cavities of phthisis.

Abscess of the lungs has an etiology similar to that of gangrene. In pneumonia it is rare, occurring about once in fifty cases, according to Wilson Fox, Huss, and others, but more frequently in pneumonia of the upper than lower lobe, and in this respect differs from gangrene. The physical signs, like those of gangrene, are the signs of consolidation, until communication between the abscess and bronchial tubes is established, when there will be profuse expectoration of pus, followed by signs of a cavity. There are also symptoms of collapse as in gangrene, but not so marked.

Prognosis.—The prognosis both of gangrene and abscess of the lungs depends upon the primary disease, the extent of the area of lung involved, and the condition and surroundings of the patient. Relapses occur, however, and on the whole the prognosis must be regarded as unfavorable. Where the disease is limited and the patient young and vigorous, recovery may take place.

Treatment.—The patient should be placed in a well-ventilated room of a suitable temperature, 75° F. Chloride of lime in an open vessel may be used as a disinfectant. An ounce of turpen-

tine in boiling water in an open vessel, as in treating diphtheria, may also be useful. Other antiseptic inhalations are probably useless.

In addition to this, the general treatment of the patient is of the first importance. Not only is plenty of fresh air indicated, as already remarked, but the treatment should be supporting. For this purpose nutritious and easily digested food, as peptonized milk and the like, is indicated, as well as alcoholic stimulants. In order further to strengthen the heart as well as to reduce temperature, if the latter be necessary, digitalis should be used. This drug may also be combined with opium if the cough and pain be troublesome. (℞ Tinct. digitalis, Magendie's solution morphiæ sulphat., āā ʒ i.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. every three hours.) Tablets of antifebrin, two to five grains each, might also be given every three hours to reduce temperature, if necessary. As collapse with lowered temperature usually obtains, however, such drugs are rarely to be thought of. The internal administration of turpentine, sodium salicylate, and quinine is of little or no value, as well as external applications, such as blisters, cups, and the like. The chief reliance is to be placed on alcoholics and other supporting measures, including proper hygienic surroundings.

Hemorrhagic Infarction of the Lungs.

Etiology and Pathology.—Hemorrhagic infarction or embolic processes in the lungs, is circumscribed pulmonary apoplexy due to embolism.

Pulmonary infarction may occur in several ways. First and most commonly, there is plugging of a branch of the pulmonary artery by an embolus, followed by diapedesis or transudation of blood into the parts formerly supplied by the obstructed arterial twig. Secondly, and more rarely, it is due to rupture of a branch of the pulmonary artery from intense hyperæmia around the obstruction and fatty degeneration of the vessel. The blood in such cases, according to Rindfleisch, finding its way into the air cells and bronchi in the neighborhood, rapidly coagulates, and the process then ceases.

Finally, in some cases no known cause for the infarction can be found, all trace of an embolus having disappeared.

After complete obstruction of a twig of the pulmonary artery by an embolus has occurred, the parts beyond the plug, including air cells, bronchioles, and interstitial tissue, become the seat of hemorrhagic infiltration; but how?

According to Cohnheim, this is accomplished by the arterial blood being forced backward or regurgitated from the capillaries of the pulmonary veins into the excommunicated capillaries of

the obstructed twig of the pulmonary artery. The latter do not rupture usually, but allow a diapedesis or transudation of blood through their walls, which have become abnormally permeable owing to disturbance of their integrity by embolism. Besides this, they probably allow leakage of arterial blood more readily than venous blood, to which they had been accustomed. It was formerly thought that infarction in these cases was always due to rupture of capillaries simply from intense hyperæmia, as might occur in mitral disease, without taking the embolus into account. But this did not explain why the infarction was limited to such abruptly and well-defined areas, sometimes a single lobule. The true explanation in these cases is that, owing to mitral obstruction or regurgitation, there follows, sooner or later, dilatation of the right ventricle. At first it is dilated hypertrophy, but in time dilatation becomes prominent and, not being properly compensated by hypertrophy, the blood-current becomes sluggish. In this condition thrombi or venous clots may form in the right heart, especially in the musculi pectinati of the right auricular appendix, or between the columnæ carneæ of the right ventricle near the apex. From these thrombi, emboli, becoming detached, cause infarctions in the lungs by their direct transmission along the pulmonary artery.

Emboli, besides originating in the right side of the heart from dilatation, may enter the systemic venous circulation from any part of the body, and, passing through the right heart, produce infarction in the lungs. In fractures or other severe injuries of the skull affecting the diploë, otitis giving rise to inflammation of the petrous portion of the temporal bone, and thrombosis of the cerebral sinuses from any cause, emboli may enter through the superior vena cava into the right side of the heart.

In like manner emboli may become detached from thrombi formed in any of the peripheral veins, as occurs sometimes in typhoid or other fevers; also in thrombosis of uterine or ovarian veins, and even the iliac or renal veins from pressure caused by large uterine fibroid and other tumors.

When the emboli are septic, metastatic abscess generally occurs, instead of infarction or rapidly follows it.

It may be observed here that emboli originating in the portal circulation, as sometimes occurs in hemorrhoids or dysentery and pylephlebitis, are likely to produce infarctions in the liver. Those coming from the lungs or left side of the heart affect the brain, spleen, or kidneys, as elsewhere fully described.

Hemorrhagic infarction may only affect a single lobule or there may be several infarctions simultaneously in one or both lungs. From the fact that the pulmonary artery becomes smaller as we approach the surface of the lung, infarctions are found more com-

monly at the periphery than in the interior of the lungs. For the same reason also, central infarctions, when they do occur, are more extensive than peripheral. Naturally, the infarcted areas are somewhat pyramidal in shape, with their bases toward the periphery. From what has been already said, hemorrhagic infarction of the lungs may affect both sexes at all ages.

Symptoms.—In all cases of this disease, sudden dyspnœa is a symptom, and it will be proportionate to the area of pulmonary tissue involved. Along with this there is cough, and the expectoration is characteristic, the sputa being brownish-red and darker than those of lobar pneumonia. If the infarction be due to thrombosis in the right heart from causes already mentioned, there may also be a correspondingly sudden irregularity of the heart's action and radial pulse. The sudden occurrence of hæmoptysis of the character above mentioned, in connection with heart disease of long standing, is generally due to infarction, even though the prominent symptoms of irregular cardiac action and intense dypnœa be absent. In other cases the infarction may give rise to pleurisy with its attending pain. Sometimes pneumonia is developed to a varying extent, and even gangrene may result. Frequently the symptoms are so vague or wanting, that infarction may be entirely overlooked.

The temperature is generally slightly increased, sometimes rising to 102° F. Septic infection is often overlooked on account of the general condition of the patient.

Physical Signs.—On inspection dyspnœa will be observed which upon inquiry will be found to have come on suddenly. The dyspnœa will be in proportion to the extent of infarcted area. The sputa are brownish-red, being darker than those of lobar pneumonia.

On palpation, the vocal fremitus will be found to be usually increased, unless the infarction be central or complicated with pleurisy.

Percussion elicits dulness in proportion to the extent of the infarction. Should this area be small or located centrally, there may be little or no dulness.

Auscultation reveals bronchial breathing and bronchophony over the part affected if the infarcted area be sufficient. Crepitant and subcrepitant râles are also usually heard.

In some cases there are no physical signs owing to the small extent of the infarcted area, or existing complication, pleurisy for instance. The heart should always be examined.

Diagnosis.—By means of sudden dyspnœa, localized spots of dulness, if any exist, crepitant and subcrepitant râles, and slight rise in temperature with the characteristic brownish-red sputa, which last for a greater length of time than in pneumonia; the

coexistence of heart disease, especially old mitral lesion, and the etiology in general; it is usually an easy matter to make a diagnosis.

In cancer of the lungs, the sputa resemble those of infarction, but the former contain cancer cells, and there would be the cancerous cachexia, and other signs already mentioned. According to Loomis, the sputa of hydatid disease of the lungs may also resemble those of infarction, but in the former case the discovery of hooklets would be decisive.

Prognosis.—This is always unfavorable when dependent on cardiac thrombosis and septic emboli. It is also unfavorable in proportion to the area of lung tissue involved, and the number of infarcts present. In case of small peripheral single infarcts of aseptic origin, the prognosis is generally good. But even here it depends much upon the original cause.

Treatment.—This is purely symptomatic. Hemorrhage is rarely so profuse as to call for the use of hæmostatics. Absolute rest in bed for the time being, and regulating the action of the heart in case of disease of that organ may become necessary. For the latter purpose digitalis may be used in general, as the heart's action is likely to be not over-strong. Should signs of collapse be present, with cool extremities, as may occur in severe cases, alcoholic stimulation and the application of sinapisms to the body and extremities may become necessary. Extensive dry-cupping, in the author's experience, relieves dyspnœa better than anything else. For dyspnœa and the cough, as well as enfeebled and irregular heart's action, five to ten minims of Magendie's solution of morphine given hypodermically is often an excellent remedy. Should pleurisy or pneumonia arise as complications, they are to be treated independently of the infarction.

Pulmonary Apoplexy.

Pulmonary apoplexy is escape of blood into the lung tissue, and may be circumscribed or diffuse.

Circumscribed pulmonary apoplexy due to embolism is, as we have already seen, termed infarction. But this form may also occur locally from causes which lead to rupture of pulmonary capillaries, either by over-distending them or weakening their walls, or both, without embolism. These causes are fully considered when speaking of hæmoptysis.

Diffuse apoplexy causes more or less destruction of pulmonary tissue by extravasation of blood, which has escaped from one or more large vessels. Sometimes the hemorrhage is confined within the lung substance; at other times, from rupture of the pleura, the blood may be discharged into the pleural sac.

Diffuse pulmonary apoplexy may be due to surgical injury, or rupture of large vessels due to previous atheromatous degeneration, or in the course of gangrene, cancer, or thoracic aneurism. It occurs more frequently among men than women, for the obvious reason that men are more exposed to the cause.

The symptoms are those of collapse. The surface becomes cool and clammy, the countenance anxious, the pulse feeble, irregular, and even intermitting, and on auscultation, bubbling râles would be heard over the chest before coagulation took place. Hæmoptysis is usually present, sometimes it is profuse, or, the blood escaping into the pleural cavity without communication with a bronchial tube or the trachea, there would be very slight hæmoptysis. After coagulation of blood, if the patient lived, there would be signs of more or less consolidation. After absorption of the clot and recovery have taken place, the signs would again become normal, unless a cavity, cicatrized tissue, or some other abnormal condition remained.

Generally, however, the patient dies before physical examination can be made or any treatment adopted. In slight cases, however, recovery is not only possible but probable. The patient should be kept perfectly quiet, with abundance of fresh air, and the same treatment by hypodermic injections of morphine and ergotine as in hæmoptysis from any cause. Bits of ice for thirst should be freely allowed, but the administration of such astringents as gallic acid, ferric alum, and the like is useless. Bags of ice to the chest are also recommended. Care should be taken, however, not to render the clothing and sheets damp. This can easily be avoided by a little care and having the ice thoroughly enclosed in rubber or oil silk. On no account should the patient be allowed to walk up-stairs to the bedroom, but should either remain down-stairs or else be carried up by a stretcher or other means.

Hydatid Disease of the Lungs.

Hydatids, or echinococci of the lungs, as well as of other organs of the body, are parasitic growths that occur usually where dogs are plentiful and open water for drinking, as in Iceland, Australia, Texas, and other countries.

No locality can be said to be entirely free from this disease where such a combination of circumstances exists, since it is through infected water that the disease is most frequently contracted. Eggs or scolices of the tænia echinococcus may also be inhaled, or carried to the mouth by the fingers, and so enter the body.

When taken into the stomach, as in drinking infected water, they are carried by the portal circulation into the liver, where they

usually become located first, especially in the right lobe. From thence they migrate into the lungs, pericardium, pleural cavities, peritoneum, stomach, and intestines. They generally enter the lower lobe of the right lung from the liver, directly through the diaphragm, and hence the frequency with which they are found in that locality. But instead of this, they may also find their way into the inferior vena cava, by the hepatic veins, and so through the right heart into any part of one or both lungs.

When inhaled they are more likely to attack the upper lobe of the right lung, as the right bronchial tube, larger than the left, allows their entrance more readily into the right side.

Symptoms.—The symptoms of pulmonary hydatid disease differ according to the number and size of the cysts. There are chiefly sensations of pain and oppression in the chest, dyspnœa, and cough. Sometimes there are attacks of suffocation and hæmoptysis. Fever and emaciation occur in some cases. Pleurisy may be a complication.

Physical Signs.—Should one or more cysts be superficial and extensive, bulging of the chest walls with displacement of the heart and liver may occur. The dulness on percussion may extend across the median line, with diminution or even absence of the respiratory murmur and vocal fremitus over the seat of dulness.

In other cases, compression of the lung tissue may give increased vocal fremitus, bronchial breathing, and bronchophony at some point. Should the contents of the cyst be expectorated, signs of a cavity may result.

Diagnosis.—Physical signs of pleurisy with effusion at the upper instead of the lower part of the thorax should always be regarded with suspicion. But a positive diagnosis can only be made in any case when a cyst ruptures, and scolices or hooklets are found in the sputa; or else, if a hydatid cyst be suspected, and it is sufficiently near the surface, some of the fluid, aspirated by means of the hypodermic or other aspirating needle, may be found to contain some scolices or hooklets, which would be decisive.

Prognosis.—When the cysts rupture and are coughed up through communication with a bronchial tube, or undergo suppuration or calcification, the prognosis is good. According to Loomis, about fifty per cent recover. But death may result from suffocation, hæmoptysis, gangrene, or inflammation resulting from rupture into the peritoneum, pericardium, or pleural cavity.

Treatment.—As a prophylactic measure, the drinking of impure water should be avoided. Aspirating the cysts when possible, and as soon as the diagnosis can be made, may be of benefit, especially if they be washed out with mild solutions of iodine.

At first, however, it is better to inject a weak tepid solution of borax. (℞ Pulv. sodii biborat., ʒ ij.; aquæ, ℥i.) Then iodine, say a drachm to eight ounces, may be used about three times weekly, and after that stronger solutions may be tried. But the practitioner is warned against very strong injections to begin with. Unpleasant complications may arise, far worse, if anything, than the original disease. This is a very important fact. Sustaining the vital powers by nutritious and easily assimilated diet, so often urged, is obviously necessary in many cases, and even alcoholic stimulants may be indicated.

The administration of iodide of potassium, so strongly advocated by some, is evidently worthless, so far as effecting a cure is concerned. But, as in thoracic aneurism and other tumors surrounded with more or less inflammatory exudation and proliferated connective tissue, iodide of potassium is temporarily of benefit in reducing the size and retarding the growth of such tissue. Otherwise it is useless.

Hæmoptysis.

Hæmoptysis is the spitting of blood, pure or mixed with other matters, but always in quantity sufficient to be seen with the naked eye.

Etiology and Pathology.—In true hæmoptysis, the blood must come from the larynx, trachea, bronchi, or pulmonary tissue—in other words, from any part of the respiratory apparatus below the epiglottis.

Hæmoptysis occurs more frequently among men than women, and from fifteen to thirty-five years of age. It is rare in children and the aged.

Now, as regards the causes of hæmoptysis. In general terms, wounds or other injuries, ulcerative processes, over-distention of capillaries from any cause, and weakness of their walls are more or less causative of hæmoptysis, as well as hemorrhage from other organs. In addition to these, there are certain local causes to be considered; and these local causes differ according to the seat of the hemorrhage.

First, laryngeal or tracheal hemorrhage is not a very frequent source of hæmoptysis, nor is it usually copious. At most, the sputa are tinged or streaked with blood. It is due sometimes to severe catarrhal hyperæmia or congestion, but is more frequently caused by an ulcerative process of some kind, such as syphilitic, cancerous, or tuberculous, and is sometimes due to the presence of aneurism.

Bronchial hemorrhage, secondly, is the most frequent source of hæmoptysis. Besides ulcerative causes, especially in connection with mediastinal tumors and thoracic aneurism and traumatism,

the capillaries may become over-distended and rupture from intense hyperæmia, as in severe bronchitis, mitral obstruction, and regurgitation, or excessive action of the heart from hypertrophy or stimulants.

Rupture of capillaries from weakness of their walls is seen in the hemorrhagic diathesis or hæmophilia which appears to be hereditary, scurvy, scrofula, and rickets, and in chronic interstitial nephritis with hypertrophy of the left ventricle of the heart and brittleness of the arterioles from fibrosis of their muscular coats throughout the body. It may also occur, for the same reason, in the course of typhoid fever, malarial fevers, and the exanthemata which sometimes assume a hemorrhagic character.

Profuse hæmoptysis from bronchial hemorrhage may also occur in tuberculous patients before there are any physical signs of tubercle. After the disease has become established, it is usually easy to account for the hemorrhage, but, according to Walshe, "The very early hæmoptyses of phthisis remain anatomically unexplained." Niemeyer says that they are due to weakness of the walls of the vessels. The truth is the walls of those vessels, according to Williams and others, are weakened by the presence of bacilli, as proven by the microscope. It is not unlikely that in such cases the bronchial glands are primarily the seat of bacilli, which are taken up by the vessels and carried to the lungs. On their way they cause hemorrhage by injury to the capillary blood-vessels before they have yet produced localized inflammation of pulmonary tissue. Instead of tubercular ulceration of the vessels, the latter sometimes are found to have undergone fatty degeneration. In some cases both of these conditions are found together. According to Flint, hæmoptysis is almost certain to indicate phthisis unless it can be accounted for by injury or heart disease. To these exceptions Sir Thomas Watson adds vicarious hemorrhage. But this, as is now known, is often associated with tuberculosis.

Vicarious bronchial hemorrhage with hæmoptysis sometimes takes the place of the menses, but even here the women are not infrequently if not always phthisical.

Finally, pulmonary hemorrhage is a source of hæmoptysis and is next in frequency to bronchial. They are produced by similar causes and often exist together. Besides causes already mentioned, therefore, it occurs to a slight extent in acute lobar pneumonia, and hence the rusty-colored sputa in that disease. It may also be due to rarefaction of air during violent inspiratory efforts with the glottis obstructed as in croup—in fact, intense congestion from any cause, such as exposure to cold, or cardiac excitement from over-stimulation with alcohol, or hypertrophy, and heavy lifting.

It may also occur in the course of hydatid disease, cancer, gangrene, abscess, and pulmonary consumption in any stage. After cavities are formed in the latter disease, large vessels ramifying in their walls or extending through them first become aneurismal, and then may rupture, giving rise to profuse hæmoptysis which may speedily prove fatal.

Pulmonary hemorrhage is sometimes of nervous origin, as seen among the insane, in chorea, epilepsy, hypochondriasis, and in various cerebral and spinal diseases. It occurs also in pulmonary infarction, as well as diffuse apoplexy of the lungs from any cause, as already stated.

Symptoms.—Hæmoptysis does not usually occur suddenly and without warning of some sort, especially in those cases where the hemorrhage is profuse. The blood expectorated is generally bright red and frothy. In many cases it is intimately mixed with sputa; at other times there may be a discharge of pure blood varying in amount from a spoonful to a pint or more. Generally the patient expectorates into a vessel already containing water, so that it nearly always appears greatly in excess of what it really is. In like manner, as blood spreads on fabrics of various kinds, appearances are nearly always worse than the true conditions, to judge from the number of bloody cloths about a room sometimes. When the blood has remained in a cavity, it may be expectorated in dark clots. The sputa in pneumonia are rusty-colored, in hemorrhagic infarction reddish-brown, and in gangrene they are generally prune-juice.

For a few hours or a day or more, in some cases, before a profuse hæmoptysis, the patient not infrequently has a sense of pain or constriction across the chest, or perhaps a rush of blood to the head. Suddenly there is a warm trickling sensation behind the sternum, and blood may then be coughed up in small quantities for a day or two. Or it may be a profuse hemorrhage at once, and sometimes it results fatally.

Physical Signs.—During the flow of blood, besides seeing the blood expectorated, dyspnœa to varying degree will be observed on inspection, together with increased frequency of respiration and pallor of the surface if hemorrhage be profuse.

Palpation and percussion at this stage usually give negative results. Rhonchal fremitus, however, may be present.

On auscultation, moist bubbling râles of various sizes will be heard over the seat of hemorrhage and in various tubes. Even crepitant râles may sometimes be heard.

The vocal resonance is generally unchanged.

After coagulation of blood takes place, all the physical signs will usually be those of consolidation, and in proportion to the amount of coagulated blood and the area involved.

Diagnosis.—Careful examination of the mouth, pharynx, and nasal cavities will readily exclude them as sources of the hemorrhages. Even in cases, occurring during the night, when some of the blood is swallowed or gets into the pharynx during sleep, there are apt to be evidences of nose-bleeding. Moreover, the blood hawked up in thees cases is dark and mingled with nasal secretions and is unattended by any previous symptoms or cough.

In hæmatemesis the blood is vomited up, and is usually dark and clotted, and mingled with food and acid; in cancer of the stomach it resembles coffee grounds from being partly digested; but in ulcers of the stomach the vomiting of fresh liquid blood may be profuse so as to very much resemble hæmoptysis. But in all cases hæmatemesis is preceded by symptoms referable to the epigastric region, such as severe pain after eating, and nausea. In hæmoptysis the blood is coughed up instead of being vomited, is bright red, frothy, pure or mixed with sputa, is alkaline, and the symptoms are referable to the chest, such as a sense of constriction, pain, and a warm trickling sensation behind the sternum. The seat of the hemorrhage depends on the particular cause in each case. As bronchial and pulmonary hemorrhage are due to the same causes and often exist together, it might be impossible to distinguish between the two. Bronchial hemorrhage is, however, much more frequent than pulmonary. A positive distinction between the two is quite unnecessary, as the treatment is the same for both.

It is true that sometimes, when gastric hemorrhage is profuse, the blood is bright red and alkaline, as may occur in some cases of ulcer of the stomach. On the other hand, in hæmoptysis it is sometimes dark and clotted, as when it has remained in a cavity. But the symptoms referable to the stomach and chest in each case respectively will usually lead to a correct diagnosis. Moreover, melæna or dark stools often follow gastric hemorrhage, owing to the presence of dark blood.

Prognosis.—This depends on the cause and the extent of the hemorrhage. Pulmonary apoplexy is, as we have seen, a serious and often fatal affection. Occurring in the course of tubercular consumption, profuse hemorrhage often hastens the fatal result. Sometimes it is immediately fatal by causing suffocation or collapse. In connection with thoracic aneurism, it is not infrequently and speedily fatal. With these somewhat rare exceptions, hæmoptysis in most cases is not a dangerous occurrence. Occurring early in phthisis, it generally indicates rapid progress of the disease. Not only has the latter a firm hold already, but the blood drawn back into the air cells by insufflation offers a medium for the rapid proliferation of bacilli.

Treatment.—The patient should be kept at perfect rest in bed in a quiet, cool, and well-ventilated room, and free from noise and excitement. For the purpose of getting to the bed-room the patient should not be allowed to walk up-stairs, but should be carried up or else remain down-stairs. All noise and excitement should be avoided, and the patient should not be allowed to talk. The two remedies are morphine and ergotin, and both should be given hypodermically. From a sixth to a fourth of a grain of morphine, in the case of an adult, should be given hypodermically, as quick action is needed, and there is no time to wait for absorption by the stomach, which may be very slow in such cases. After giving the morphine, which allays cough and restlessness, from one to three grains of ergotin should be given, also hypodermically. This may be repeated after three or four hours if necessary. What food is taken should be limited to small quantities of cold fluids, such as a little cold milk, and, to make sure of digestion and a quiet stomach, the milk should be peptonized. Bits of ice by the mouth also may be allowed.

A solution of common salt or chloride of sodium has been highly recommended. Sometimes a teaspoonful of the dried salt is given. The theory is that by absorbing fluids, it thickens the blood and renders it more coagulable. I have tried it, but have never seen it do any good. Besides it is often a nauseous dose. Given in small quantities for a length of time, it may be of some benefit in preventing hæmoptysis.

Acetate of lead, ½ grain, and opium, ⅓ grain, every two hours, tannic acid (four grains every two hours), alum, iron, and gallic acid have all been recommended, but are probably worse than useless. Five grains of gallic acid in the form of glycerite with one-third grain of opium every two hours would be the best way of giving it. Even then the opium alone is of benefit in all probability.

Antimony and ipecac have been used, but they are, like other emetics, of no use, and cannot fail to do harm. Counter-irritation does no good. Dry cups, however, might be tried in urgent cases, but generally do no good; besides, they annoy the patient.

In mild cases, where the patient has merely a spitting up of blood, a teaspoonful of fluid extract of ergot ter die will often be sufficient. If cough be troublesome, it may be given with some cough mixture containing opium sufficient to allay it. Such a mixture should be given in all cases requiring it. Bags of ice to the chest may be employed in some cases, but their efficacy is doubtful. Care should be taken, if they are used, not to wet the patient's clothing and sheets. Rest, opium, and ergotin, a cool and well-ventilated apartment, with cool fluids in moderation for food, form the chief treatment for hæmoptysis.

Phthisis.

Phthisis, as now generally understood and accepted, not only signifies tuberculosis but, unless otherwise specified, it implies pulmonary tuberculosis, the germ of which is Koch's tubercle bacillus, and infectious under certain conditions, as will be presently described.

The disease may be acute or chronic, but whether its progress be slow or rapid, or whatever form it may assume, there is but one phthisis, and that is tubercular.

Acute Phthisis.

Acute phthisis occurs when the progress of the disease is rapid. In these cases it may appear to commence as a lobar pneumonia, but its true nature soon becomes evident. Instead of resolution taking place as usual, there are repeated chills and signs of softening, followed by excavation, rapid emaciation, and death, usually in the course of a few weeks. Various names have been given to these acute cases, such as phthisis florida, galloping consumption, tuberculous lobar pneumonia, acute caseous pneumonia, and by Williams, of London, it is termed scrofulous pneumonia. When associated with extensive hepatization of pulmonary tissue it is then termed by the same author acute tuberculo-pneumonic phthisis. But inasmuch as phthisis is always necessarily a tuberculous disease, it is sufficient, perhaps, to call it acute pneumonic phthisis simply.

Acute phthisis may also be a part of that form of the disease known as miliary, general, or disseminated tuberculosis, which affects various organs and tissues throughout the body simultaneously. The physical signs of pulmonary disease in such cases are chiefly those of bronchitis, the tubercles being disseminated throughout the lungs.

Acute general miliary tuberculosis is nearly always secondary to some pre-existing tubercular lesion from which bacilli in large numbers find their way into the blood; however, such lesion may have been overlooked. The bacilli do not proliferate readily in the swiftly running and circulating blood, but may be conveyed by it, to a limited extent, even in ordinary cases of chronic phthisis, especially to such organs as the liver, kidneys, spleen, and meninges of the brain; the circulation in those parts favoring their lodgement. But in general miliary tuberculosis the bacilli enter the blood in large numbers, either through the lymphatics, especially the bronchial glands, or by unoccluded veins. In this manner of absorption and conveyance by the vessels, it somewhat resembles pyæmia.

According to Ponfick, tuberculosis of the thoracic duct fulfils the necessary conditions for a general outbreak; and according to Weigert, of the vessels concerned in its production, the pulmonary veins occupy about half the number of all the cases, and then follow in order the splenic, portal, hepatic, and internal jugular veins.

To sum up the varieties of acute phthisis, therefore, they may all be reduced to two—(1) acute pneumonic phthisis, and (2) acute disseminated phthisis. In the former case the disease affects a certain well-defined area of pulmonary tissue with all the physical signs of consolidation and perhaps subsequent excavation. In the latter the tubercles may be so disseminated as to give only the physical signs of a bronchitis.

In chronic phthisis, which is much more common than the acute, the disease assumes various forms, but these may be reduced to two according to the tissues chiefly involved—(1) catarrhal, and (2) fibroid. They are not always distinctly separate, but may and often do exist together in various proportions. The catarrhal form is the more common of the two, and will be described first.

Catarrhal Phthisis.

Etiology and Pathology.—Catarrhal phthisis is that chronic form of the disease most commonly met with, and, as is well known, it usually appears first at the top of the lungs.

The reasons given for its affecting the pulmonary apices first are as follows: first, those parts are the most liable to injury from exposure or strain from coughing or lifting, and, according to Green, injury to the vessels from imperfect circulation, with stagnation of blood—conditions that tend to produce frequent exudations that are favorable to the lodgement of bacilli; and secondly, there is less respiratory motion with consequent imperfect ventilation, and less tendency to the absorption of exudations and disturbance of bacilli.

Beginning in the bronchioles, which become plugged with an inflammatory exudation and usually limited to a circumcribed area, the disease extends down into the air cells, resembling in this respect lobular or broncho-pneumonia. It is in fact a tuberculous lobular pneumonia, which is one of the names by which it is known. Other names for this form are caseous phthisis, caseous infiltration, catarrhal pneumonic phthisis, broncho-pneumonic phthisis, bronchitic phthisis, and the like.

The walls of the bronchioles become infiltrated with leucocytes (white blood-corpuscles) and the bronchioles and air cells become stuffed with leucocytes and epithelioid cells, as in ordinary inflammation. In severe cases fibrin and blood are even found. But

besides these are tubercles which characterize the disease and distinguish it from all others.

Now, what is a tubercle when reduced to its ultimate elements? According to Cheyne, it is composed of epithelioid elements derived from the membrane attacked by bacilli. Coats, of Glasgow, regards it as composed of leucocytes (white corpuscles of the blood), epithelioid and greater epithelioid or giant cells, the whole forming a non-vascular collection that assumes a roundish form, of about $\frac{1}{50}$ inch in diameter or less. It is not to be regarded as an adventitious growth, according to Williams, but simply as a hyperplasia of normal tissue, caused by bacilli, which are minute vegetable bodies $\frac{1}{3000}$ inch long, that have found lodgement in a favorable soil from without, generally by inhalation. These tubercles are primarily similar, if not identical, in all forms of the disease and in whatever locality found, differing chiefly in color and consistency according to their age and the changes they have undergone. Hence they are conglomerated or disseminated, soft or hard, and gray, white, or yellow, according to circumstances. The unity of phthisis as well as other tubercular affections is thus established, however forms of the disease may differ.

As the disease progresses, there soon occurs caseous metamorphosis of the tubercles and other products mentioned, together with necrosis of the delicate tissues involved, resolution being impossible. Softening of these caseous materials leads to the formation of cavities, partly by absorption, but chiefly by expulsion in coughing. The bacilli are found chiefly in the softened contents and on the walls of the cavities, but they may also exist in all the affected tissues.

It is interesting here to observe how this form of phthisis extends. The blood-vessels are usually and fortunately occluded by the ulcerative process, so that it cannot spread by absorption of the bacilli into the blood except to a very limited extent, or in rare cases of general tuberculosis, as already mentioned. It has no predilection for the lympatics, but it extends along the air passages from one point to another. Imperfectly expelled virus is also drawn back, during inhalation, into parts as yet unaffected. In this way secondary cavities are formed, as also intestinal ulcerations, the latter from swallowing the virus. From these the mesenteric glands become enlarged and the peritoneum affected secondarily by absorption.

Sometimes this form of phthisis is observed in scrofulous children and is then very chronic. This form is termed, by Williams, scrofulous phthisis.

Laryngeal phthisis is also spoken of by authors, but it is a tubercular laryngitis that is nearly always secondary to or

coincident with the pulmonary disease. When hemorrhage is an early and prominent sign, it is sometimes called hemorrhagic phthisis.

Instead of beginning in the bronchioles through inhalation of bacilli, the bronchial glands are sometimes primarily affected. Bacilli may remain in these glands stored up, so to speak, for an indefinite period, and then extend to the pulmonary tissue. It may be in such cases that hæmoptysis, due to tubercular ulceration of the vessels, occurs as an early sign and before any physical pulmonary or bronchial signs exist.

Tuberculosis is a contagious disease under certain conditions, especially those that tend to lower vitality. It is transmissible even between man and animals by the digestive tract, as was first found by Chauveau, in 1868, through uncooked tuberculous food, especially cow's milk and beef; also through the respiratory tract through infected air, as was proved by Villemin in 1869 and Tappeiner in 1876–77. Tuberculous virus is also transmissible by inoculation, by subcutaneous injection, or through the integument stripped of its epidermis, as was proved by Villemin in 1869; and also in the following ways: by other mucous membranes than those already mentioned, as the conjunctival and genito-urinary; by dermatoses which destroy the epidermis; through sudoriparous and sebaceous glands; and finally through wounded and absorbing surfaces. In some cases, according to Landouzy and Martin, the ovule of the mother may become directly infected by the spermatozoa infected with bacillary germs.

Koch's tubercle bacillus thrives best at a temperature of 98° F. to 100° F., and is capable of proliferation between 86° F. and 104° F., although it may live far beyond these extremes. It remains virulent in running water at a temperature of 60° F. for six weeks, and in stagnant water of the same temperature for eighteen weeks, in dried sputa for a month. It attacks the lungs by preference, though no tissue is exempt from it.

From what has already been said, it is seen that tuberculosis is a disease the germ of which is the bacillus discovered by Koch, of Berlin, in 1882, and that it manifests itself in various ways, most frequently as pulmonary tuberculosis or phthisis. But instead of this, or with it, sometimes it manifests itself as acute general miliary tuberculosis or tubercular peritonitis, meningitis, or pleuritis, and the like.

Pleurisy is thought by some to cause phthisis, but this cannot occur directly unless the pleurisy be of tubercular origin. In by far the greater numbers of these cases the pleurisy is caused by the pulmonary affection of which it is merely symptomatic, the real condition having been overlooked. Non-tuberculous pleurisy can only give rise to phthisis by lowering vitality and

limiting respiratory movements so as to render the patient more susceptible to tuberculous infection.

A much vexed question has been the relation between scrofula so-called and tubercle. The truth is there is no such thing as scrofula, but it is tuberculosis in which the bacilli are confined chiefly to the lymphatics, where they become modified or even destroyed. On the other hand, they thrive in the pulmonary vesicular tissue and proliferate rapidly.

The disease attacks both sexes at all ages, but is seen most frequently among those between twenty and thirty, that period of life when growth and reparative process are less vigorous than before, and exposure to influences that favor its production are greater. As already stated, anything that tends to lower vitality predisposes to it. It is this potent factor of the disease that is inherited, in all probability. The patient inherits the disposition, and this consists in lack of vigor to resist the infection, as well as thin chest and inadequately developed lungs. In addition to these may be mentioned insufficient light, damp localities, previous ill health, mental anxiety, rapid child-bearing, lactation, venereal excess, menstrual disorders, and the like. Overwork and insufficient food are also causative of the disease, especially among those who may be predisposed to it by inheritance. Occupations necessitating the inhalation of dust and irritating particles, do not of themselves cause phthisis, but they act powerfully as predisposing causes by giving rise to bronchitis, thus favoring the lodgement of bacilli, as well as interfering with the general health so as to lower vitality. But the immediate cause in all cases of phthisis is the presence of the tubercle bacillus. All other predisposing causes merely furnish a favorable soil for the lodgement and growth of these bacilli. And these may enter the body in many ways, as already stated, but in phthisis they probably enter the lungs chiefly through inhalation of infected air. From this it would appear that the right lung would be more frequently the primary seat of the disease, the right bronchial tube being larger than the left; but this point does not appear as yet to be settled.

According to Flint, those who already have general vesicular emphysema or cardiac disease are not as subject to phthisis as others, though satisfactory explanation is wanting.

Symptoms.—Perhaps the first symptom in chronic phthisis of either form is cough. At first it is dry and hacking, and occurs chiefly in the morning. It is attended with little or no expectoration, in fact the cough is more reflex from the irritation caused by the presence of tubercle than it is from inflammation. Soon, however, a localized capillary bronchitis at the top of the affected lung is set up, and the expectoration is somewhat increased in

quantity, but even now it is scant and does not usually contain bacilli. As the disease progresses, the cough becomes more and more troublesome. The expectoration, at first scant, now becomes abundant and purulent. It often contains elastic fibres of pulmonary tissue and, after softening takes place, it swarms with bacilli. Not infrequently the sputa become mixed with blood, and sometimes they are of a greenish color from putrefaction of the ingredients. After cavities have formed, the matter expectorated collects in them, at night especially, and when expelled forms circular disks shaped like money, and constitutes the so-called nummular expectoration. As the patient becomes more and more feeble, especially when the throat becomes very sore and painful, some of this material is imperfectly expelled and swallowed. By this means ulceration of the bowels takes place. The cough, from having been dry and hacking at first, toward the end often, with the voice, becomes hollow or sepulchral.

Hæmoptysis may also be one of the earliest signs of phthisis, though it may occur at any period of the disease. Formerly it could not be explained, but was thought, as Niemeyer puts it, to be due to weakness of the vessels. Now, however, according to Williams, it has been found to be due to tubercular ulceration of the capillaries and their fatty degeneration. In these cases the primary seat of the disease may be in the bronchial glands, whence bacilli are carried to the lungs by the vessels, instead of the disease commencing in the bronchioles, as it generally does.

The amount of blood expectorated differs greatly. In some cases the sputa are merely streaked with blood. In other cases the patient may rapidly lose a pint or more. Sometimes death from collapse or suffocation follows immediately. After cavities have formed, the vessels formerly supported by lung tissue become dilated after that support has been removed by the process of excavation. The bursting of a large aneurism in one of these cavities may also cause speedy death. In other cases the walls of the vessels become necrosed and then rupture.

Frequency and feebleness of the pulse is one of the earliest signs of phthisis. The cause is not exactly known. Possibly it may be due to the influence of the tuberculous virus on the heart, even at this early stage.

Loss of appetite is also one of the earliest symptoms. Not infrequently it is accompanied by nausea and even vomiting, especially during or after a severe attack of coughing. The loss of appetite is doubtless due to the lowered condition of vitality on the part of the patient, rather than dyspepsia in any form.

Fever is also one of the symptoms of phthisis. At first the skin feels hot and dry even though the thermometer may not show any fever. The unnatural warmth imparted to the touch

is no doubt due to the dryness of the skin. As the disease progresses, however, the thermometer shows an increase in the patient's temperature, going up to 101° F. to 103° F. in the afternoon. The temperature in the early morning is generally normal, and may even be below normal. A rapid rise of temperature to 104° F., say, indicates extension of inflammation so as to involve lung tissue or pleura. A fresh spot of pneumonia or pleurisy is always attended with rise of temperature according to amount of tissue involved. After softening takes place, the fever is generally preceded by a chill in the afternoon. This hectic or habitual fever usually begins after softening has occurred. From absorption of purulent material toward the end, the fever resembles that of pyæmia.

Night sweats usually follow the fever. Sometimes they are scarcely noticeable; at others they are so profuse as to be rapidly exhausting.

Diarrhœa often occurs during the course of catarrhal phthisis, and is due to one of three causes—(1) indigestion, (2) intestinal ulceration, and (3) waxy degeneration of the intestinal mucous membrane. Indigestion causes diarrhœa in phthisis as it does in other cases, and from this cause the diarrhœa may occur at any period of the disease. But when due to intestinal ulceration, it occurs later on, when expectoration is swallowed instead of being expelled, owing to the weakened state of the patient and the pain in the throat from tubercular ulcerations. The intestinal ulcerations occur near the ileo-cœcal valve, in the large intestine, and also at the sigmoid flexure more frequently than elsewhere, from lodgements of the material that should have been expectorated. The peritoneum and mesenteric glands become secondarily involved. In the stomach the presence of gastric juice prevents ulceration except in cases of extreme emaciation. Lardaceous or waxy degeneration of the intestines occurs late also, and gives rise to the so-called colliquative diarrhœa. Waxy (lardaceous, amyloid) degeneration may and does also extend often to the kidneys, liver, and spleen. It is caused by absorption of purulent matter contained in cavities and carried by the vessels to those organs. The arterioles of the glomerules of the Malpighian corpuscles of the kidney are first attacked, as stated elsewhere. Subsequently the corpuscle and uriniferous tubule become affected, giving rise to swelling of the extremities and more or less general dropsy. The urine contains some albumin and casts also in some cases.

Owing to fever and lack of nourishment chiefly, the patient becomes emaciated and anæmic. Pain in the chest is often present, due to dry pleurisy. The respirations are shallow and frequent, and the patient complains of shortness of breath, espe-

cially on exercise. The eyes are sunken but remarkably clear, sometimes unnaturally brilliant.

Physical Signs.—These differ according to the stage of the disease. There are three stages, which may be summed up as follows:

1. A stage of incomplete consolidation of lung tissue, with more or less localized bronchitis, and perhaps dry pleurisy.
2. A stage of complete consolidation of lung tissue, commencing softening, and attending complications mentioned.
3. The breaking down of tissue and the formation of cavities. Complications are more frequently present in this than in any other stage.

First Stage.—Inspection may yield negative results. Not infrequently, however, expansion of the chest may be limited somewhat on the affected side. The apex beat of the heart, if seen, will be observed to be more frequent than in health. Emaciation is not yet noticeable. On palpation, the vocal fremitus is exaggerated over the affected part, and the skin may be felt to be dry and abnormally warm perhaps. On percussion, there is slight dulness. On auscultation, the respiratory murmur over the affected part has now lost its purely vesicular character and is, according to Flint, vesiculo-bronchial. The expiration is prolonged and more tubular in quality than in health. From the fact that the breathing is louder than normal, it was termed rude respiration by the older writers. The fact that this respiratory murmur may be wavy, jerky, cog-wheeled, or interrupted is of no clinical significance, since this often occurs in perfect health should the patient be nervous or have palpitation of the heart from any cause. The vocal resonance or pectorophony is exaggerated, like the vocal fremitus.

Adventitious sounds are heard, even in the first stage usually, and they are generally subcrepitant râles, as the disease begins as a localized tubercular capillary bronchitis. The crepitant râle might also be heard if not obscured by the subcrepitant. Sometimes a single subcrepitant râle, or mucous click as it is called by Loomis, is the only adventitious sound heard. This may also be of intra-pleural origin. Hæmoptysis may also be observed, even in this stage.

Second Stage.—We have now to deal with complete solidification of lung tissue, commencing softening, and local complications. On inspection, the expansion of the chest walls over the affected lung is more markedly diminished than before. Flattening over the part due to retraction of lung tissue is also noticeable, as a rule. The clavicle, therefore, is more prominent than usual. Respiratory movements are increased in frequency and shallow, and the apex beat of the heart is generally visible, owing

to emaciation. The apex beat is generally in the normal position, but it may be displaced by pleuro-pericardial adhesions.

On palpation, second stage, the vocal fremitus is noticeably increased, the solidified lung tissue being a vibrating medium, instead of refracting the sound of the voice as in health. The fremitus may be diminished or even absent, however, if a large bronchial tube leading to the affected part be obstructed by mucus, pus, or blood. On coughing and removing the plug, the fremitus may return. Thickened pleura would also diminish it. The surface is felt generally to be hot and dry. The heart beats and pulse are felt to be feeble and frequent.

On percussion, second stage, dulness is marked in proportion to the extent of the consolidated area. Sometimes tympanicity is elicited if the trachea or a large bronchial tube be near the seat of consolidation. The force of the blow extends from the latter to the former. Exaggerated resonance owing to vicarious emphysema in neighboring cells is sometimes elicited, but vicarious emphysema is not so marked in this wasting disease, the volume of the blood becoming much diminished.

On auscultation, second stage, the respiratory murmur over the solidified lung tissue becomes bronchial breathing. Both inspiration and expiration become tubular in quality and high pitched. Vocal resonance becomes markedly increased and, as in pneumonia, is now termed bronchophony or bronchiloquy according as the voice simply or the articulate words are heard. Should a large tube leading to the part become obstructed, however, the vocal resonance, though still bronchial in quality, would be diminished or weak. Should coughing remove the plug, the voice sound would return again.

Localized adventitious sounds are also heard about the affected part at this stage. They are more marked than in the first stage, generally, and consist of moist bronchial râles of various kinds, and sometimes intra-pleural râles. Owing to breaking down of tissue certain crackling, creaking, and crumpling sounds now begin to be heard, called indeterminate râles.

Third Stage.—In this stage cavities are formed. But in addition to cavities, other complicated pathological conditions exist, such as solidified tissue, localized bronchitis, and pleuritis. While rules hold good in such cases, therefore, we must expect to find exceptions.

On inspection, emaciation, shallow and rapid breathing, diminution of respiratory movements on the affected side, flattening of the chest over the cavity, and prominence of superficial veins are usually observed. Not infrequently the chest is covered with pityriasis versicolor. The clavicle at the affected apex stands out. The apex beat of the heart is generally seen, owing

to emaciation. It may be in the normal position, but is often widely displaced owing to traction from pleuro-pericardial adhesion and retraction of lung tissue. This is especially the case when the left lung is the one affected. Walshe mentions a case where the apex-beat was found under the left clavicle. It may be in either axillary line. Occasionally inspection may yield far less positive results, owing to arrest of the disease and improvement in the patient's condition.

On palpation, third stage, the vocal fremitus is increased as a rule, due to solidified lung tissue around the cavity or a tube leading to the surface of the lung. Sometimes the fremitus is diminished or even absent if a large tube leading to the affected part becomes stopped up, as already stated. Thickened pleura or intervening healthy lung tissue in case of a small, deep-seated cavity would give but little fremitus. Rhonchal fremitus, due to gurgles, may sometimes be felt. The pulse is frequent and feeble.

Percussion, third stage, elicits dulness, as the rule, especially when gently performed, as it should be.

Cracked-pot resonance, however, is sometimes obtained. It requires a sharp blow with the patient's mouth open, and results from the sudden expulsion of air from a cavity with tense but yielding walls. It is imitated by clasping the hands and striking them on the knee. Sometimes it may be due to concussion of air in a hollow viscus.

Tympanitic resonance is also occasionally produced. It signifies a large superficial cavity containing air, having tense walls, and not communicating too freely with a bronchial tube. The patient's mouth should be shut.

Amphoric resonance, or jug-sound, is produced by percussing rather forcibly over a cavity with hard, smooth, symmetrical walls, and containing but little fluid, and having rather a large mouth; in other words jug-shaped. The patient's mouth should be open. This sound is exactly imitated by percussing over the cheek made tense with the mouth partly open. The sound is significant of a cavity capable of reverberating sounds within it. Instead of amphoric resonance, it is also called metallic resonance. Both have reference to the same condition—amphoric relating to the shape of the cavity, metallic to the quality of sound elicited. Bell-metal resonance is also obtained over these cavities by using a coin as a pleximeter and percussing on it with another coin, the ear of the auscultator being applied on the opposite side.

Flatness is obtained in some cases, and even normal resonance may be obtained if a small, deep-seated cavity have an abundance of healthy lung tissue intervening.

Myoidema, which may be noticed in any stage, is generally

most noticeable in the third. It is produced chiefly over the pectoral muscles by giving a sharp blow with the point of the finger upon a rib in front and high up in the chest. In some cases it

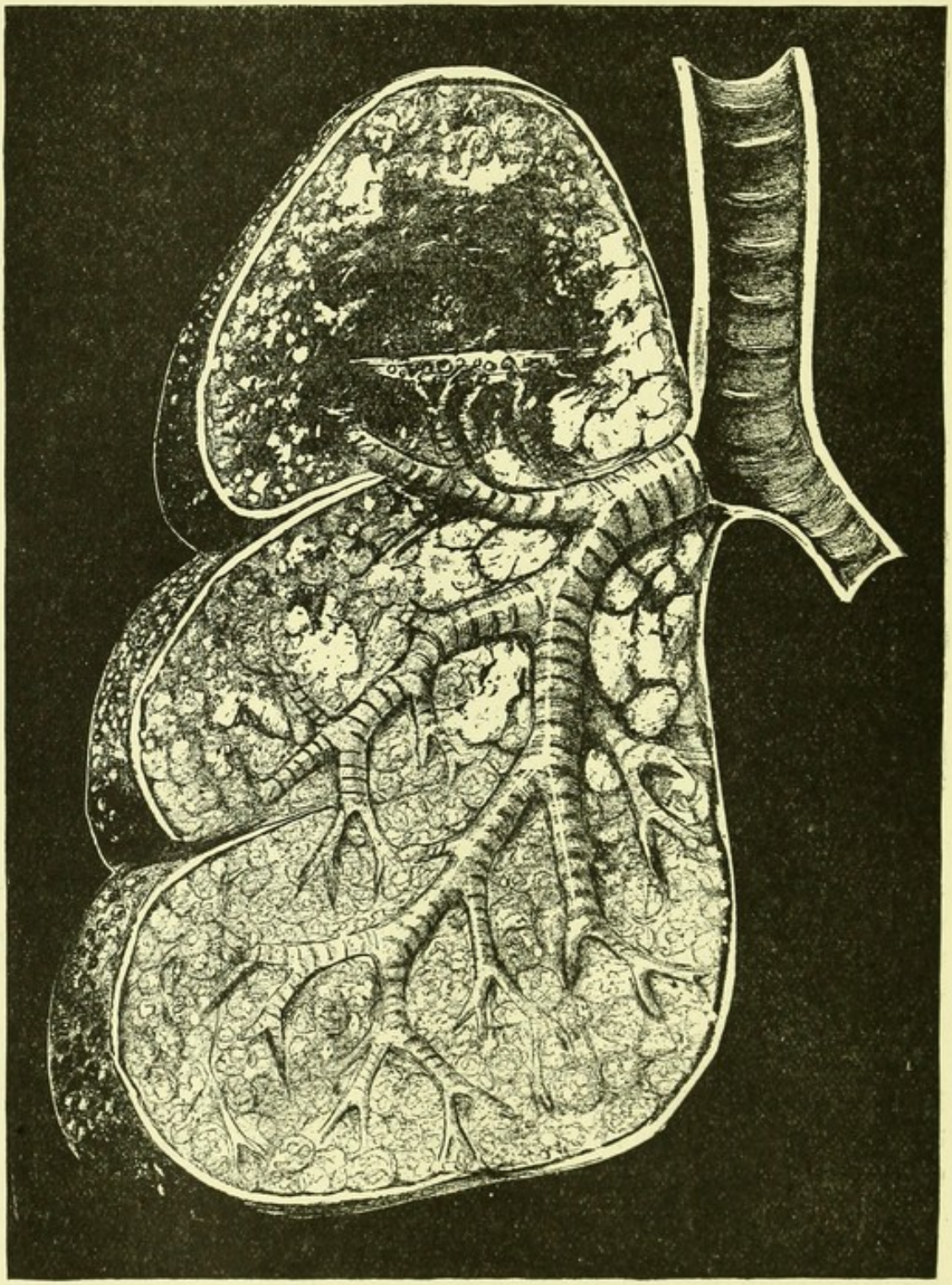


Fig. 15.

is obtained over the deltoid, scapular, and other muscles. Though once thought to be significant of phthisis, it is now regarded as of little value. It was so termed by Lawson Tait, of Birmingham,

and consists of a knot that rises up suddenly under the blow with the point of the finger.

Auscultation, over the cavity, during the third stage, reveals the presence of cavernous breathing as a rule. This breathing is blowing in quality and is suggestive of air passing in and out of a cavity or hollow space, as Flint described it. Instead of this, however, it may be bronchial or caverno-bronchial. In some cases it is amphoric or metallic; both terms refer to the same sound. Metallic breathing is produced in an amphoric cavity.

The vocal resonance over a cavity is best appreciated when the patient whispers. Over a cavity there is usually heard cavernous whisper. It is simply a blowing sound like the breathing. When the articulate words are heard, it is termed pectoriloquy. Over an amphoric or jug-shaped cavity, whispering amphorophony or amphoriloquy would be heard, as the case might be.

Adventitious sounds of various kinds are generally heard in the third stage. Gurgles are heard, as a rule. These are large, bubbling, moist râles made in the cavity. In an amphoric cavity, metallic tinkle might be heard. It is the result of a loud râle reverberating in the cavity with a metallic quality. It is also called amphoric tinkle. It is rarely due to the dropping of fluid, since the cavity is generally too small. In addition to gurgles and metallic tinkle, moist bronchial râles and intra-pleural râles may also be heard. Besides these, there may be also indeterminate râles, already mentioned.

It should have been stated that ægophony may sometimes be heard, but this will be more fully described when speaking of pleurisy.

Diagnosis.—What are the earliest signs by which this disease can be recognized? To any physician who has a fair knowledge of physical diagnosis it is evident that if the top of the left lung be affected it is much easier to make an early diagnosis than if it be on the right side, since in health the patient has already exaggerated fremitus and pectorophony on the right side, as well as slight dulness on percussion, and rude or vesiculo-bronchial respiration. These are all signs of incomplete solidification of lung tissue as seen and easily recognized if they occurred on the left side. In the healthy chest, however, these signs under the right clavicle are due to the greater convection of sound by the larger right primitive bronchial tube into the right chest; and the fact that the right muscles are, in the great majority of cases, thicker than the left, as most people are right-handed. Hence it is that healthy people—those who are right-handed and work—have already four signs of incipient phthisis at the top of the right lung. That is to say, they have under the right clavicle exaggerated vocal fremitus, slight dulness on percussion, vesic-

culo-bronchial breathing, and exaggerated vocal resonance (pectorophony). In addition to these, therefore, so far at least as the right lung is concerned, some localized adventitious sound is necessary to establish the presence of phthisis. And as chronic phthisis of either form, catarrhal or fibroid, usually begins as a localized tuberculous capillary bronchitis, the first adventitious sound usually heard is the subcrepitant (muco-crepitant) râle. Any localized adventitious sound, however, in a suspicious case would aid in the diagnosis of phthisis, whether it be the mucous click, intra-pleural râle, or the like. Sometimes there is a solitary sibilant râle instead of the mucous click.

Frequency of the pulse and loss of appetite are also among the earliest signs. Of course hæmoptysis, if not explained by injuries, the presence of heart disease, vicarious menstruation, and the like, would almost be conclusive.

But of what practical value is the tubercle bacillus in the early diagnosis of phthisis? As an aid to the early diagnosis of the disease, it may be said to be of little or no value, since it is rarely if ever found until physical signs place the matter beyond doubt. Of course if the bacillus is found, it would be conclusive evidence. But in the early stage of the disease the sputa are scant, the bacilli are few and deeply situated, and even the expert is often disappointed after much time has been spent in the vain search. Of what practical value, therefore, is this to the general practitioner? The best he could do in cases of doubt, it seems to me, would be to send a carefully stoppered vial of the suspected sputa to an expert for examination. Even then he must expect to be disappointed.

Inoculation of inferior animals with the suspected sputa has been tried with variable success, but this method can hardly be said to be a very practical one.

Examination of the larynx is of little value except as furnishing corroborative evidence, since primary tuberculous laryngitis is rare, and, by the time this is apparent, phthisis has already been recognized. Myoidema at no stage is to be relied upon, since myoidema is found on percussion in other affections. The diagnosis of phthisis, therefore, rests chiefly upon the physical signs of more or less localized bronchitis, consolidated lung tissue and cavities, with secondary local inflammations, affecting the upper part of the lungs preferably.

Bronchitis is a bilateral disease, and gives no signs of solidification, as it is only an inflammation of the mucous membrane lining the bronchial tubes, and has nothing whatever to do with the air cells.

Cancer of the lungs gives rise to solidification, but the dulness in cancer often extends across the median line, owing to can-

cerous enlargement of the mediastinal lymphatic glands. The sputa also are like currant-jelly, and contain cancer cells instead of bacilli. There is also want of hectic fever in cancer.

Pleurisy, with effusion of long standing, may be mistaken for phthisis, especially if the examination be confined to the apices of the lungs, as often happens with a careless examiner. But flatness on percussion changing with position of the patient, due to effusion, will be found at the lower part of the thorax in pleurisy. Absence of the respiratory murmur over the effusion, as well as other signs of pleurisy, will be noticed. In cases of doubt, the hypodermic syringe may be used. Only the first stage of chronic phthisis offers room for doubt as a rule. Then the signs of incomplete consolidation, so fully described, together with any of the localized adventitious sounds mentioned, will usually lead to a correct conclusion. The discovery of the tubercle bacillus under the microscope would be conclusive, but the general practitioner need not expect to be able to do this, since he has neither the time, the proper instruments, nor the experience.

Prognosis.—This depends chiefly upon the stage of the disease, the amount of hereditary tendency, and the means at the disposal of the patient for a change of abode and medical attention in general.

It is easy to understand that, if the patient is to be cured at all, it must be done early. For as the disease progresses, complications arise, including the loss of important tissue and the crippling of vital organs, to an extent that at once renders the case utterly hopeless. Hence the necessity for an early diagnosis, and the recognition of important facts at once, since phthisis is a disease that admits of no compromise. The later in life it begins, the better is the chance for the patient and the less likely are offspring to be affected by the hereditary tendency. The stronger the hereditary tendency, the less favorable the prognosis. Given a patient between eighteen and thirty whose father and mother died of phthisis, and the chances are few for recovery when attacked, as they generally are. Hemorrhage is regarded by some as favorable when it occurs early, as showing an effort of nature to throw off the disease. This is a great error. It shows no such effort on the part of nature; but it does show tubercular rottenness of the pulmonary capillaries to such an extent that the patient sometimes bleeds to death at once or becomes suffocated or exhausted. Blood is also drawn back by inhalation in a vast number of hitherto unaffected air cells, in which bacilli thrive and proliferate rapidly. Complications of various kinds may arise, too numerous to mention here. Any and all of them help to kill the patient. Under improved methods of treatment, some do recover. But, as is well known, the prognosis

in any case may be said to be a very serious matter. Owing to the changes and discoveries in the treatment, the percentage of deaths can hardly be stated at present.

Treatment.—Since the discovery of the tubercle bacillus in 1882, by Koch, of Berlin, efforts have been made to cure phthisis by discovering an antidote to the disease. Unfortunately, however, not even yet has there been discovered a remedy which would destroy the tubercle bacillus without injury to the patient. It may be interesting here to briefly review attempts that have been made in this direction. In 1883, Filleau, of Paris, thought that he had discovered the cure of phthisis by injecting carbolic or phenic acid subcutaneously, to be exhaled by the lungs. It was claimed that the appetite returned, night sweats were arrested, the weight increased, and so on. But this treatment seems to have fallen into disuse.

Seiler, also of Paris, then claimed that hydrofluoric acid fumes did the same thing. These fumes are good for those working in glass dust, as among glass-blowers, but otherwise they are of little value.

Bergeon's method came next. The details of this method need not be mentioned, so familiar are all with it, particularly its absolute failure.

Iodoform, arsenic, and creosote have all been tried, with and without the pneumatic cabinet. However useful they may be, no one claims that they cure phthisis without other means.

Grancher and Martin, of Paris, reported to the Paris Academy of Medicine, in November, 1889, that they had been able to retard the progress of phthisis by the method of inoculation. This also appears to have failed, so far as curing phthisis is concerned.

Koch, of Berlin, more recently thought that he had discovered the true cure for tuberculosis in his so-called lymph or tuberculin. Thus far, however, it has disappointed even the most ardent admirers of that justly celebrated physician. As an antidote to the tuberculous virus it may be said to be a failure. But according to the experiments in this city of Jacobi, Loomis, Kinnicut, Heinemann, and others, Koch's tuberculin may be said to be, in certain cases, an adjuvant in the treatment of phthisis and tuberculous diseases in general.

Dr. J. Blake White, of this city, however, claims that his solution of chloride of gold hypodermically injected gives equally good results in many cases as Koch's tuberculin; and Dr. James R. Leaming is disposed to agree with this view.

But suppose some antidote, so to speak, is discovered; how important it is to make an early diagnosis! For when loss of important tissue, and disease in other vital organs, have occurred through ulceration and other processes, there still remain press-

ing considerations regarding treatment, even after the bacillus has been driven from the field.

Admitting, then, that at present no such thing exists as an antidote to phthisis—or rather tuberculosis—the question arises, How are we to treat this terrible disease?

This important subject is divided into two parts: (1) prophylaxis, and (2) treatment by medicines, as symptoms arise that require it.

First, prophylaxis. This embraces not only such subjects as climate, diet, clothing, and exercise, but also the subject of marriage. Phthisical patients should not be allowed to marry.

Climate.—Any change is said to be better than none. In general terms, however, the climate should be dry and the temperature uniform, whatever degree it may be. At Loomis' sanitarium, in the Adirondack Mountain region in this State, for instance, great success has been met with in the treatment of phthisis. In like manner St. Paul, Minn., is well spoken of by many. Colorado springs are also well known, as also Asheville, N. C. For warmer climates for the winter, at least, Thomasville, Ga., and Southern California offer excellent advantages. The sandy soil and pine-wood region of Thomasville, Ga., render it dry and the atmosphere aseptic. Owing to impregnation of the latter with terpina, terebine, and perhaps other derivatives of turpentine, a pine region is desirable, especially in cases where expectoration is abundant. Sommerville, S. C., is well spoken of, as well as Las Vegas, Albuquerque, N. M., Marfa, Texas, and Knoxville, Tennessee. Those suffering from heart disease or rheumatism, or renal disease as complications should not be sent to high altitudes, as the latter affect the heart unfavorably and are too cold for patients suffering with the other complaints mentioned. Hæmoptysis does not appear to be a contra-indication for high altitudes, as is proven by results in the Adirondacks and Davos Platz and the Engadine, in Switzerland.

There are many other localities, but space does not allow entering into particulars about them. Physicians and their patients who are not acquainted with details can easily obtain information on inquiry.

In conclusion, with regard to change of climate, let it be remembered that the sooner the change is made the better. It is not only useless, but cruel, to send patients away from friends and the comforts of home when they are too far gone to be able to exercise or help themselves. Another fact is that, having found a suitable climate, the patient should remain there sufficiently long to be cured. They often become impatient and return too soon, only to suffer relapse. The more sparsely settled the country also, the less liability will there be to infection. On the other

hand, the atmospheres of large cities and even towns swarm with tubercle bacilli from the sputa of consumptives, and therefore are to be avoided.

Diet.—The diet of consumptives should be highly nutritious and easily digested. For this reason, milk or some of its preparations is the chief article. Where pure milk is not well borne by the stomach, it should be peptonized. Or else kumyss, matzoon, or kephir can be tried. Among the poor, who are not able to buy these articles, I have found buttermilk to act well. The patient should drink as much as can be properly digested, two to four quarts per day. Raw eggs can often be added with advantage. When the patient is feeble and alcoholic stimulants are indicated, a little whiskey or brandy may be added to the milk, so as to make milk punch, or else it may be given separately in water as the patient prefers. But on no account should alcohol be given in sufficient quantity to excite the patient and cause perspiration. Beer, light wines, and the like may not only be allowed in many cases, but they often do good. But the plan of giving them should be the same. They should be used with moderation, for the days of whiskey-cure for phthisis have passed.

Cod-liver oil is also an excellent article of diet, and especially indicated in cold weather. During the summer I prefer milk. On no account should cod-liver oil be insisted on if it is not well borne by the stomach. In such cases an emulsion may be tried, otherwise the pure oil is to be preferred. Sometimes it can be given with malt. Lately I have used diastase instead of malt. (℞ Forbes' diastase, ʒ ij.; olei morrhuæ, q. s. ad ʒ viij. M. Sig. Tablespoonful ter die immediately after meals.)

Rare meats and even scraped raw beef are used with advantage sometimes. Pastries and sweets, as a rule, are indigestible and should be avoided.

Exercise should be moderate and systematic, but of a pleasurable kind, rather than taken as a task. Should the temperature be 100° F. or more, all exercises should be forbidden, though the patient should be in the open air if practicable. Horseback-riding and living out in the open as much as possible should be encouraged. The patient need not be afraid to go out in all sorts of weather provided clothing be sufficient to guard against dampness and changes. The shoes particularly should never be allowed to become damp. This can be prevented by wearing low-quartered rubbers when it is wet. But habitually coddling the feet with arctics, and the like, is bad.

Medicinal Treatment.—As already stated, there is no antidote to phthisis as yet found. Medicines are therefore used only as symptoms occur that require them.

Cough, for instance, requires attention. In the early stage a

small blister over the affected part will often allay this symptom, as it is then irritative and reflex. Later on, however, cough mixtures containing more or less opium become necessary. (℞ Sol. morph. sulphat. Magendie, ʒ ss.; syr. prun. virginiæ, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. as required.) Where there is much bronchitis, Stokes' expectorant is excellent. (℞ Pulv. ammoniæ carb., gr. xvi.; fl. extr. senegæ, fl. extr. scillæ, āā ʒ ss.; tinct. opii camph., ʒ iij.; syr. tolu, q.s. ad fl. ℥ ij. M. Sig. ʒ i. as required.) In severe cases the so-called Bellevue breathing-mixture is good. (℞ Spts. æther. comp., ʒ ij.; morph. sulphat., gr. i.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. as required.) There are many other formulas for cough mixtures, but those mentioned are sufficient usually. They can be modified according to the case. Instead of giving opium continuously in all cases, it should be given only when the cough is so distressing that it becomes necessary to control it. Those cough mixtures containing opium, therefore, should be held in reserve until needed. Meantime any simple cough mixture may answer for regular use. (℞ Pulv. ammoniæ muriat., gr. viij.; syr. prun. virginiæ, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die before meals.) Cod-liver oil itself is often a good cough remedy, so far as allaying tickling in the throat is concerned.

Should expectoration be abundant, terpina hydrate may be used; it is better than terebene. (℞ Terpinæ hydrat., ☽ i.; glycerini, ℥ ss.; aquam, ad fl. ℥ ij. M. Sig. ʒ i. ter die.) Or else ten drops of terebene may be given on a lump of sugar.

Night sweats often require attention. A drachm of tinct. belladonna in any two-ounce cough mixture will often control them. It acts well in the cough mixture and saves extra dosing. Instead of this, $\frac{1}{120}$ grain of atropine may be injected hypodermically. Sometimes, however, belladonna given in quantity sufficient to control night sweats will cause the patient's voice to become husky, and this is not desirable, as it looks as if he were getting worse instead of better. In such cases oxide of zinc may be given instead. (℞ Pulv. zinci oxid., gr. xij. Ft. pil. No. iv. Sig. One at bed-time.) A pill of three grains of oxide of zinc at bed-time rarely fails to check these sweats. Another remedy is agaricin. This white powder, obtained from the fungus of the English larch, may be given in doses of an eighth of a grain ter die. (℞ Tablets of agaricin (gr. $\frac{1}{8}$) No. xij. Sig. One ter die.) The tablets may contain as much as $\frac{1}{4}$ grain if necessary. These remedies are not required every day. Only at times need they be taken. The sweats may cease for several days or weeks.

Hæmoptysis, when it occurs, requires attention. This subject has already been mentioned. Morphine and ergotin are the only remedies that appear to have any influence. Both should be given hypodermically, as no time is to be lost. The sixth or a

quarter grain of morphine may be given, and immediately afterward one to three grains of ergotin. The patient should remain absolutely quiet in a cool room and not be allowed to speak. Cold liquids in moderate quantity should be given as food. The ice bag applied to the chest may do good. The swallowing of astringents does no good, in my experience. In ordinary cases fluid extract of ergot in drachm doses ter die often accomplishes the purpose. If cough be troublesome, the ergot may be mixed with opium. (℞ Sol. morphiæ Magendie, ʒ i.; fld. extr. ergot., q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) For other particulars regarding the treatment of hæmoptysis, the reader is referred to that subject.

Fever in phthisis not infrequently requires controlling, since it is not only uncomfortable to the patient, but exceedingly wearing and exhausting. Quinine is of little value for this purpose. Antipyrine is too depressing. Phenacetin induces perspiration, antifebrin is the best remedy. It may be given in five-grain tablets in the afternoon, according to the time for the rise of fever. One may be given at one, four, and seven o'clock P.M. Sometimes even antifebrin causes sweating. In these cases give it in combination with agaricin. One-eighth of a grain of the latter drug should be included in or given with each antifebrin tablet. Or else belladonna or oxide of zinc may be used as above stated. Finally, if nothing succeeds, quinine may be tried. At Brompton Hospital for Consumptives, fever is not interfered with unless the temperature rises to 102° F. But it seems to me that when at 101° F. it can do no harm to reduce it a little. In no case, however, is it necessary, or even desirable, to force the temperature down to normal. In cases of slight elevation of temperature, especially if there be headache, the ice bag to the head is often sufficient, and at the same time delightful to the patient. During the rise of temperature the patient should be at rest in the recumbent position and no exercise be allowed.

Diarrhœa sometimes occurs, and requires prompt attention, otherwise the patient soon loses the ground already gained. If it happens early in the disease and is probably due to indigestion, it is easily controlled. The diet may be restricted temporarily or changed, or perhaps some drug has started the trouble and may be omitted. Rest and a few powders of bismuth and morphine soon check it. (℞ Bismuthi subnitrat., ʒ i.; morphinæ sulphat., gr. i. M. ft. chart. No. vi. Sig. One at once and repeat every two or three hours as required.) But when the diarrhœa is due to tubercular ulceration or amyloid degeneration of the intestines, then indeed is it sometimes difficult to stop. But even here the same powders should be tried. They may be given oftener and be made a little stronger if necessary. Powdered kino added, sometimes acts well. (℞ Bismuthi subnitrat., pulv. kino, āā ʒ i.; pulv. opii, gr. vi. M.

ft. chart. No. vi. Sig. One ter die.) In some cases the rectum has to be injected with a weak solution of nitrate of silver with a little opium if there be ulceration in that part. (℞ Argenti nitrat., gr. ij.; glycerini, ℥ ss.; aquam, ad fl. ℥ iv. M. ft. injectio.) This, however, is rarely necessary. Absolute rest in bed is required. Hot applications may be made to the abdomen to relieve pain.

The appetite should be encouraged by outdoor life, and bitter tonics if necessary; iron is indicated for the anæmia, but unfortunately the patient has so many things to take and the stomach is so delicate that iron in any form is not usually well borne. The solution ferri albuminat., mixed with cod-liver oil in the proportion of about one to two, with or without diastase, can, however, generally be given. (℞ Sol. ferri albuminat., ℥ ij.; ol. morrhuæ, ℥ vi. M. Sig. Tablespoonful ter die.) In this way the patient is saved the annoyance of so many different doses throughout the day.

For nausea and vomiting, nothing appears to act better, or in fact so well, as a little aromatic spirits of ammonia. It may be given in drachm doses, or a few drops alone, or combined with any substance that the patient may fancy. Lime water does no good further than rendering food alkaline. It is often given with milk, and sometimes checks nausea, but it does not aid digestion of milk; for which purpose the Fairchilds' peptonizing powders are best.

Pityriasis versicolor is easily washed off the chest by means of soft soap (green soap).

The occurrence of such complications as waxy kidney and pneumothorax, as well as pleurisy, require no special mention here. The reader is referred to those subjects elsewhere. Bedsores are to be guarded against and treated by well-known methods.

Fibroid Phthisis.

Fibroid phthisis is the second form of chronic phthisis. It also usually begins in the bronchioles at the top of the lungs, as with catarrhal phthisis; but instead of going down into the air-cells, it extends along the lymphatics to the pulmonary interstitial connective tissue, producing shrinkage and bronchiectasis as in chronic interstitial pneumonia. Indeed, these two diseases are now regarded as identical and both of bacillary origin. Even in the so-called knife-grinders' consumption and potters' lung the tubercle bacillus is now nearly always found. In other words, fibroid phthisis is a tuberculous interstitial pneumonia. Cavities, as already remarked, are due to dilatation of bronchi, rather than softening and breaking down of caseous material. In some cases the lung may be so compressed as to be no larger

than the size of a man's fist. Bacilli are found chiefly in the sputa and on the walls of cavities.

The disease occurs more frequently in men than women, and from thirty to forty years of age. It is usually more chronic in its course than the catarrhal form.

The symptoms in the main are similar to those of catarrhal phthisis except that they come on more gradually and extend over a greater length of time. Hæmoptysis is perhaps less frequent in this form. But in both about half the number of cases are subject to tubercular ulceration of the intestines from swallowing the virus.

Physical Signs.—These differ somewhat from those in the catarrhal form. On inspection, in fibroid phthisis, not only is there retraction over the affected part, but the shoulder on that side is usually lowered somewhat. Respiratory movements are limited, to a marked degree if pleuritic adhesions be also present, as is often the case. The other lung, if unaffected, often becomes enlarged from vicarious emphysema. The apex beat of the heart is often displaced, and widely so in some cases, due to pleuro-pericardial adhesions and shrinkage of the lung. The shrinkage of the thorax is usually horizontal, with decrease in the antero-posterior as well as other horizontal diameters. Sometimes it also settles down, with decrease in the vertical diameter. The apex of the heart is then found between the fourth and fifth ribs instead of the fifth and sixth. The intercostal spaces are consequently much narrowed.

On palpation, the vocal fremitus is found to be increased over the indurated tissue, unless there be obstruction in the tubes from stricture or other cause, or interception due to thickened pleura. In these cases it may be not only diminished, but even absent. The apex beat may be felt out of its normal position.

Percussion elicits marked dulness over the indurated lung tissue, and exaggerated resonance over the emphysematous portion. Owing to induration of lung tissue, narrowing of intercostal spaces, and hardening of the ribs, the dulness is sometimes termed wooden, and there is a feeling of great resistance to the finger used as a pleximeter on palpatory percussión, as Piorry first observed. It is unnecessary, however, to speak of such resonance as being hard. There may be a feeling of hardness imparted to the finger through the sense of touch, but the sound will be dull. In case of cavity, we may get the usual signs on percussion, as heretofore described. The line of hepatic dulness will be unusually high up if the vertical diameter of the thorax be much shortened.

Auscultation reveals bronchial breathing and bronchophony over the indurated lung, unless convection of the breath and

voice sounds is obstructed in the tubes from muco-pus, stricture, and the like, or else thickened pleura may intercept them. Should cavity exist, there would be the usual cavernous breathing and whisper. In case of amphoric cavity, those sounds would be amphoric (metallic) accordingly. Owing to obstruction to the pulmonary circulation in extensive fibroid disease of the lungs, the right ventricle becomes enlarged as in general vesicular emphysema, but not so much, perhaps, owing to diminution in the volume of blood in this wasting disease. The second sound of the heart is often accentuated in the pulmonary interspace, as might be expected, from enlargement of the right ventricle.

Diagnosis.—Pleurisy with retraction is difficult to differentiate from fibroid phthisis sometimes; indeed, they are both frequently present. But in pleurisy there are no signs of cavities, while there is diminution or even absence of respiratory murmur, vocal resonance, and fremitus, the very opposite being the case in solidification of lung tissue. The heart is not so much displaced in pleurisy, and the patient is usually in much better general condition and with less cough and expectoration than in fibroid phthisis.

Cancer of the lung gives dulness on percussion, but it usually extends across the median line, with inward-pressure signs on the trachea and œsophagus from cancerous enlargement of the mediastinal lymphatic glands. Besides the cancerous cachexia also, the sputa in the two diseases differ, the one containing cancer cells, the other tubercle bacilli.

Atelectasis due to compression from pleuritic effusion, aneurismal or other tumors, deformities, and the like may be readily differentiated by means of careful examination and ascertaining the cause of the atelectasis.

Chronic pneumonia, as already stated, is fibroid phthisis in the great majority of instances. In rare cases only may nodules of interstitial pulmonary connective tissue be found due to non-tubercular inflammation.

Syphilis of the lung has already been considered. There is the history of syphilis, the rapid improvement under anti-syphilitic treatment, and the absence of tubercle bacilli.

Prognosis.—What has been said already under catarrhal phthisis applies here. The disease is more chronic in its course, but equally fatal in time. Much depends upon the surroundings of the patient and the means for securing proper nursing and treatment. Death may be hastened by hæmoptysis, dropsy, or heart failure. In some cases the patient lives many years.

Treatment.—The treatment for fibroid phthisis is, in the main, similar to that for catarrhal phthisis, to which the reader is referred. The patient is to be removed from injurious surround-

ings and influences if possible. Counter-irritation by means of compound iodine ointment is of much benefit in some of these cases. Where the stomach bears it well, iodide of potassium should be given. Small doses of mercury added are of special advantage if the patient has ever had syphilis. (℞ Pulv. potass. iodid., ʒviij.; hydrarg. bichlorid., gr. ss.; aquæ, ℥ij. M. Sig. ʒi. ter die after meals.)

The pneumatic cabinet is especially indicated in this form of phthisis, on account of the pulmonary gymnastics afforded. By these means the lungs are expanded, and old adhesions are stretched or even broken up.

Hill-climbing is also good exercise for those patients who are able to stand it.

The rest of the management is the same as that for catarrhal phthisis, to which the reader is referred.

Acute General Miliary Tuberculosis.

This disease has already been referred to. In some very rare cases it appears to be primary, and to follow some acute disease like typhoid fever or measles. Nearly always, however, it is secondary to some pre-existing tuberculous lesion, from which bacilli in large numbers are absorbed into the blood through the lymphatics or unoccluded veins. It usually runs a rapid course, and often resembles typhoid fever, the chest signs present, if any, being those of bronchitis simply, with marked dyspnœa. The temperature usually runs high, but it may fall below normal. The disease is rapidly fatal, as a rule, and often not to be detected during life. On post-mortem examination not only the lungs, but the pleuræ and other organs, may be found to be studded with miliary tubercles.

The lungs, liver, and spleen are usually affected, as well as the heart, kidneys, and thyroid gland. Even the marrow of bones, the choroid coat, and serous membranes generally may be the seat of these miliary tubercles. In doubtful cases examination with the ophthalmoscope may reveal their presence in the choroid coat.

Strümpell distinguishes four forms—the typhoid, the pulmonary, the meningeal, and the intermitting form.

The typhoid form resembles typhoid fever, and its duration is from ten days to three weeks.

The pulmonary form lasts longer, its duration being some three or four weeks or more, and characterized by great dyspnœa.

The cerebral or meningeal form is in fact a tubercular meningitis. Its duration varies, and it is characterized by headache, fever, stupor, rigidity of the back and neck, and coma. The respirations are peculiarly deep and accelerated.

Finally, the intermitting form runs a more protracted course. There are also thoracic symptoms, headache, and dulness of mind, repeated chills at irregular intervals, and fever. Rapid emaciation and anæmia with general exhaustion follow, and the patient dies with pulmonary symptoms or tubercular meningitis.

Such in brief are the four types of this disease as described by Strümpell. I have not had experience sufficient to witness all four of these forms, the few that I have seen being chiefly of the mixed typhoid and pulmonary forms.

The diagnosis is often very difficult unless there is the history of previous tuberculous lesion. Even then there is no certainty about it. Previous tuberculous lesion or strong hereditary tendency, however, coupled with the peculiar dyspnœa, high fever, and the evident severity of the case, would lead one to suspect the disease in question. The fever is more irregular than in typhoid. Discovery of miliary tubercles in the choroid or blood would be conclusive. In doubtful cases they should always be thoroughly examined.

The prognosis is absolutely unfavorable. The few cases I have seen rapidly came to a fatal issue. Perhaps, as Strümpell states, those cases reported as cured were not carefully diagnosticated.

The treatment is merely symptomatic. Stimulants are given to prolong life, and opium to relieve pain and restlessness. Ice bags to the head are often comfortable to the patient, besides helping to lower the temperature somewhat. Extensive cupping over the chest sometimes helps to relieve dyspnœa, but even here the hypodermic injection of morphine gives equal relief without annoying the patient.

Pleurisy.

Pleurisy or pleuritis is circumscribed or diffuse inflammation of one or both pleuræ. There are various classifications, but they may be reduced to two, (1) dry pleurisy and (2) pleurisy with effusion.

Either one of these classes may be acute, subacute, or chronic. By many authors, however, chronic pleurisy is described as empyema, the pleurisy with sero-fibrinous effusion of long standing being called subacute pleurisy with effusion. I shall, however, treat of the latter as chronic pleurisy with effusion, and describe empyema separately.

Dry Pleurisy.

Etiology and Pathology.—Dry or circumscribed pleurisy, or pleurisy without effusion, is circumscribed inflammation of the pleura with thickening of the membrane, and often adhesion of

the opposing surfaces. Sometimes it is called interstitial or adhesive pleurisy, or pleurisy with scant fibrinous exudation. The thickening and adhesion are the result of proliferation of the connective tissue of the pleura, and this proliferation takes place without sero-fibrinous effusion. It is a very common affection and often escapes notice. The causes are extension of inflammation from the lungs, as in phthisis; or it may be secondary to extension of inflammation from cancer or other neoplastic growth. Fractured ribs or other surgical injury may give rise to it; sometimes it is due to exposure to a cold draught; and finally, there may be no known cause.

Symptoms.—Dry pleurisy may occur from time to time until extensive adhesions have taken place without any noticeable symptoms except slight dyspnœa. This would necessarily occur after extensive adhesions had formed. In many cases, however, the patient has a sharp stitch in the side, near one nipple or the other. There is little or no fever when the disease is primary and the cough is not attended with expectoration, but is simply reflex. Usually there is some rise of temperature, however, when the pleura becomes inflamed from extension of the inflammation in phthisis, for instance, but even here the rise is probably due to a lobular pneumonia. This disease is usually of short duration, only lasting a day or two at most. In other cases it may continue several weeks or more. Or one attack may soon be followed by another.

Physical Signs.—In dry pleurisy these are few. On inspection, jerking respiration or a catch in the breath may be observed, with diminution of respiratory movements on the affected side.

Palpation is usually negative. The surface is not large enough to change the vocal fremitus or give rise to a friction fremitus, except after repeated attacks. The vocal fremitus might then be diminished if thickening of the pleura be extensive.

Percussion would also yield negative results, or else dulness might be elicited according to the area involved. On auscultation, pleuritic crepitation, especially on inspiration, might be heard. In old cases and after repeated attacks, various intra-pleural râles may be heard. If the patient have dry pleurisy for the first time, however, and it be limited to a single spot, no adventitious sound may be heard. The respiratory murmur and vocal resonance could not be affected in such cases, but are diminished in case of extensive thickening.

Diagnosis.—The two diseases for which dry pleurisy might be mistaken are pleurodynia and intercostal neuralgia. But dry pleurisy has only one point of pain, which the patient easily locates with the point of the finger. In intercostal neuralgia there are usually three points of tenderness—near the spinal col-

umn, at the anterior extremity of the nerve, and about its middle. Besides this, the patient usually gives the history of previous attacks of neuralgia in other localities.

In pleurodynia, which is myalgia, or muscular rheumatism of the side, there is extreme tenderness all over the affected muscles. The patient shrinks from touch, there is pain on motion, and lumbago or other muscular rheumatism is often present.

Prognosis.—This is nearly always favorable. As already stated, many cases of primary idiopathic dry pleurisy escape notice during life, and give little or no inconvenience. The case is different should attacks be repeated and adhesions become extensive. Here the lung becomes greatly crippled in its movements, while the other has to do extra work, thus interfering with the patient's general health.

Treatment.—Very often the patient recovers without seeking medical advice. If the pain in the side be severe, it is quickly relieved generally by the application of a bottle or two of hot water. A flask or other flat vessel would be better. Sometimes a hot flat-iron wrapped in flannel will be sufficient. If these fail, a hypodermic injection of morphine, five to ten drops of Magendie's solution, will usually give speedy relief. Should it become subacute or chronic, the compound iodine ointment may be rubbed on at bed-time, or the part may be painted with tincture of iodine, and finally a small blister may be tried. The patient's general health should be attended to, the diet should be liberal, and care should be taken not to live in damp apartments. Among gouty subjects, however, iodide of potassium and colchicum should be given. (℞ Pulv. potass. iodidi, ℈viij.; vini sem. colch., ℥ss.; aquam, ad fl. ℥ij. M. Sig. ℥i. ter die.) The diet in such cases should be regulated accordingly.

Acute Pleurisy with Effusion.

Etiology and Pathology.—Acute pleurisy with effusion, acute diffuse or plastic pleurisy, is acute diffuse inflammation of the pleura with sero-fibrinous effusion into the pleural cavity, as the result of interstitial exudation. The proportion of fibrin in these acute cases is greater than in chronic pleurisy where the proportion of fibrin diminishes while that of the serous element increases. The disease may be primary or secondary. Acute primary idiopathic pleurisy with effusion is often caused by exposure to wet and cold, especially among those who are previously over-fatigued, or who have insufficient food, and the intemperate. In some cases it attacks those who are apparently in good health and from no known cause. This disease may also be due to injuries of various kinds.

Acute secondary pleurisy with effusion occurs as a complica-

tion in such affections as Bright's disease of the kidneys, pyæmia, rheumatism, pneumonia, and various acute infectious diseases, as small-pox, measles, scarlet fever, typhoid and typhus fever, and the like. In some cases it is due to tuberculous inflammation extending to the pleura from the lung.

Either of these forms of acute pleurisy may become subacute and in some cases chronic. But the latter is usually a chronic disease when first observed, as we shall see.

According to Landouzy, of Paris, many of these cases are not primary pleurisy *a frigore*, so called, but are merely symptomatic of latent tuberculosis. Indeed, from statements made by that author, one would be led to believe that there really is no such thing as acute primary pleurisy with effusion, or pleurisy *a frigore*, but that in all cases they are due to latent tuberculosis. This may be the rule for the climate of Paris, but not for all climates, as I have learned from personal experience, as well as by inquiry at the Brompton Hospital, in London, and elsewhere.

There are three stages: First, the dry stage of congestion, which lasts from a few hours to twenty-four hours or even longer.

Secondly, the stage of effusion, which lasts about five days on the average. The amount of fluid is usually not so great as in the subacute or chronic form and is more fibrinous.

Thirdly, the stage of absorption, which usually begins about the seventh day, and lasts until about the fourteenth day in an ordinary case—the whole duration being about two weeks.

Symptoms.—These vary according to the severity of the case. Sometimes they are very mild, the patient remaining in-doors scarcely a week. In other cases the attack is very severe with high temperature, and may prove fatal.

The disease generally begins with chilly sensations or repeated small chills, rather than the severe chill of pneumonia. Immediately following this there is a sharp pain in the affected side, near the nipple. Soon fever sets in, with increased frequency of the pulse. The temperature rarely goes up higher than 101° F., but it may go up to 105° F. The pulse is hard and full and varies from 100 to 120. The face becomes flushed. At first the breathing is jerky, with a catch in the breath owing to the pain. The patient favors the affected side and leans over toward it to prevent the pain, which is increased on breathing. There is a short, dry cough, which also gives the patient much pain. The latter, however, subsides in a few days. The patient now usually lies on the affected side, to allow free respiratory movements of the other. Sometimes the symptoms are more severe than those described, and even delirium may occur.

Physical Signs.—During the first stage, on inspection the patient will be observed to lean over toward the affected side to

restrain movements of respiration. Sometimes he will lie on that side for the same reason. The breathing is jerking, and respiratory movements are exaggerated on the unaffected side. Palpation and percussion yield negative results. On auscultation, the respiratory murmur and vocal resonance will be slightly diminished, but a friction sound will be heard, which is loudest at the end of inspiration.

During the second stage, or stage of effusion, on inspection, respiratory movements will be observed to be restricted on the afected side, exaggerated on the other side. Sometimes the apex beat of the heart is observed to be displaced.

Palpation reveals diminution or absence of fremitus over the seat of effusion. If the effusion be great, the heart may be felt displaced toward the opposite side.

Percussion elicits marked dulness or even flatness over the effusion, which may change somewhat with position of the patient. Above the level of the fluid Skodaic tympanicity is frequently obtained.

On auscultation, the respiratory murmur is usually absent, the vocal resonance much diminished, and no friction sound is heard over the seat of effusion, the fluid separating the opposing surfaces. If the amount of effusion be small, however, the friction or other intra-pleural adventitious sound may be heard.

During the third stage the effusion becomes absorbed and the friction sound returns, louder even than at first. The physical signs become more and more normal, and finally the friction sound disappears.

Subacute pleurisy results from a badly managed case of the acute variety, or in cases where the patient is in bad condition when attacked, or perhaps is tuberculous.

Diagnosis.—Acute lobar pneumonia is the disease that offers the greatest difficulty of diagnosis from this disease. But in pleurisy with effusion, there is interception to the transmission of sounds to the chest walls, so that the respiratory murmur and pectorophony (vocal resonance) are diminished or even absent, according to the amount of effusion. Vocal fremitus is therefore diminished or even absent. In pneumonia, solidified tissue offers a vibrating instead of the refractive medium of vesicular tissue, so that vibrations are directly transmitted to the chest walls with increased force. Hence, in the latter case we have bronchial breathing and bronchophony, and marked increase of vocal fremitus. The line of dulness or flatness in pleurisy with effusion also changes often with position of the patient, which never occurs in pneumonia. Regarding adventitious sounds, we have in pleurisy the friction sounds and perhaps intrapleural râles, but in pneumonia we have the crepitant râle in the first stage, and the crepitant

and subcrepitant râles in the third stage. The sputa in pneumonia are rusty colored and characteristic, but in pleurisy the cough is dry and unattended with expectoration. The temperature in pneumonia is usually higher than in pleurisy.

In cancer of the lung there are signs that give rise to dulness on percussion, but they are usually found at the upper and front part of the lung, instead of low down and posteriorly. The line of dulness in cancer often extends across the median line also, owing to enlargement of mediastinal glands. The line of dulness in cancer moreover does not change with position of the patient. Cancer of the lung also gives rise to solidification of lung tissue with consequent increase, instead of diminution or absence of the respiratory murmur, pectorophony, and fremitus.

Hydatid disease may be mistaken for pleurisy with effusion. But by means of examining some of the aspirated fluid the diagnosis is conclusive by finding hooklets in hydatid disease, which would be absent in pleurisy. Moreover, the latter disease is much more acute in its course than hydatid disease.

Prognosis.—The prognosis in the primary idiopathic form of this disease is usually favorable. The patient generally recovers in two or three weeks. As a secondary affection, however, occurring in the wake of some acute infectious disease, Bright's disease, or phthisis, the prognosis is unfavorable. Repeated attacks of the primary disease may also lead to contraction and crippling of the lung and lead to the development of phthisis or some intercurrent disease.

Treatment.—In order to relieve pain, hot applications to the affected side are often sufficient. Dry cups are also recommended, but the hot applications are more comfortable to the patient. At the same time, opium may be given if necessary. A hypodermic injection of five to ten minims of Magendie's solution, repeated at intervals of several hours for a day or two, until the pain subsides, is generally sufficient. If the bowels are constipated, they may be moved by giving at bed-time a little calomel rubbed up with bicarbonate of soda. (℞ Hydrarg. chlor. mit., gr. ij.; sodii bicarb., gr. v. M. ft. pulv. Sig. Take at bed-time.) Should the bowels not move by breakfast-time next day, a little salts or a Seidlitz powder may be given. The patient should be kept in bed in a warm, dry room of a temperature of about 70° F. The food should be nutritious, consisting largely of milk or some of its preparations, or some of the animal broths. Valentine's meat juice is an excellent food in this and all other diseases.

Bleeding, either general or local, is not to be thought of. It does no good, and weakens the patient. Instead of this, veratrum or aconite may be used. Of the two, veratrum is the best, but it is to be used with great caution. A drop or two, three

times daily, is usually enough to lower the pulse. Such remedies, though out of the question in pneumonia, may be used in pleurisy, as the heart is not nearly so much crippled in pleurisy as it is in pneumonia. In other cases, where the patient is weak, especially in secondary acute pleurisy, stimulants may be necessary instead of veratrum. The amount of alcohol is regulated here, as in other diseases, by the condition of the patient and previous habits. From a teaspoonful to a tablespoonful of whiskey or brandy in a little milk may be given every three hours; but in severe cases or where the patient has been addicted to intemperance, much more can be administered. In all cases where the tongue becomes dry and brown and delirium sets in, alcohol is indicated at once. Such signs, however, need not be waited for.

Blisters are not indicated during the acute stage. Should, however, the case become tedious and the effusion show little disposition to be absorbed, blisters may be used. Counter-irritation by means of tinct. iodine or compound iodine ointment may also be of service in such cases.

The temperature rarely goes so high as to require interference. Should it go up to 102° or 103° F., however, or even higher, five-grain tablets of antifebrin may be given in the afternoon at about three-hour intervals, say at 2, 5, and 8 P.M. Quinine will do no good unless a malarial element is present. Should the patient be very anæmic, iron should be administered during convalescence. The tinct. ferri chloridi in ten-drop doses well diluted, ter die, is one of the best remedies. The sol. ferri albuminat. in ʒ i. doses may be given instead, however. It is not disagreeable to take and easily digested.

An all-important question arises in the treatment of some of these cases. Shall the chest be aspirated, and if so when?

Of course if life be threatened from dyspnœa, some of the fluid should be withdrawn at any time in the course of the disease, but only sufficient to give relief. But unless symptoms of suffocation are urgent, and they very rarely are, do not draw off any of the fluid before the end of the third week. Why?

Because if the fluid be drawn off too early, and before active inflammation has subsided, adhesion of the two layers of the pleura will result, and this would be one of the most unfortunate terminations that the disease could possibly have. The fluid in the sac keeps the two layers apart. To draw it off too early, therefore, would be malpractice. According to Potain, of Paris, and many other authors, only in rare and urgent cases should any fluid be withdrawn before the twenty-first day, and then only a part of it—sufficient to relieve pressure on absorbents. Then with counter-irritation, good food, and moderate exercise the rest of the fluid becomes rapidly absorbed.

Should adhesions occur, they should be treated with the pneumatic cabinet, exercising the chest systematically by expanding it and by hill-climbing.

No separate remarks are necessary for the treatment of the subacute form of this disease. Nutritious food, perhaps stimulants, iron, tonics, counter-irritation, and aspiration if called for, with the pneumatic cabinet and hill-climbing, are even more necessary here than in the acute form.

Chronic Pleurisy with Effusion.

Etiology and Pathology.—Chronic pleurisy with effusion is chronic inflammation of the pleura with sero-fibrinous effusion, the latter being the result of interstitial exudation. By most authors it is called subacute pleurisy with great effusion. This disease in rare instances follows one or repeated attacks of the acute or subacute form. Generally, however, it is chronic from the first, and then is almost invariably of tuberculous origin. According to Flint, double pleurisy with effusion is always, in his experience, of tuberculous origin. Recently, however, I have aspirated a case of double subacute pleurisy with effusion following the grippe. The patient, a gentleman aged 71, had no signs of tuberculosis.

Symptoms.—The disease comes on insidiously. There may be no pain in the side at all. Always, however, there is hacking, reflex cough with little or no expectoration. The appetite is poor, emaciation follows, and after a lapse of several months hectic fever is often noticed. The temperature never goes very high, 100° F. to 102° F. in the afternoon, unless some complication occurs. Although the patient and friends think that the disease may be phthisis, yet the course is observed to be somewhat slow. Physical examination alone can determine the nature of the affection. Should the physician confine his examination to the apices of the lungs, he would find consolidation of the lung at the top on the affected side from compression, and hastily makes a diagnosis of phthisis only. Upon examination farther down, however, the presence of fluid in the pleural cavity becomes at once apparent.

Physical Signs.—In order to understand these, it is necessary to know that, in an average case the pleural cavity is distended with fluid below, and the lung is compressed above. Sometimes it looks like a placenta pressed up at the apex, and against the spinal column posteriorly. This lung is in a state of compression atelectasis. The primitive bronchial tube leading into it and the larger divisions of the bronchi are huddled together in a bundle and dilated in the efforts of inspiration, so that they often form an irregular cavity. The opposite lung is in a state of vicarious

emphysema owing to the extra work it performs, and the heart is not infrequently displaced.

On inspection, therefore, we usually find bulging of the intercostal spaces over the seat of effusion, which is always at the lower part of the thorax. The apex beat of the heart is displaced laterally in a direction opposite to the effusion. There is diminution of respiratory movements on the affected side, and exaggerated movements on the opposite side. Collapse not infrequently follows removal or absorption of the fluid, and the other side now appears abnormally large on account of the vicarious emphysema. Sometimes no change in the shape of the chest is observed if the case be recent and but little emaciation has taken place.

Palpation shows diminution or absence of the vocal fremitus over the effusion. Above this and where the lung is compressed, the fremitus is increased. The apex beat of the heart may be felt out of position. Intercostal fluctuation is sometimes felt.

Percussion over the fluid elicits marked dulness, or flatness if the patient is emaciated. The upper line of the fluid, instead of being a dead level, is, according to some, curved somewhat like the letter S, forming what is termed the curved line of Ellis. It is lowest in front, highest at the side, and averaged between the two posteriorly. This line often changes with position of the patient, unless prevented by adhesions. Over the compressed lung there is dulness on percussion. But not infrequently, that is to say in about two-thirds of all cases, we obtain tympanitic resonance above the fluid. This occurs more frequently in front than behind. The true cause of this tympanicity was first explained by Skoda. The pulmonary vesicles being obliterated by compression, the bronchial tubes are gathered up in a bundle and dilated by the effort of inspiration, giving us an irregular cavity to deal with, as already stated. Hence the tympanicity on percussion. There is exaggerated resonance over the other lung on account of the vicarious emphysema.

Exceptionally we obtain tympanitic resonance on percussion over the effusion. This is particularly true in case of children. The blow extends to a distended stomach or colon. The more distended with gas such hollow viscus is, and the more abundant the effusion, the more surely are we apt to get tympanitic resonance on percussion. Very gentle percussion is therefore necessary in the case of children. Even cracked-pot resonance, due to concussion of air, may be obtained in some of these cases.

On auscultation, the respiratory murmur is diminished or absent, as a rule, over the effusion which intercepts that sound. Sometimes, however, owing to a string of adhesion, bronchial breathing may be telephoned to a spot somewhere over the seat

of the effusion, or else it may be transmitted there along a rib. Above the seat of effusion and over the compressed lung we hear bronchial breathing. Occasionally cavernous breathing is heard over the seat of tympanitic resonance. Over the other lung the breathing is simply exaggerated, owing to the extra work that lung has to perform.

Pectorophony or vocal resonance over the chest is much diminished over the effusion, but not necessarily absent if the voice is loud enough. The whispered voice is, however, generally absent, like the breathing.

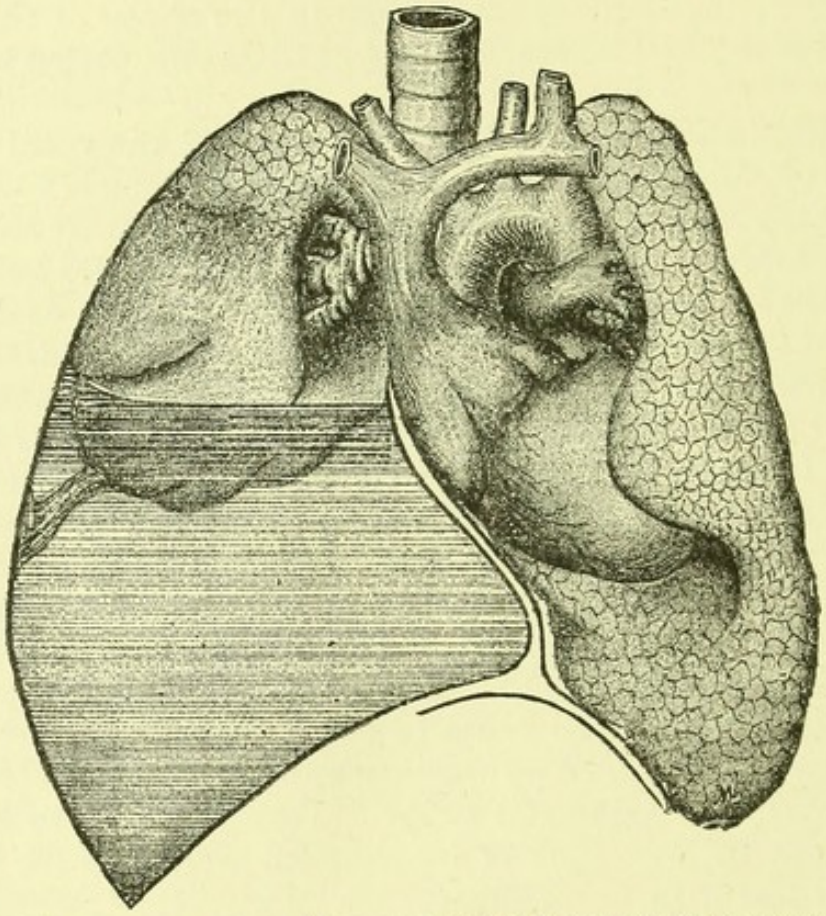


FIG. 16.—DIAGRAM SHOWING PLEURISY WITH EFFUSION, COMPRESSED LUNG, A STRING OF ADHESION FROM THE COMPRESSED LUNG TO THORACIC WALL, DILATED BRONCHI AND DISPLACEMENT OF ORGANS TO THE OPPOSITE SIDE. (From the Author's "Handbook of Physical Diagnosis.")

Ægophony is sometimes heard when there is not too great an amount of fluid. It is nothing but distant bronchophony thrown into vibration by means of the presence of the fluid. It also has a nasal twang. I have never heard it higher up than the inferior angle of the scapula. Ægophony or goat's voice is distant trilling bronchophony, and was formerly considered of great value in determining the presence of fluid. Now, however, with the hypodermic aspirating needle a positive diagnosis can be made in case of doubt, so that ægophony is becoming more and more a clinical curiosity than a valuable sign.

Thickened Pleura.—It frequently happens that when the effusion has become absorbed, or has been removed, thickened pleura remains. What are the physical signs in such a case?

Thickened pleura gives the same kind of physical signs that pleurisy with effusion does, except that they are not so marked. In other words, thickened pleura acts as a partition to intercept sound, but it is not so much of a partition or diaphragm as is pleurisy with effusion. A string of pleuritic adhesion is a different thing. It may and often does act as a telephone, so that by this means we may hear a spot of bronchial breathing over the seat of great effusion. While a string of pleuritic adhesion, therefore, acts like a telephone, a thickened plate of pleura acts like a diaphragm or a partition.

Diagnosis.—The diagnosis of pleurisy with effusion from pneumonia, cancer, and hydatid disease has already been considered. It is only carelessness should the physician make a hasty diagnosis of solidification of lung by examining only the apices, and omit to discover effusion lower down. The absence of expectoration ought to arouse his suspicions. The presence of fluid at the top of the thorax should also cause him to suspect hydatid or some other fluid cyst.

Aneurism has been mistaken for pleurisy with great effusion until sudden death of the patient with great hemorrhage from the mouth caused a change of diagnosis. Autopsy revealed a large aneurism of the thoracic aorta. This case occurred in Bellevue Hospital in the spring of 1868.

Enlarged heart, according to Walshe, has also been mistaken for pleurisy with effusion. But such cases are so very rare that they need no further notice. Enlargement of the liver and spleen remain for consideration, also hydrothorax.

Enlargement of the liver generally occurs downward, but sometimes it enlarges upward. The line of dulness will then extend higher up in front than behind, the organ moves up and down during respiration, the respiratory murmur, though feeble posteriorly, is not absent, and the heart, if displaced at all, is pushed upward. The signs do not change with position of the patient, as they often do in pleurisy. If effusion be on the right side, the liver may be pushed down so that it may give increased dulness on percussion, and may even be felt below the ribs. But the line of dulness will be as high behind as in front, and the liver is permanently depressed and does not move up and down with respiration. Also, a small yielding interval may be felt between the lower border of the ribs and the normal liver that has been pushed down by the fluid, whereas no such interval exists in case of enlargement of the liver downward. In case of doubt, use the hypodermic needle.

The spleen causes slight dulness, normally, from the ninth to the eleventh rib on the axillary line. It usually enlarges downward and forward in the direction of least resistance, and then it may be felt in the abdominal cavity.

Sometimes, however, the spleen enlarges upward, as high as the fifth rib, without going below the free margin of the ribs at all. Such a case was seen by me at the New York Polyclinic several years ago. The late Prof. E. Darwin Hudson, my colleague in that institution, saw the patient with me. The heart is pushed upward in these cases. The enlarged spleen moves up and down during respiration, the level of dulness changing an inch sometimes on respiratory percussion, according as percussion is performed at the end of a full inspiration or expiration. The respiratory murmur, though weakened over enlarged spleen, may not be entirely absent as in pleurisy, and the vocal fremitus in enlarged spleen is unchanged though absent in pleurisy. Finally, in doubt, the hypodermic syringe may be used.

Prognosis.—This varies for different cases. When of tuberculous origin, as it generally is, recovery is very rare. When due to other causes than tuberculosis or some other chronic disease, recovery from the pleurisy not infrequently occurs. But even in these cases the lung has become so compressed, and often bound down with adhesions for such a length of time, that it rarely ever expands fully again. Meantime the other becomes vicariously emphysematous from extra work, and the right heart in some cases becomes enlarged from obstruction to the pulmonary circulation. Acute general bronchitis occurring in these cases may cause sudden death. This has happened frequently during the grippe epidemic. On the whole, the prognosis must be regarded as unfavorable, first because the disease is generally secondary to tuberculosis, and secondly on account of its crippling the other lung and the heart, and the liability to a fatal issue should the patient be taken ill with some other disease.

Treatment.—The indications are to support the strength of the patient and to get rid of the fluid in the pleural sac.

The first indicaton is met by a nutritious and liberal diet, with moderate exercise, and the administration of tonics of various kinds. In some cases cod-liver oil is beneficial, as in phthisis. In fact what has been said under the head of phthisis in this respect equally applies here, for often the case is one really of tuberculosis, the pleurisy and effusion being only symptomatic.

The second indication, namely, getting rid of the fluid, may be accomplished in one of two ways: (1) measures that will cause its absorption, and (2) mechanical means.

Absorption of the fluid will be hastened by supporting the patient as already suggested and by certain remedies. Of these

iodide of potassium is the best. (℞ Pulv. potass. iodidi, ʒviij.; aquæ, ℥ij. M. Sig. ʒi. ter die after meals.) Along with this blisters may be used. The blisters are changed about from one point to another over the effused liquid, so that continuous counter-irritation to a moderate degree may be kept up. To give hydragogue cathartics, diaphoretics, and diuretics, except the iodide, will not only do no good, but great harm, by weakening the patient. If the bowels are costive, they should be regulated of course. The skin should be kept in good order by the judicious use of baths and friction. Should the kidneys need stimulating a little, the iodide of potassium may be given with infusion of digitalis. (℞ Pulv. potass. iodidi, ʒviij.; infusi digitalis, ℥viij. M. Sig. Tablespoonful ter die after meals.) Should these means fail, the fluid may be withdrawn by aspiration.

In what cases are we justified in aspirating the chest?

According to Anstie, it should be done: (1) In all cases where the fluid fills one pleural cavity and begins to compress the other lung; (2) in all double pleurisies where the total fluid would about fill one pleural cavity; (3) in all cases of large amount of effusion where there have been one or more fits of orthopnœa; (4) in all cases where the fluid is purulent; and (5) in all cases where fluid, occupying at least half of a pleural cavity, has existed for a month and shows no signs of being absorbed.

Where shall we puncture? Bowditch prefers the scapular line at a point two inches above the line of the lower border of the healthy lung. Push in the intercostal space with the point of the finger and plunge the disinfected needle in quickly and firmly at the depressed part. If no fluid be found here, puncture a little higher up and farther toward the axillary line. Bowditch's point has the advantage of allowing the pleural sac to be entered at the most dependent part, and with less risk of perforating the diaphragm and causing peritonitis. The fluid, however, at the most dependent point often contains fibrinous shreds and particles that stop up the needle, so that it has to be withdrawn and cleaned out sometimes, unless it be a large one.

Others prefer a point half-way between the nipple and axillary lines in the fifth interspace on the left side, and the fourth on the right, so as to avoid the liver. Generally, however, the axillary line is used, the point of puncture being made on that line, between the fifth and sixth ribs on the left side and fourth and fifth on the right.

Neither Bowditch, Anstie, nor Murchison recommends to withdraw all the fluid at once, but only so much as will relieve the mechanical distress caused by the pressure. That is usually all that is sufficient to excite the natural process of absorption. They all stop the withdrawal of the fluid as soon as the

patient begins to complain of pain and constriction across the chest or in the epigastrium. Sometimes coughing is excited by withdrawing the fluid, and sometimes to such an extent as to put a stop to the operation. The patient should be slightly stimulated just before the operation, and it may also become necessary to repeat it. Stimulants should be at hand in case of fainting or any accident requiring their use.

It is impossible to say just how much fluid is to be withdrawn. The amount differs for different cases. Some authors, however, mention fifty ounces as the amount to be withdrawn, others eighty. The fact is, the operator must be guided by the signs in each case as to when to stop the operation.

Empyema.

Empyema, pyothorax, or suppurative pleurisy is a disease characterized by pus in the pleural cavity.

It may be due to traumatism, or an abscess opening into the pleural cavity from the liver, abdomen, the chest walls, or lung. When it occurs without any of these causes, as it often does, it is probably due to some constitutional vice, or lowered vitality as may follow previous illness or chronic acoholism, or accompany some exhausting disease. It rarely follows pleurisy with sero-fibrinous effusion, but is usually a suppurative inflammation from the first. Just why pleurisy in some cases will give a sero-fibrinous effusion, and at other times pus results, is not exactly known.

The symptoms are similar to those of pleurisy, and need not be repeated. They are, however, more grave, generally speaking, and the patient is more subject to chills and hectic fever.

The physical signs are the same as those for ordinary pleurisy with sero-fibrinous effusion.

The diagnosis of the disease from ordinary pleurisy can only be told by exploratory puncture. This may be done with an ordinary hypodermic syringe. Sometimes pointing takes place and the pus escapes spontaneously. The diagnosis is then at once established.

Prognosis.—The prognosis depends on the time when the patient is first seen and the treatment pursued. In general, however, it must be regarded as a very serious disease. About one in five recover when spontaneous opening occurs. The mortality, according to Loomis, is greater in those cases where artificial openings are made. This is no reason for not operating, however, since it is only in the more favorable cases that spontaneous escape of pus occurs.

In children, the prognosis is much more favorable, and they generally recover when seen early.

Treatment.—The only treatment in this disease is to let the pus out as soon as the diagnosis is made. There is no use in waiting until you can get your patient stronger and in better condition. They grow steadily worse in spite of everything until the pus is withdrawn.

In the case of children, aspiration alone is necessary. The operation should be performed as in ordinary pleurisy, and should be repeated at short intervals every five days, or week, if the fluid returns. Each time it will be less and less purulent until finally it becomes absorbed and disappears. In the case of adults, aspiration generally does no good. The fluid remains purulent. Permanent drainage, therefore, becomes necessary. An opening should be made in the axillary line between the seventh and eighth ribs. This should be done carefully with a knife, and the opening should be large enough to admit a quarter-inch tube. A rubber tube is as good as any. It is cheap and may be renewed as often as necessary to keep it perfectly clean. The outer end should be made secure by means of a baby pin or other contrivance; otherwise the tube may slip into the pleural cavity. It is not unusual to find several tubes in the pleural cavities of those who have died of empyema.

There is no necessity for washing out the cavity with some strong antiseptic fluid. It is dangerous. Warm water and a little borax (℥ ij. : Oi.) is the best injection. This may be used every day or two to keep the parts clean. Absorbent and antiseptic cotton may be used for keeping the clothing dry.

In some cases one or more ribs have to be resected in order to get at fistulous tracts and sacs of pus, so as to open them up.

In all cases the diet should be liberal and nutritious. Moderate stimulation may be necessary, and claret wine with water or else a glass of beer may be taken with meals. Moderate exercise and fresh air are also recommended. Unless the patient is malarious or lives in such a district, quinine does no good except as a bitter tonic, and even then the compound tincture of gentian is better. Fever and sweats are to be treated as in phthisis.

Hydrothorax.

Hydrothorax is a dropsical and non-inflammatory affection, in which there is fluid in both pleural cavities. It is the result of a serous transudation and not of an inflammatory exudation, and is usually associated with general dropsy, whatever be the cause of the latter. Hydro-peritoneum and hydro-pericardium may exist at the same time. In some cases the fluid may accumulate in one cavity only, from pressure on the veins by some tumor, as aneurism.

The disease comes on gradually with increasing dyspnœa and a short, dry cough. There is no fever unless due to some other disease.

The physical signs are those of double pleurisy with effusion. There are, however, no friction sounds in hydrothorax, and being a bilateral affection the heart is seldom displaced.

The diagnosis of hydrothorax from pleurisy is simple, the latter being an inflammatory disease, the former a dropsical transudation.

Œdema of the lungs gives rise to symptoms resembling hydrothorax; indeed they may exist together. But in œdema of the lungs we hear the liquid crepitant râles, and the patient will have an abundant watery and blood-stained expectoration. Both are absent in hydrothorax. The prognosis depends on the cause and the amount of pressure. Unless promptly treated, it may be the cause of death quickly. In many cases it readily yields to treatment, so that the patient lives to die of something else.

Treatment.—Hydragogue cathartics and diuretics will generally be sufficient to drain off the fluid. A drachm of pulvis purgans (pulv. jalap. co.) may be given at once and repeated until the dyspnœa is relieved and the physical signs show that the fluid has disappeared from the pleural cavity. Elaterium may also be given instead of the pulvis purgans, but it is uncertain in its action, and valuable time may be lost. At last half a grain should be given to accomplish any positive result. Should purging become excessive, it can easily be stopped by giving a little morphine hypodermically. As a diuretic the infusion of digitalis is one of the best, especially when given with acetate of potash. (℞ Pulv. potass. acetat., ʒ ss.; infusi digitalis, ʒ vi. M. Sig. Tablespoonful ter die.) Anstie recommends tinct. iron, gtt. xx. every six hours as soon as the diuretic begins to take effect. The iron is certainly an excellent remedy if the dropsy be due to Bright's disease.

Should the case be very urgent, the chest may be aspirated or the abdomen tapped, or both may be done if indicated.

Hæmothorax.

Hæmothorax is blood in the pleural cavity, and is generally a unilateral affection.

It may be due to traumatic causes, or result from cancer of the pleura or rupture of aneurism into the pleural sac. Rarely is it caused by sudden removal of fluid by which rupture of vessels occurs. Sometimes it takes place in those who have the hemorrhagic diathesis, or in connection with scurvy and purpura. In such cases it would be likely to be bilateral.

The symptoms and physical signs are those of fluid in the pleural cavity. But neither in hæmothorax nor hydrothorax are there usually any friction sounds. Hydrothorax is bilateral, hæmothorax generally unilateral. In hæmothorax, also, the symptoms are often sudden and urgent, accompanied by pallor of the surface and signs of collapse, whereas hydrothorax is always insidious in its progress.

The treatment in hæmothorax is to be directed to the primary disease of which this affection is merely a symptom. The immediate treatment of the hæmothorax itself is to keep the patient at rest and give opium if necessary to allay pain if it be present, and assure complete rest, and thus favor the formation of clot as in other cases of internal hemorrhage. Alcoholic stimulants may become necessary. Paracentesis thoracis is contra-indicated for obvious reasons.

Pneumothorax.

(*Pneumo-Hydrothorax—Pyo-Pneumothorax.*)

Etiology and Pathology.—Pneumothorax is air in the pleural cavity, and it is generally unilateral.

It may be due to traumatic causes, such as penetrating wounds of the thorax, injury to a lung from the end of a fractured rib, and the like. Or it may be due to openings into the pleural cavity from rupture or ulceration of the stomach or œsophagus, and from the lungs in empyema, abscess, or hydatid disease.

Ninety per cent of all cases, however, according to Walshe, are caused by escape of air from the lungs into the pleural cavity, due to the breaking down of tubercle. It is very doubtful if gas ever originates spontaneously in a closed pleural cavity. Pneumothorax occurs somewhat more frequently on the left than the right side.

Symptoms.—These generally are sudden in their onset. The patient is seized with a sharp pain in the affected side and dyspnœa. If the opening into the pleural cavity becomes closed, it is said to be a case of closed pneumothorax. If the opening be valvular so that air enters the pleural cavity but does not escape, it is called valvular pneumothorax. In open pneumothorax, the opening into the pleural cavity allows the free entrance and escape of air both ways. The dyspnœa in valvular pneumothorax evidently increases, owing to the rising pressure from air pumped into the pleural cavity, and often becomes extreme. The side is much bulged, the heart pushed in the opposite direction, and the face becomes deadly pale or cyanotic. The pulse becomes rapid, perhaps 140 per minute, the surface cool and clammy, and there are signs of collapse. If the pneumothorax remains

open, the dyspnœa soon disappears, equilibrium being soon established. In closed pneumothorax, the dyspnœa is in proportion to the amount of pressure brought about before the opening becomes closed.

But the air does not remain alone except for a short time. In from four hours to three or four days, pleuritic inflammation is set up, owing to the foul air and débris that escape from the lung into the pleural cavity. As a result of this pleurisy we have an effusion. This effusion may be sero-fibrinous, giving rise to pneumo-hydrothorax, but very much more frequently it is purulent, giving rise to pneumo-pyothorax. If the pneumo-pyothorax be due to bursting of an empyema into the lung, there will be profuse expectoration of pus.

Physical Signs.—On inspection we notice bulging of the intercostal spaces on the affected side, with diminution or absence of respiratory motions and displacement of the heart in the opposite direction. Respiratory movements are exaggerated on the unaffected side. Dyspnœa and anxious countenance are usually noticeable. Sometimes there is cyanosis, at others the face is deadly pale. The patient prefers the half-sitting posture, and leans over to or lies on the affected side to allow free movements on the unaffected side.

On palpation, the vocal fremitus is diminished or absent according to the amount of air in the pleural cavity. Sometimes the lung is compressed like a placenta against the spinal column. The heart may be felt displaced from its normal position and beating rapidly.

On percussion we get tympanitic resonance over the affected side. The pitch will be high or low according to the amount of air in the pleural cavity and the tension of the chest wall. Over the other lung exaggerated resonance will be obtained, that lung being in a state of vicarious emphysema from extra work.

On auscultation, the respiratory murmur is found to be diminished or absent over the affected side, and so is the vocal resonance. The latter, when heard, sometimes has a metallic (amphoric) quality, according to Walshe.

As soon as the effusion of fluid into the pleural sac takes place, we have the physical signs of pneumothorax above the fluid, while up to the level of the fluid the signs are those of liquid effusion, namely, flatness on percussion and the like. These signs change greatly with position of the patient in this combination of diseases. On auscultation, we often hear amphoric (metallic) breathing and metallic (amphoric) tinkle. The latter is thought by some to be due to dropping of fluid from the vault of the cavity into the fluid below.

Succussion, however, at once distinguishes this disease from

all others. Place the ear to the chest and at the same time shake the patient, and the splashing of the fluid is easily heard, often by the patient as well.

Diagnosis.—The diagnosis of pneumothorax from emphysema has already been considered. It is not likely to be mistaken for any other disease. The diagnosis of hydro-pneumothorax or pyo-pneumothorax, as the case may be, rests upon hearing the metallic tinkle and amphoric breathing, but above all on the splashing sound obtained by succussion.

Prognosis.—This must be regarded as unfavorable. The disease on which it so often depends, phthisis, is generally past cure when this complication arises. The disease itself may cause death from suffocation or collapse in a few hours. Walshe mentions a few instances in which the patient lived for ten years or more. Generally they die in a year or two, and often in a much shorter time.

Treatment.—This is merely palliative. For the pain, shock, and dyspnœa, a hypodermic injection of morphine should be given at once. The attending physician is the best judge of the amount to be given, but it should be sufficient to relieve the alarming symptoms. As soon as possible a drainage tube should be placed in the side, as in empyema. It guards against the accumulation of air in the pleural cavity in case any time the disease may become valvular, an accident that may happen at any moment, and speedily cause death. In a few instances it becomes closed, and the case then becomes one of empyema together with the original disease. The diet and hygiene should be the same as that for empyema or phthisis.

Actinomycosis.

Actinomycosis is a specific infectious disease that depends upon the radiating fungus called the *Actinomyces bovis.* The disease occurs among cattle more frequently than men. In either case, however, it usually begins in the mouth. Abscesses form about the lower jaw and from these pus burrows backward, giving rise to peripleuritic abscess, prevertebral phlegmonous inflammations, and sometimes abscess in the lungs, as well as metastatic abscess elsewere. Fistulæ spread out in various directions through the affected parts. In some cases a genuine empyema, instead of peripleuritic abscess, results. Among cattle the disease begins usually as a hard tumor on either maxillary bone, which is often mistaken for scirrhous cancer.

The diagnosis of this disease depends on finding the fungus. This, according to Strümpell, consists of a tangle of fibres which terminate in characteristic little clubs.

The prognosis is generally unfavorable, and the treatment thus far is chiefly surgical. Symptoms, of course, are to be treated as they arise. Thus pain is to be relieved by opium, and for rise in temperature antifebrin may be given, as quinine has little effect. The diet should be highly nutritious and stimulants given when necessary.

CHAPTER III.

DISEASES OF THE LIVER.

THE liver is situated in the right hypochondriac region and extends across the epigastrium into the left hypochondrium. It weighs about fifty to sixty ounces. As mapped out by percussion from above down, its upper boundary corresponds to the base of the ensiform cartilage on the median line of the sternum, the upper border of the sixth rib on the right papillary (nipple, mammillary) line, the upper border of the eighth rib on the right axillary line, the ninth rib on the scapular line and the tenth rib on the vertebral line. By percussing from these points downward, we determine the lower boundary line by noting the points where liver dulness ceases. On the median line in front the lower boundary corresponds to a point about midway between the base of the ensiform cartilage and the umbilicus, and turning upward to the left; on the right papillary line, the free margin of the ribs; on the right axillary line, the upper border of the eleventh rib, but posteriorly hepatic dulness is lost in the thick muscles of the back below the eleventh rib. The liver dulness extends about two inches to the left of the median line, where it passes into the lower margin of cardiac dulness. The vertical line of dulness measures about three inches on the right sternal line, four inches on the right papillary line, four inches and a half on the right axillary line, but posteriorly it is indefinable as already stated. In women who have laced tightly, the lower border anteriorly is usually lower than that mentioned. The liver may also be displaced from various causes, or malformed, so as to give boundary lines different from those mentioned.

Bile in the intestinal canal not only acts as a cathartic and antiseptic, but it also precipitates pepsin, thus allowing the pancreatic emulsion of fat to proceed. On the other hand, the lack of bile in the intestinal canal, as occurs in obstructive disease of the hepatic ducts, for instance, allows pepsin to come in contact with pancreatin by which the action of the latter is destroyed. This fact is worthy of note and remembrance in studying diseases of the liver.

Pigment liver is described separately by some authors. It occurs in the course of malarial fevers and in the morbid condi-

tion of blood described as melanæmia. Pigment is also found in the spleen and other organs. Hæmoglobin becoming liberated is converted into hæmatoidin, which gives the pigment liver its melanotic or black appearance.

Corset liver is characterized by the corset furrow that lies chiefly in the right lobe. It is due to habitual tight-lacing, and hence is found in women, rarely among soldiers. According to Strümpell it cannot be felt during life unless extreme. The furrow can then be felt along the margin of the ribs if the abdominal walls are lax. This should be remembered, according to

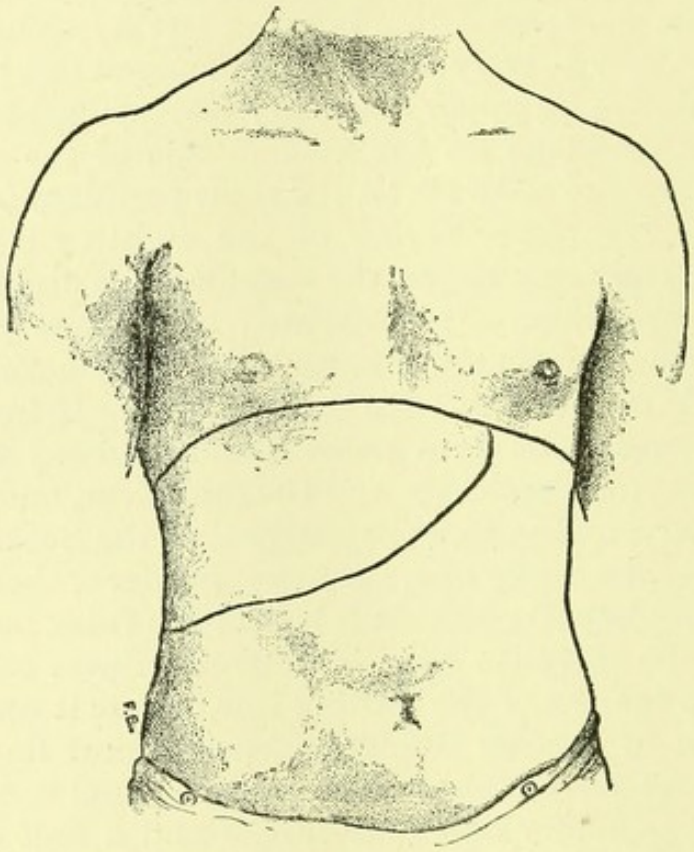


FIG. 17.—NORMAL LIVER. SHOWING LOWER BOUNDARY.

Strümpell, to prevent confounding the part of the liver before the furrow from some enlargement.

Movable liver, according to the same author, is of very rare occurrence, and is only found among women. The cause is unknown.

CONGESTION AND HYPERTROPHY OF THE LIVER.

Etiology and Pathology.—Congestion of the liver may be active or passive. In either case the organ is uniformly enlarged and its surface is smooth.

Active congestion of the liver is due to intemperance and gluttony, chronic malarial poisoning and vaso-motor disturbances, and occurs in the course of diabetes mellitus and sometimes in

rachitis. Among articles of diet that produce the disease may be mentioned the various condiments and spices, and even coffee, which is generally forbidden during the cure at Carlsbad, weak tea being used instead. Cessation of hemorrhages elsewhere, as hemorrhoids, the menopause, vicarious menstruation, and the like, are also said to produce hepatic congestion. Not only does the liver become enlarged, but in some cases, as among topers, chronic malarial poisoning, and diabetes mellitus, there may be an actual hypertrophy due to increase in the number and size of the secreting hepatic cells.

Passive congestion, on the other hand, is due to some obstruction to the return circulation, as seen in mitral and tricuspid disease and general vesicular emphysema. This form of congestion produces the nutmeg liver and subsequent red atrophy.

Symptoms.—In both forms there is usually a feeling of weight and uneasiness in the right hypochondrium, and in the active form there may be more or less tenderness over that region on pressure. Headache, loss of appetite, palpitation and irregular heart, and general apathy, with irregular bowels and piles, are usually present. On palpation, the anterior border of the liver may be felt below the free margin of the ribs, and the area of percussion dulness is enlarged. In some cases the liver may be so enlarged as to cause bulging of that side of the chest.

Diagnosis.—The diagnosis between active and passive hyperæmia rests in the former case upon the absence of heart disease, general emphysema, or aneurism, or other cause that by obstruction or pressure might interfere with the return circulation. Active congestion may cause such enlargement with tenderness as to be mistaken for abscess or even pleurisy with effusion. But abscess causes the liver to be irregularly enlarged is attended with graver constitutional symptoms than active congestion, and is slow in its progress. Only in very rare cases would there be doubt sufficient to justify aspiration. In pleurisy with effusion the line of dulness will be as high posteriorly as in front, with corresponding diminution or absence of vocal fremitus and respiratory murmur, whereas in enlargement of the liver the line of dulness extends up higher in front than behind. In the latter case also, the liver moves up and down with respiration, but in pleurisy with effusion it is permanently depressed. In pleurisy with effusion the signs often change with position of the patient, in enlargement of the liver they do not.

Treatment.—In passive congestion the treatment should be directed to the primary disease. In active congestion removal of the cause by regulating the diet, and habits generally, is necessary. In chronic malarial poisoning, change of climate may be necessary if quinine, iron, and arsenic fail to effect a cure. For an

ordinary attack of active congestion of the liver following a debauch or over-eating, ten grains of calomel at bed-time, followed by a saline cathartic next morning, followed by a few days of rest and low diet, are usually sufficient. In chronic cases the patient should be sent to Carlsbad or Homburg if possible.

Perihepatitis. Suppurative Hepatitis or Abscess of the Liver. Gangrene of the Liver.

Etiology and Pathology.—Perihepatitis is inflammation of the capsule of the liver, and may be associated with abscess, cancer, or syphilis of the liver, or due to extension of inflammation from the peritoneum or right pleura. Blows or other injuries may also cause it. As a primary disease, however, it is usually due to exposure to cold while being overheated, especially in hot and malarious climates. Besides adhesions to various neighboring organs resulting, the capsule becomes more or less thickened, and so much so in some cases as to subsequently contract and, by compression, produce atrophy of the liver.

Suppurative hepatitis is an acute circumscribed inflammation of the parenchyma of the liver. Although abscess usually results, acute primary circumscribed hepatitis may end in resolution. It may be due to blows or other injury, lodgment of foreign bodies such as might result from swallowing needles, pins, and the like, the presence of gall stones, round worms (lumbrici) that have found their way into the liver from the intestines along the bile ducts, and as a result of surgical operations and suppurations about the rectum. In pyæmia also, as well as suppurative pyelophlebitis, the liver is not infrequently the seat of abscess. Dysentery is often associated with abscess of the liver in the tropics and neighboring countries, and, according to Budd, the liver becomes involved not only in dysentery but other diseases in which there are ulcers that contaminate the portal circulation.

As a primary disease, however, suppurative hepatitis rarely occurs except in hot and malarious climates, notably India. The reason why it occurs more frequently there than in the West Indies, according to Maclean, is attributable to the beneficent influence of the cool sea breeze in the latter, which is wanting in the interior of India. In addition to heat and malaria, intemperance acts as a powerful predisposing cause.

Abscess of the liver is usually situated in the right lobe and near its upper surface. There may be only one abscess or there may be many, and these may be deeply or superficially situated. The pus varies in character and amount. In one case mentioned by Maclean there were seventeen pints of pus. In others there may be only one or more ounces. The abscesses may be diffuse or encysted.

In very rare cases gangrene may result from suppurative hepatitis. It would occur rather by admitting air into the abscess than as a result of the disease. As it occurs very rarely and is then beyond the reach of curative treatment, nothing further will be said regarding it.

Symptoms.—In the case of perihepatitis, should the inflammation extend to the capsule secondarily from some other point, the pain and acute symptoms become suddenly aggravated. If the case be one of primary acute perihepatitis, it usually begins with a chill followed by a sharp pain or stitch in the side like pleurisy. There is marked tenderness on pressure over the liver, and more or less fever is usually present. In acute hepatitis, before suppuration occurs, the symptoms resemble those of active congestion of the liver, but are generally more marked. There is usually a sense of weight in the right hypochondriac region, with, perhaps, some pain, so that the patient prefers to lie on the opposite side. The pain, through sympathy, may extend to the right shoulder, but should not be regarded as a necessary symptom. There is more or less disturbance along the gastro-intestinal tract, as evidenced by loss of appetite, furred tongue, nausea, and even vomiting. Diarrhœa is not infrequently present. There is usually a dry reflex cough due to irritation of the right pleura and lung. More or less fever is often present. Jaundice occurs only in those cases where the abscess presses on the bile ducts or is complicated with extensive catarrh sufficient to cause resorption of bile, and hence is not present as a rule.

Acute hepatitis may end in resolution, as already stated, or abscess may result. When suppuration takes place, it is usually indicated by recurring chills at irregular intervals, followed by fever and sweats. The temperature rises to 103° or 105° F., the pulse becomes frequent, and pain, dyspnœa, and cough increase, with great mental depression. The urine becomes scant and high-colored and loaded with urates.

On the other hand, in case of an encysted abscess, the symptoms might be so obscure as to render it impossible to make a diagnosis without a careful physical examination and even exploratory puncture. The habits and previous history of the case, as well as place of living, should be carefully looked into.

After the formation of abscess, on physical examination by inspection we find that, if the abscess be large, the right hypochondrium is more or less bulged, and respiratory movements are less marked on that side. Pointing of the abscess may even be observed in some cases. On palpation fluctuation is sometimes felt. The surface of the liver will be smooth, but may be uneven if there be several abscesses. Pain is usually increased. On percussion the area of hepatic dulness is enlarged in the direction

of the abscess. Unless relieved by aspiration, the abscess may burst into the pericardium or peritoneum with speedily fatal result. Or it may be discharged into the right pleural cavity or into the intestine, or else externally through an intercostal space or the abdominal wall near the ensiform cartilage.

Diagnosis.—Perihepatitis might be mistaken for pleurisy, intercostal neuralgia, or even pleurodynia. But in pleurisy the pain is situated higher up than in perihepatitis, and after effusion takes place in pleurisy the signs of the latter are unmistakable. In intercostal neuralgia there is usually the history of neuralgic attacks in other localities, besides the three points of tenderness along the course of the nerve. The pain in perihepatitis is more diffused over the region of the liver and there is marked tenderness on pressure with the ends of the fingers under the ribs in the right hypochondrium. For this purpose the patient should be in the recumbent position with the knees drawn up so as to relax the abdominal walls as much as possible. Pleurodynia or muscular rheumatism often changes from one muscle to the other, causes pain on touch or motion, and is frequently associated with lumbago. Moreover, in intercostal neuralgia and pleurodynia there are usually no constitutional disturbances. Abscess of the liver might be mistaken for abscess of the abdominal walls if the latter should occur near the right hypochondrium. But abscess of the abdominal walls gives no previous history of ulcerative diseases that are likely to contaminate the portal blood; the abscess forms rapidly, is superficial, and gives an irregular outline of dulness on gentle percussion. On forcible percussion, tympanicity may be elicited from the stomach and intestines. The opposite conditions usually obtain in the case of abscess of the liver. Moreover, in the latter disease the tumor moves up and down with respiration, but is stationary in the former.

Hydatid disease occurs in certain countries where dogs are numerous, and open drinking-water, as mentioned in hydatids of the lungs. Should the patient have changed locality, the place of former residence should be inquired into. In both diseases there might be signs of a fluctuating tumor. But hydatid growth is slower than abscess of the liver, there are wanting the constitutional symptoms characteristic of suppuration, and hydatid fremitus is sometimes felt. Finally, in case of doubt, aspiration would lead to a correct decision.

Prognosis.—Abscess of the liver from any cause is to be regarded as a grave affection. As a complication of pyæmia or dysentery the prognosis is always unfavorable. As a primary affection the result is fatal in case of rupture into the pericardium or peritoneum, and is unfavorable when it bursts into the right

pleural cavity. It is most favorable when it opens externally, less so when it opens into a bronchial tube or the intestine. The prognosis also depends much upon the early recognition of the disease and treatment by improved methods.

Treatment.—In case of hepatitis or perihepatitis, the patient should be kept in bed and have hot poultices applied over the liver until the pain is somewhat relieved. Blisters will do no good unless the disease becomes subacute or chronic. The bowels should be freely moved with calomel and the diet should be light. Quinine should be given as an antiperiodic if the case be due to malarial poisoning.

In case of abscess of the liver, if it be secondary to dysentery and the like, the disease of which it is a complication requires proper treatment as well. In any case the strength of the patient is to be maintained by nutritious and easily digested diet, and stimulants if necessary, and, as soon as abscess is believed with good reason to exist, aspiration should be performed without delay. The puncture may be made into the right lobe between the eighth and ninth or ninth and tenth ribs, or wherever it is indicated by bulging or pointing. Even exploratory puncture in case of doubt will do no harm if carefully performed antiseptically. One aspiration will hardly prove sufficient, and it may be necessary to repeat the operation many times. The attempt to establish adhesions between the liver and abdominal walls by means of caustics is not only an unnecessary preliminary for aspiration, but may prove fatal by delaying the operation.

Acute Yellow Atrophy of the Liver.

Etiology and Pathology.—This disease is characterized by acute fatty degeneration of the hepatic cells throughout the liver, and was first described by Rokitansky in 1845. According to Frerichs and others, it is the result of an acute diffuse parenchymatous inflammation. Inasmuch as other organs, as the kidneys, heart, and muscles, have also undergone acute fatty degeneration, it is regarded by some as a severe constitutional disease of which the liver affection is but a local manifestation. The liver is much reduced in size so that its capsule is puckered; the organ itself being soft and flabby. As the cells undergo fatty degeneration and liquefaction, they are absorbed by the lymphatics, leaving only connective tissue and blood-vessels. The latter being much congested gives the cut surface a red appearance, while the outer surface appears yellow. The blood contains tyrosin and leucin, as first observed by Frerichs, and shows little disposition to coagulate. The spleen is enlarged. The tissues throughout are

more or less tinged yellow, and ecchymoses occur in serous cavities. The gall bladder and bile ducts are empty.

The cause of this disease is unknown. It occurs most frequently between twenty and thirty, according to Frerichs, and oftener in females than males. Pregnancy is said to be a predisposing cause. Alcohol, malaria, and syphilis, as well as great mental emotion from grief, fright, and the like, have been considered as contributing causes; but as the disease is rare and little is yet known about it, the etiology may be said to be obscure at present.

Symptoms.—The disease may commence with ordinary symptoms referable to hepatic disturbance, such as headache, loss of appetite, pain and tenderness in the epigastric region and over the liver, nausea and vomiting, with bowels inclined to constipation. The stools become clay-colored. Slight fever and aching of the limbs may be also present. After a few days, jaundice is

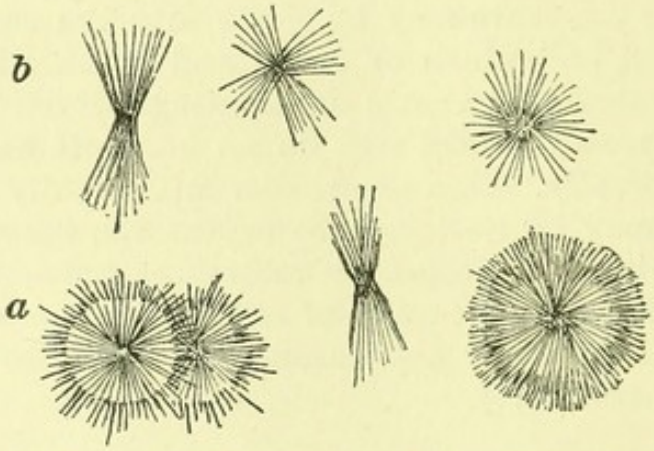


FIG. 18.—*a*, LEUCIN CRYSTALS; *b*, TYROSIN CRYSTALS.

observed. The symptoms now begin to increase in severity. The patient suddenly becomes restless, and soon there is delirium, or, it may be, convulsions or coma. The pupils are dilated. Cutaneous ecchymoses occur, as well as hemorrhages from mucous membranes (the latter giving rise to vomiting of matter resembling coffee grounds), epistaxis, and bleeding from the genitals and intestines. The stools, clay-colored at first, now become dark from admixture of blood. The temperature falls to even below normal, and the pulse becomes slow, except during a convulsion, when it may run up to 150. There is great tenderness over the liver, so that pressure over the organ causes reflex twitching of the facial muscles and shrinking, even while the patient is insensible. Instead of coming on gradually, the disease may at once assume a grave form, delirium and coma appearing among the early symptoms. Toward the end, the pulse becomes feeble and frequent. The urine is normal or slightly diminished in quantity

and dark from bile pigment. The specific gravity may be a little higher than normal, and in it are found crystals of tyrosin and leucin. The chlorides, uric acid, and urea are absent, but albumin and blood are often present.

On physical examination, the liver is found to rapidly decrease in size, so that near the end little dulness can be obtained on percussion over the organ. The spleen is somewhat enlarged.

Diagnosis.—Until grave symptoms occur, it is often impossible to make a diagnosis of this rare disease. But after the severe and characteristic symptoms set in, there can no longer be doubt. unless the case be one of acute phosphorus poisoning, when a diagnosis would be impossible without full knowledge of the poisoning. Even in yellow fever with black vomit the liver does not decrease in size, nor does the urine become acid and contain tyrosin and leucin.

Prognosis.—The disease, so far as known, is invariably and rapidly fatal. The duration depends on the early symptoms. Where these are gradual in developing, the patient may live two or three weeks; but after severe symptoms occur, the duration is only a few days, or less than one week.

Treatment is only palliative. Little or no treatment is required until the occurrence of grave symptoms, and then delirium is best controlled by ice to the head, and morphia, while stimulants may be given to prolong life.

Cirrhosis of the Liver.

Cirrhosis signifies yellowness, and was first used by Laennec, of Paris, about 1819, to express the yellow appearance of the cut surface of the liver in this disease. Afterward the term was applied to other organs regardless of color, so that now we speak of cirrhosis of the kidneys, lungs, or brain.

From the fact that cirrhosis of the liver is often caused by drinking alcoholic liquors, it is sometimes called gin-drinker's liver; and because it is a chronic disease usually resulting in contraction, it is also called chronic atrophy of the liver. Other names are chronic interstitial hepatitis, hob-nailed liver, granular liver, sclerosis, and fibroid degeneration of the liver.

Pathology.—There are two theories regarding the pathology. The first is that there is primarily a chronic inflammation of the interstitial connective tissue (Glisson's capsule) resulting in proliferation with subsequent contraction. By this means many capillary vessels and ducts are obliterated, as well as hepatic cells. According to the second theory the hepatic cells are first destroyed, and their spaces become occupied by connective tissue. Owing to increase of the interstitial connective tissue, the liver

at first is enlarged, but afterward contraction usually results, so that the liver may be reduced from fifty or sixty ounces to half that weight. The left lobe and anterior edge appear to suffer most, leaving the right lobe somewhat globular in form, with its surface hob-nailed from irregular contraction. The organ is tough and indurated from increase of the fibrous tissue and its subsequent shrinkage.

Owing to obstruction to the portal circulation, there are congestion of the gastro-intestinal tract, piles, and in the majority of cases, enlargement of the spleen.

Etiology.—Abuse of alcohol is the most frequent cause, but, as already stated, it is not certainly known whether it acts primarily on the hepatic cells or interstitial connective tissue. But apart from this, there appears to be a certain amount of predisposition on the part of some to develop the disease; for out of a great number of those who drink alcohol, even to excess, only a few have cirrhosis of the liver. Strümpell favors the view of the primary action of the alcohol on the hepatic cells. If this be correct, we can better understand how cirrhosis of the liver is brought about by other causes, such as malarial fevers, habitual congestion of the liver from heart disease, and gluttony (including the use of highly seasoned food), tight-lacing, and the like. In some cases there appears to be no cause. From the fact that men are more exposed to the alcoholic habit which requires some time to produce the effect, we naturally find the disease usually among men and from thirty to sixty years of age, although a few very rare cases have been observed at the ages of ten and eleven. Syphilis may, among other changes, also produce contraction of the liver, but is described separately.

Symptoms.—These are chiefly due to obstruction to the portal circulation, and they become more and more marked as the disease progresses. At first, and even for months, there may be only symptoms of dyspepsia. Very rarely does the patient complain of pain, but rather a deep-seated feeling of uneasiness over the liver. Subsequently the appetite is lost, and not only may there be nausea, but vomiting occurs. Dark blood is sometimes vomited after the disease has become established, but it may also be an early symptom if well-marked obstruction to the portal vein occurs early. Dark blood may also be passed by the bowels (melæna). Owing to lack of absorption by the gastro-intestinal veins, innutrition and anæmia follow, and the urine becomes scant, besides being high-colored and abundant in urates. Albumin in the urine occurs in some cases, but it does not necessarily indicate renal disease, though the two may coexist, as the finding of casts under the microscope would show. Jaundice is not usually marked, only the orbital conjunctiva appearing on

close inspection to be tinged with yellow. Well-marked jaundice, if it occurs, is usually due to some complication or intercurrent affection. The skin, instead of being distinctly yellow, is rather of a sallow hue.

Ascites is almost sure to occur in time. This is not infrequently followed by œdema of the lower extremities, partly due to pressure on the return circulation by the ascites, and partly on account of anæmia and increasing pressure of the blood in the capillaries. The loss of albumin, when it exists to any appreciable degree, further aids in the occurrence of general dropsy. But in some rare cases œdema of the lower extremities may be noticed as early as, or even before, the ascites, though the heart and kidneys be normal. For if the inferior vena cava runs through a foramen instead of a fissure in the posterior border of the liver, the vessel will become constricted at that point, with consequent œdema of the lower extremities. As the abdomen becomes distended with fluid, the dyspnœa increases from interference with descent of the diaphragm. Much relief may be obtained should diarrhœa come on, as it sometimes does. Piles and dysenteric symptoms may prove very annoying. Fever is not a part of the disease, but may be present from other causes or complications. Owing to obstruction to the portal vein, the superficial abdominal veins are sometimes seen to be greatly distended from the collateral circulation, though deep veins are also affected. When well marked around the umbilicus, they form what is called the *caput Medusæ*. To sum up, during the early part of the disease, or first stage as it is sometimes called, the symptoms are chiefly those of dyspepsia. But after ascites occurs, the globular form of the abdomen, with its distended superficial veins, the general emaciation, and sallow skin, are characteristic. The disease lasts usually some three or four years, and the cause of death is generally exhaustion.

Physical Signs.—These are usually negative at first. After the disease has become established, however, the physical signs are important in making a correct diagnosis. Thus, on inspection, the enlarged superficial abdominal veins, including the *caput Medusæ*, may be observed, as well as the general emaciation, the sallowness of the skin and conjunctiva, and the globular form of the abdomen.

On palpation, the surface of the liver, smooth heretofore, is now felt along its anterior border—if not too much shrunken, and within reach—to be nodular, uneven, and hard.

Percussion is perhaps the least trustworthy means of examination, owing to the distention of the abdomen with fluid and gas. But in many cases the area of hepatic dulness is found to be smaller than normal, not reaching down to the free margin of the

ribs nor across the median line. If the spleen be found enlarged, it is a point greatly in favor of cirrhosis of the liver, taken with the other signs and history of the case. For examining the liver, the patient may be on the back or left side with the knees drawn up; but in mapping out the spleen, the erect posture while sitting or standing is best, otherwise it may gravitate out of reach. The presence of fluid in the abdomen is readily told by percussion. As the fluid gravitates to the most inferior parts, so do we get flatness or much dulness on gentle percussion over the most dependent parts; but on top, where the bowels, distended more or less with gas, are floating. we usually get tympanicity; and

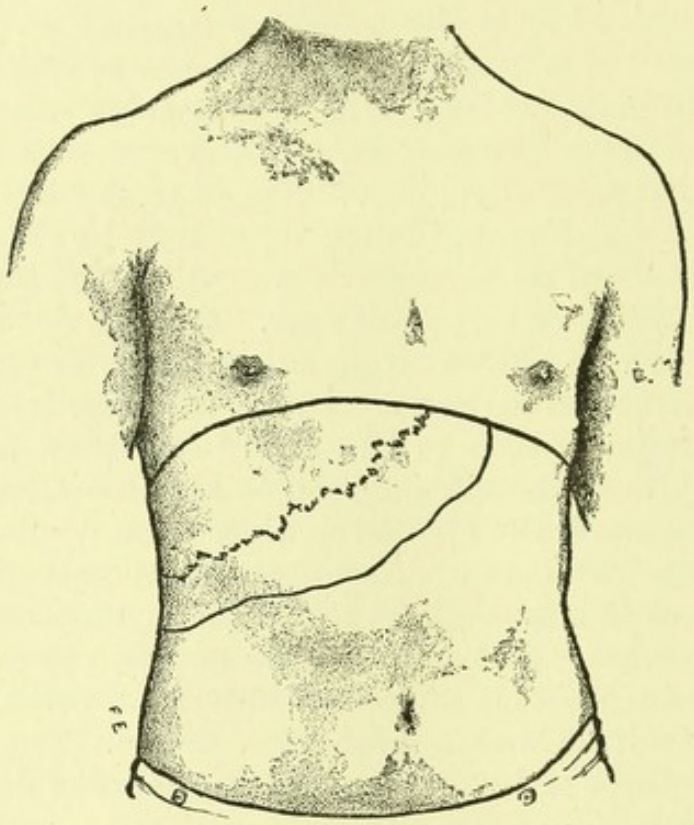


FIG. 19.—NORMAL LIVER, AND DOTTED LINE SHOWING CIRRHOSIS.

these signs change with position of the patient, unless the fluid be encapsulated in some way. Should there be much fluid, it may be withdrawn for the purpose of facilitating the diagnosis.

Diagnosis.—Cancer of the liver is probably the only disease that might be mistaken for cirrhosis; and in cancer, the cachexia, as well as cancer in other organs, usually renders the diagnosis easy. In cancer, also, the liver is not infrequently enlarged, and the nodules are much more marked. In both waxy and fatty liver the organ is enlarged. In the former case the liver is hard, but the dropsy, if any exists, is general and usually due to waxy kidneys that nearly always coexist. In fatty liver there is no dropsy and the liver is smooth and soft. In ovarian dropsy the disease began in one groin or the other, and the fluid does not

change with position of the patient; but in cirrhosis the fluid is distributed over the abdominal cavity, and does change with position.

The greatest difficulty in making a diagnosis occurs in the early stage of the disease, when physical signs are not well marked, and only dyspeptic symptoms may be present. Here the habits and age of the patient are to be considered.

Prognosis.—This is bad; and unless the disease be recognized early, and proper means be employed at once, the patient strictly following directions, it may be said to be uniformly fatal.

Treatment.—It is only in the early stage, before contraction and irreparable injury has occurred, that treatment can be any other than palliative. In a favorable case, during the early stage, one season at Carlsbad may arrest the disease, and even effect a cure, if the patient can and will strictly follow directions. This would not be due to the water alone, but also to the diet, exercise, and baths, all of which tend to improve the hepatic circulation and function, as well as retard the growth of connective tissue, and cause its absorption. Of course, a return to the old habits would in all likelihood cause an immediate return of the symptoms. After dropsy occurs, the patient should never be sent to Carlsbad, as the treatment, being more or less devitalizing, would only do harm.

One of the necessary conditions of any plan of treatment that promises any success is at once to leave off the alcoholic habit except so far as it may be necessary to sustain life, a glass of claret wine with water for instance at dinner, but never undiluted wine. Highly seasoned food and gluttonous habits in general are to be avoided. The diet should be regulated and consist of easily digested and nutritious food. A pint of milk peptonized by means of Fairchild's tubes, according to the directions that accompany them, may be given four times daily to keep up the strength of the patient, without irritating or congesting the liver. Weak tea without milk or sugar may be drunk at meals instead of coffee. Counter-irritation is of little or no benefit, except in the early stage of the disease, and then should consist of warm poultices in imitation of the Carlsbad mud bath, instead of blisters or other severe remedies. Iodide of potassium is of little value unless there be a history of gout, syphilis, or lead poisoning, as it tends to upset the stomach and interfere with nutrition. Owing to the anæmia which always exists, iron in some form should be given. Blaud's pills (℞ Ferri sulphat., potass. carb., āā ʒ i.; tragacanthi, q.s. M. ft. pil. No. 30. Sig. One ter in die) are used, but when tincture of iron is well borne by the stomach it is better, especially in combination with arsenic. (℞ Liquor potass. arsenitis, ʒ ss.; tr. ferri chloridi, ʒ iss.; aquæ, q.s.

ad fl. ℥ ij. M. Sig. ʒ i. ter in die after meals.) After ascites occurs, tapping the abdomen may become necessary to allow free respiratory movements of the diaphragm. Indeed, repeated tappings in such cases offer the best chance for a cure.

At any period of the disease I have found the dyspeptic symptoms yield to the ordinary Mist. R. and S. of our dispensaries here in New York, or some modification, more readily than to any other single remedy, especially if there be inclination to constipation, as sometimes happens, and sour stomach. (℞ Pulv. sodii bicarb., pulv. rhei, āā ℈ij.; aquæ, ℥ ij. M. Sig. ʒ i. ter in die after meals.) Should there be palpitation or irregular heart's action, as not infrequently happens in dyspepsia due to any cause, ʒ ss. tr. digitalis may be added to the mixture, so as to give about three drops at a dose; or two to three drops of tincture strophanthus at a dose in case the digitalis is not well borne by the stomach. But evidently a great many prescriptions might be tried without avail in such cases. Diarrhœa should not be checked too suddenly if it occurs, and indeed sometimes much temporary relief may be obtained by a free purgation.

Other Forms of Cirrhosis and Atrophy of the Liver.

Fatty cirrhosis is a rare form described by some authors, in which the hepatic cells become infiltrated with fat, so that the disease may be mistaken for fatty liver. The surface is smooth and the organ enlarged, but very tough owing to increase in the interstitial connective tissue, which does not contract. It is usually found among the intemperate.

Hypertrophic cirrhosis is regarded by some as one stage of the atrophous form, the liver usually becoming somewhat enlarged before contraction takes place. By others it is thought to be of biliary origin and is termed primary biliary cirrhosis. From some cause, not certainly known, the hepatic cells are destroyed and connective tissue takes their place. This tissue does not contract, however, so that the organ may become twice as large as normal. Its surface is smooth and jaundice is a marked symptom throughout. Dropsy does not always occur, and then only when the disease is far advanced. The spleen, according to Flint, is, however, usually enlarged. Intemperance is a frequent cause and the prognosis is bad.

Biliary Cirrhosis.—This form is due to chronic retention of bile in the liver, from long-continued obstruction in the bile ducts, such as may be caused by gall stones, stricture of or pressure on the bile ducts from tumors, and the like. The hepatic cells are first destroyed, and then their vacant spaces are occupied by connective tissue, which does not contract. Hence it is also called secondary hypertrophic cirrhosis.

Red atrophy is usually described as one form of cirrhosis of the liver, and was first mentioned by Rokitansky. It is due to chronic congestion of the liver, as seen in mitral and tricuspid valvular lesions. It may be caused also by diseases that obstruct the circulation of blood in the lungs, as general vesicular emphysema, or chronic pleurisy with contraction. The radicles of the hepatic vein within the lobules are congested, while their peripheries are a pale yellow. Hence the cut surface of such a liver presents a nutmeg appearance, and it is therefore called the nutmeg liver. Subsequently the hepatic cells are destroyed and the liver collapses without increase of connective tissue in most cases. The spleen is therefore not usually enlarged.

Simple atrophy of the liver occurs among the aged or as a result of starvation. The organ is diminished in size, but clinically this form is unimportant.

Fatty Liver.

Etiology and Pathology.—The liver may become fatty through fatty metamorphosis of the hepatic cells, or by their infiltration with fat brought from elsewhere.

Fatty metamorphosis of the hepatic cells occurs in connection with other diseases, as waxy liver, cancer of the liver, typhoid fever, and pyæmia, and in poisoning from phosphorus. This form of fatty liver does not further concern us.

Fatty infiltration may occur in the course of phthisis or other wasting disease, and is then more frequently found among women than men. The fat accumulates in the liver in proportion to emaciation from absorption of fat elsewhere. It is also met with sometimes in persons of sedentary and luxurious habits, especially among those addicted to intemperance. The livers of geese are made to undergo fatty infiltration by penning and overfeeding.

In fatty infiltration, the liver becomes enlarged and pale, its surface is smooth and edges rounded. The microscope shows oil globules in the hepatic cells, especially in the periphery of the lobules.

Symptoms.—These are negative. There is no pain, ascites, or jaundice. Diarrhœa may occur at times owing to impaired hepatic function late in the disease. Dyspnœa and palpitation are due to dyspepsia or coincident fatty heart.

Diagnosis.—By physical examination alone are we enabled to make a diagnosis. The liver is felt to be uniformly enlarged, and extending downward below the free edge of the ribs. Its surface is smooth and doughy to the touch. The area of percussion dulness is enlarged. There is no dropsy or albuminuria. By these means it is readily distinguished from waxy liver, which,

though large, is hard and associated with waxy kidneys and spleen.

Prognosis.—Fatty degeneration of the liver or fatty infiltration in connection with wasting disease is of grave import. But fatty infiltration occurring as an independent disease is not a serious malady. Death may occur, however, from fatty heart, or pulmonary œdema arising from feebleness of the heart's action.

The treatment of fatty degeneration and infiltration in connection with wasting diseases requires no notice. But occurring among topers and gluttons, the diet should be regulated, and alcoholic beverages, except dilute claret wine in moderation,

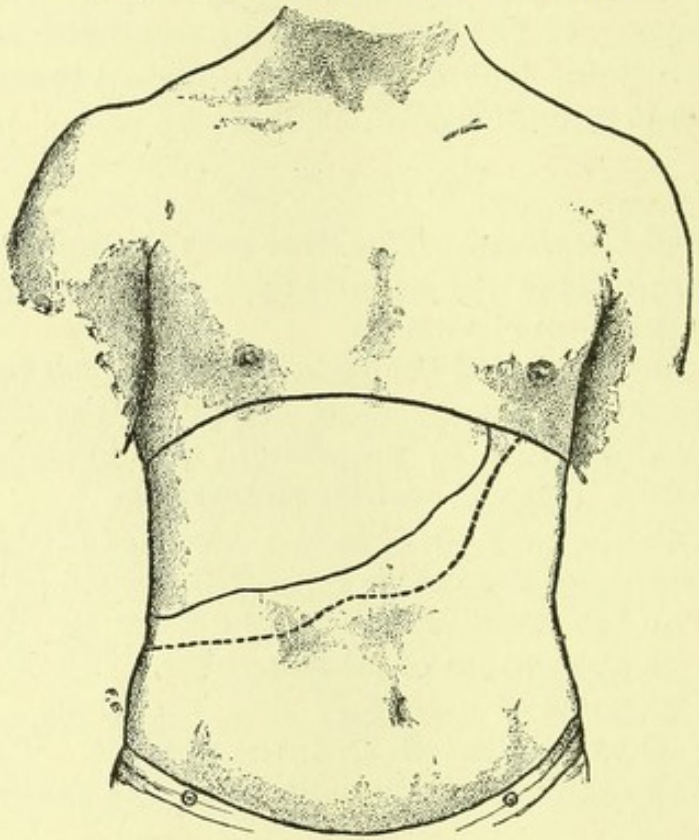


FIG. 20.—NORMAL LIVER, WITH DOTTED LINE SHOWING FATTY LIVER.

should be stopped. Sugars, starches, and fats should be avoided as articles of food, and regular exercise in the open air should be taken. One season spent at Carlsbad would give the patient great advantages in learning how to diet and exercise. The alkaline waters of Carlsbad also are invaluable in the treatment of this disease. Alkaline remedies in general are recommended, as they are supposed to saponify the fat so that it can be removed.

WAXY LIVER.

Waxy liver was first described by Rokitansky in 1842. From the fact that its cut surface is thought by some to resemble starch or lard, it is also called amyloid or lardaceous liver; and

because the infiltrated material is an albuminoid substance, it is also called albuminoid disease of the liver.

Waxy liver is always secondary to some pre-existing wasting disease, as phthisis, syphilis, caries of bone, and the like. According to Virchow, the *materies morbi* is absorbed from some diseased focus and carried to the liver, the capillaries of the hepatic artery being chiefly affected at first. The liver becomes enlarged, sometimes to twice its normal size, and hard, and its surface is smooth. The spleen is also enlarged from waxy degeneration, and the kidneys are likewise affected. Hence the urine contains albumin. There is no jaundice or dropsy in this disease unless the

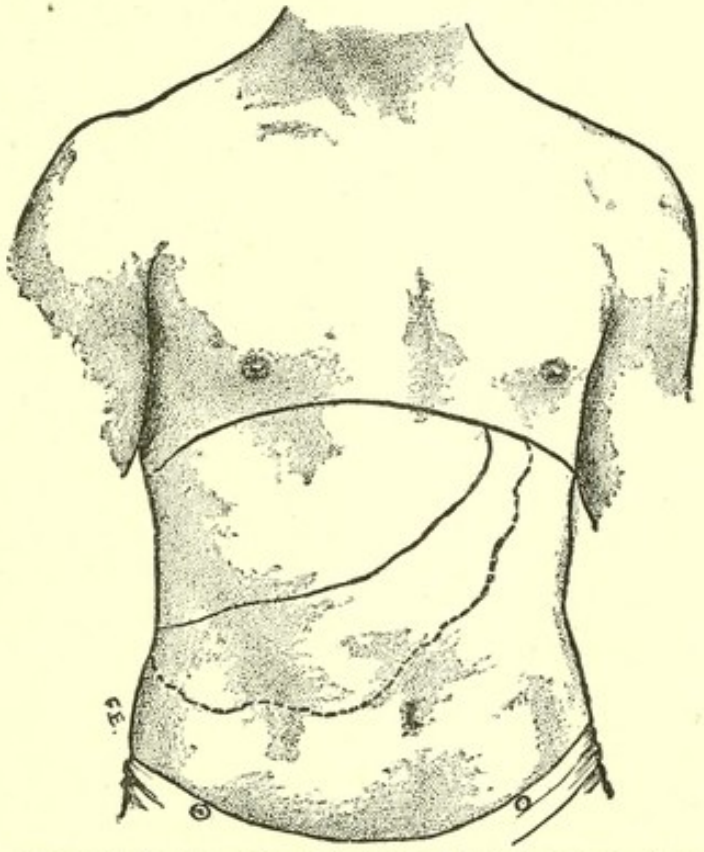


FIG. 21.—NORMAL LIVER, WITH DOTTED LINE SHOWING WAXY LIVER.

latter be due to the renal disease coexisting. It will then be general instead of being confined to the abdomen. The liver is tough and creaks under the knife. The cut surface when treated with iodine turn brownish-red, and blue with sulphuric acid. The disease affects males more frequently than females, and is more frequently due to syphilis perhaps than any other cause. On physical examination, the hard edge of the liver may be felt below the free border of the ribs, as far down as the umbilicus sometimes or even lower. The area of percussion dulness is increased.

The diagnosis is usually not difficult and rests upon the uniform and painless enlargement of the liver, its smooth surface and hardness, together with enlargement of the spleen, and albu-

min in the urine, occurring in a person already suffering with some pre-existing wasting disease. The prognosis is bad, and the treatment should be directed to the original disease, but in most cases it can be only palliative.

Cancer of the Liver.

Etiology and Pathology.—Cancer of the liver may be primary or secondary, and is usually observed in persons somewhat advanced in life, from forty to seventy years of age. It is rarely a primary disease, and is more frequently secondary to cancer of the stomach, gall bladder, pancreas, or intestines. When primary, it is usually of the scirrhous form, and medullary when secondary. The cause of primary cancer of the liver, as of other organs is unknown. Heredity is an important factor.

The symptoms of cancer of the liver are chiefly referable to the digestive tract. Dyspepsia, loss of appetite, and vomiting are not infrequent. From obstruction to the hepatic circulation piles are frequently troublesome. Indeed, the patient will sometimes consult the physician about his piles and dysuria, without suspecting any trouble with the liver. In all such cases occurring in those past middle life it would be well to examine the liver. Emaciation and the cancerous cachexia rapidly follow. If the portal vein be sufficiently obstructed, there will be ascites, but the obstruction is not usually sufficient to produce enlargement of the spleen. Œdema about the ankles is not uncommon.

Jaundice is sometimes, not always, present, and is then due partly to pressure, and partly to catarrh of the bile ducts caused by the presence of the cancerous growth. But the disease may run its course without either jaundice or ascites.

Diagnosis.—The diagnosis of cancer from other diseases of the liver is usually not difficult. Other growths, like adenoma, for instance, are practically excluded by their being so rare in the liver. Abscess carries with it the previous history of illness attended with more or less fever, which is absent in cancer. In syphilitic liver there is the history of syphilis, the liver is lobulated and subsequently contracted instead of being nodular and enlarged. Hydatid cysts are not painful, are of slow growth, and often yield the hydatid fremitus on percussion. The aspirator would prove decisive if some fluid be withdrawn and hooklets be found in it. In waxy liver, the organ is enlarged, it is true, and hard, but it is smooth and painless, besides the history of the pre-existing disease of which it is but a symptom. In cancer of the liver, the organ is not only irregularly enlarged, as easily ascertained by palpation, but the rapid emaciation, cancerous cachexia, and existence perhaps of cancer in other organs leave little

room for doubt. It is more difficult to make the distinction between cancer of the liver and cancer of the pyloric end of the stomach, omentum, or gall bladder. But as the liver is also usually involved more or less when those parts are cancerous, the diagnosis between them is not of great importance.

Prognosis and Treatment.—The disease is fatal and the treatment palliative. Morphine may be given to alleviate suffering, and brandy and milk may be injected into the rectum to sustain the patient as long as possible, should food be not retained by

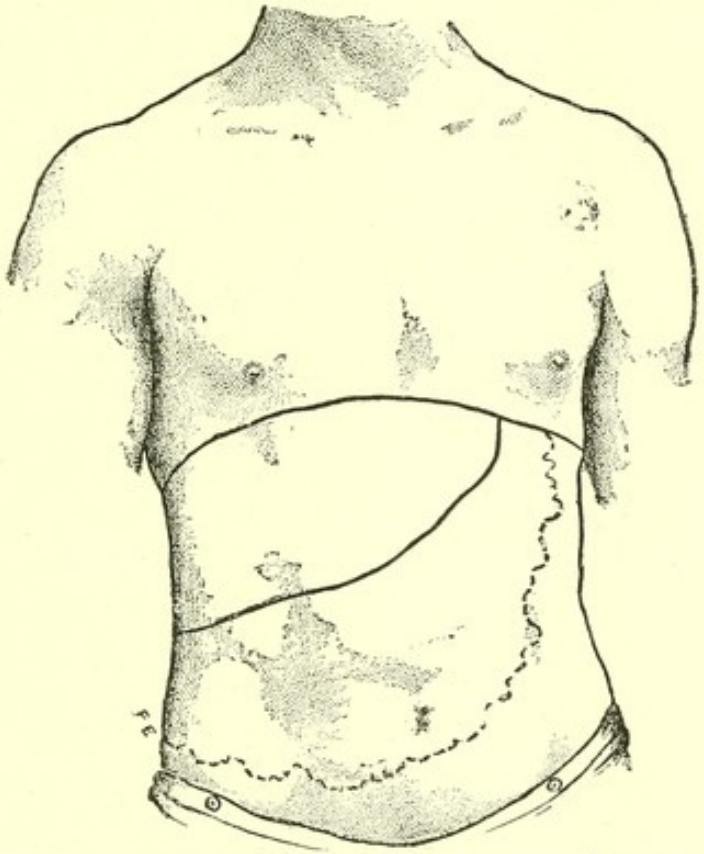


FIG. 22.—NORMAL LIVER, WITH DOTTED LINE SHOWING CANCER OF THE LIVER.

the stomach. The patient usually dies in a few months or within a year after the symptoms become prominent.

SYPHILIS OF THE LIVER. TUBERCULOSIS.

Etiology and Pathology.—Syphilis of the liver usually consists in specific inflammation of the connective tissue of the organ, either confined to one or more spots or diffuse. By proliferation of connective tissue the liver becomes enlarged, but if contraction takes place subsequently it becomes smaller. The capsule may become thickened and adherent, and the surface of the liver deeply fissured so that it becomes coarsely lobulated rather than presenting the hobnailed surface of ordinary cirrhosis. Syphilitic inflammation of the inner walls of the small, and even large, branches of the hepatic artery and portal vein is often present. Waxy liver sometimes results.

Syphilitic liver occurs in the tertiary stage of the acquired disease, but it also occurs in congenital syphilis. Gummata or gummy tumors, whitish-yellow in appearance, and varying in size from a pin's head to an orange, may be found scattered about through the hepatic substance, but particularly on the upper surface near the suspensory ligament. The disease will give rise to no symptoms if confined to a small portion of the liver. But if extensive, and, above all, if gummata and contraction produce obstruction to the portal circulation, ascites and enlargement of the spleen result, as well as jaundice, if the bile ducts also become obstructed. There may be difficulty in making a diagnosis between syphilitic liver and ordinary cirrhosis; indeed, the two may be present at the same time, especially if the patient be a toper. The clear history of syphilis and the presence of syphilitic lesions elsewhere, however, will usually enable the physician to distinguish between syphilis and ordinary cirrhosis of the liver, or cancer of that organ. The course of the disease is very tedious, and the prognosis, as well as treatment, are those of tertiary syphilis.

Tuberculosis of the liver is secondary to tubercle elsewhere. And inasmuch as the hepatic tubercles are microscopic and consequently give no physical signs, a diagnosis can only be inferred during life or positively made after death on post-mortem examination.

Hydatid Disease of the Liver.

Etiology and Pathology.—Hydatids or watery cysts are developed from the ova of the tænia echinococcus, a minute form of tapeworm about one-sixth of an inch long. This was first proved experimentally by Niemeyer in 1864. They affect the liver much more frequently than any other organ in the body, though the lungs, kidneys, spleen, brain, and other organs and tissues are also subject to this disease, which exists where dogs are plentiful and open water for drinking purposes, as in Iceland and Australia. The ova discharged with the fæces of dogs contaminate the water either directly or through drainage, and the drinking of such water gives rise to the disease in question. To a very limited extent wolves may also spread the disease. Instead of ova, scolices or imperfectly developed tænia may be the means of infection. The drinking of water containing the ova or scolices is the most common way in which the disease is acquired, but they may also be inhaled or carried to the mouth by the fingers, and thus enter the body. When due to inhalation, the right lung is apt to be the seat of the disease, owing to the fact that the right bronchial tube is larger than the

left. The eating of rare dog or wolf meat by people in some countries would also be likely to give rise to the disease.

It is readily understood why the liver is so much more frequently the seat of hydatid disease than any other organ in the body. The ova usually, or scolices it may be, after being swallowed are conveyed directly by the portal circulation into the liver, especially the right lobe, where they lodge. From thence they may migrate elsewhere, particularly into the lower lobe of the right lung, by boring directly through the diaphragm. Through the hepatic veins they may enter the inferior vena cava, to be conveyed into the right heart, and thence into one or both lungs.

Hydatids of the liver usually occur singly, though there may be many. They also vary greatly in size from a pea to a child's head, and their growth is slow. They are of two kinds, ordinary and multilocular.

Ordinary hydatids may be of the endogenous or exogenous variety. The former is usually found in man, and therefore chiefly concerns us; the latter in ruminating animals. Upon examination of an ordinary endogenous hydatid cyst, it is found to be composed of an external lamellated, elastic envelope and an internal ciliated, parenchymatous or secreting membrane, containing a non-albuminous, clear fluid, with a specific gravity of about 1015, and which yields grape sugar and succinic acid. This is termed the mother cyst. From the inner or parenchymatous membrane of the mother cyst, daughter cysts containing scolices armed with suckers and hooklets are given off. Some of them become detached and float about in the contained liquid, while others remain attached to the inner wall. These daughter cysts, in their turn, give off others which are grand-daughters in relation to the mother cyst; and this process may go on for several generations, until arrested by want of space and pressure. Meantime the mother cyst becomes enlarged, but by its presence it causes proliferation of connective tissue around it, so that it becomes encased in a fibrous capsule. As it progresses, it may rupture into the pleural, pericardial, or peritoneal cavities, bronchi, or intestines, or, finally, it may rupture externally. Instead of rupturing, however, the fluid may become absorbed by pressure, and the other contents undergo fatty or calcareous degeneration. The entrance of bile into the cyst, or inflammatory changes of the walls, giving rise to a purulent contained fluid, may also cause destruction of the scolices. The fibrous capsule contracting may leave only a cicatrix, small calcareous nodule, or a minute encysted abscess.

Multilocular hydatid cyst, on the other hand, had its true nature first exposed by Virchow. Before that time it was fre-

quently mistaken for colloid cancer. Virchow believed that it was developed in the lymphatics, though others claim its origin in the blood-vessels and bile ducts. It is rarely found anywhere except in the liver, and generally the right lobe. It forms a hard tumor varying in size, but usually as large as an orange. In its fibrous meshes is a gelatinous material containing a few vesicles or hooklets only. Pus is not infrequently found.

Symptoms.—So long as a hydatid is deeply seated in the liver and is small, there may be no symptoms whatever. But after it has attained sufficient size to cause much pressure, then there is a feeling of weight and oppression in the hepatic region. Pain may also be present. If the cyst be situated in the upper surface, it will sometimes cause dyspnœa and cough by pressure against the lungs. There may be palpitation and even displacement of the heart. On the other hand, pressure against the stomach will cause nausea and even vomiting. Jaundice, ascites, and enlargement of the spleen are not usually observed in ordinary hydatid disease of the liver, but all may be present if there be sufficient pressure on the bile ducts and portal vessels. From disturbance of digestion due to pressure on the stomach and intestines, the patient may become much emaciated. The stools vary with condition of the pressure on the bile ducts and digestive tract. There is no fever unless due to some complication. Should the cyst burst into the pleura or peritoneum, inflammation of those membranes, with its well-known symptoms, rapidly follows. Rupture into the pericardium would be likely to cause sudden death. Rupture into the bronchi would be attended with profuse expectoration of the contents of the cyst, the sputa containing hooklets. In the same way rupture into the stomach, intestines, or urinary passages would be attended with vomiting or passing the contents of the cyst. Pulmonary embolism due to rupture of the cyst into the inferior vena cava may be attended with sudden death. In some cases hydatid disease resembles encysted abscess, owing to purulent inflammation of the cyst.

In multilocular hydatid cyst of the liver the symptoms are more grave. Here, jaundice, enlargement of the spleen, and ascites are ordinarily present. The liver is much enlarged and hard but smooth. Gradual emaciation, hemorrhages from mucous surfaces, and exhaustion, with a fatal termination, is the rule.

Physical Signs.—Inspection may show bulging over the right hypochondriac region, owing to enlargement of the liver, with more or less restriction of respiratory movements on that side. On palpation, the liver may be felt to be enlarged and elastic and usually smooth unless there be several cysts. On percussion, not only will the hepatic area of dulness be increased in extent, but

hydatid fremitus may be obtained on palpatory percussion. This may be done by giving a sharp slap with the surface of the hand or by percussing on the middle one of three fingers placed over the region. The hydatid fremitus or thrill will be felt in the other two, or even by the middle one. No hydatid fremitus will be obtained in case of multilocular cyst.

Diagnosis.—Hydatid disease usually occurs in men, and from thirty to fifty, owing to occupation and exposure to the cause. Should a cyst rupture so that hooklets are found, the diagnosis would be complete. Or in case of doubt, aspiration would decide the question. Otherwise ordinary hydatid disease of the liver might be mistaken for pleurisy with effusion on the right side. In the latter disease the line of dulness or flatness is even, and often changes with position of the patient; in hydatid disease it is often irregular and does not change. The liver moves up and down with the hydatid tumor during respiration; it is stationary in pleurisy. Hydatid disease is of very slow growth and unattended with fever; pleurisy generally gives a well-defined history. Multilocular hydatid may be mistaken for cancer, but may be distinguished by its very slow growth and absence of cancerous cachexia, as well as cancer elsewhere. Abscess occurs in malarial, hot climates usually, and carries with it severe constitutional symptoms not to be found in hydatid disease. As already stated, in cases of doubt aspiration may be tried.

Prognosis.—Hydatid disease of the liver of either form is to be regarded as a grave affection. The average duration is about four years, though it may last very much longer. Multilocular disease is nearly always fatal. In the ordinary form, the prognosis will be favorable if the disease can be arrested early by evacuating the contents externally. Sometimes patients recover after rupture into the intestines, stomach, or even bronchi has occurred. Rupture into the pleural cavity is less favorable, while the bursting of the cyst into the pericardium or peritoneum would be fatal.

Treatment.—Medicines are of no value in getting rid of this disease. Iodide of potassium and mercury both had reputation for it. Now evacuation of the cystic contents is regarded alone as effectual. This may be done by aspiration, with a fine needle, disinfected, but it may have to be repeated. Hence the rather dangerous and unnecessary notion of injecting iodine after aspirating. Not all the fluid need be withdrawn, and the patient should be quiet in bed for several days to avoid inflammation—even peritonitis—that might follow. With proper precaution, however, aspiration of the liver is a safe operation. It should be performed at the point where the tumor is most prominent. Instead of aspiration, the sac may be made adherent to the abdom-

inal walls by means of chloride-of-zinc paste, as at the Leipsic clinics, and then opened. Or else Simon's method may be employed. He introduces a fine trocar and allows the canula to remain twenty-four hours. By that time adhesion will have taken place at that point. After eight days the trocar is a second time thrust in and near the former, allowing the canula again to remain. This is repeated oftener if thought necessary, and then the punctures are united by incision and the contents evacuated. Electricity applied by means of needles introduced into the liver has been said to be of service. In case of multilocular cyst, surgical interference thus far has been of no benefit. There is no other treatment, therefore, than sustaining the strength of the patient and relieving pain by hypodermic injections of morphine, or opium administered in some form.

Prophylaxis requires the boiling of water where it can be contaminated by the fæces of dogs or wolves that feed on the offal of sheep.

Pylephlebitis, Portal Thrombosis.

Etiology and Pathology.—Pylephlebitis, pylethrombosis, or portal thrombosis is of two varieties, adhesive and suppurative.

Adhesive pylephlebitis is inflammation of the portal vein or some of its branches, accompanied by thrombosis without the formation of pus, and hence is not of septic origin. The inflammation may begin as an endophlebitis or a periphlebitis. In the former case the inflammation begins in the lining membrane of the vein, and is due to the presence of the thrombus. In the second case the inflammation extends to the vein from the surrounding tissue, and will cause the formation of a thrombus at that point. In either case the thrombus or clot becomes adherent to the inner wall of the vein, and hence the name of this variety of the disease. Cirrhosis of the liver is one of the most frequent causes, partly by constricting the vessels and partly by extension of the inflammation to the vessels in various localities. Among other causes may be mentioned blows or other injuries, pressure from enlarged glands, gall stones, or abscess, the presence of foreign bodies, and finally emboli or fragments from non-septic thrombi elsewhere within range of the portal circulation, as in hemorrhoidal tumors and the like. The vein at the point where the thrombus is formed from any cause becomes, through inflammatory changes, more or less obliterated, and sometimes is converted into a mere fibrous cord.

Suppurative pylephlebitis is purulent inflammation of the portal vein or some of its branches, and is rarely a primary disease. It occurs most frequently in the branches, and is often due to the conveyance of septic material along the portal system into

the liver, though it may also originate in the liver itself. According to Strümpell, perityphlitic abscess is the most frequent source of suppurative pylephlebitis. From such a focus of infection, septic material may be conveyed into the liver through the superior mesenteric vein by its connection with the portal system. The disease may occur with abscess of the liver, or else it may be secondary to pyæmia, gastric or dysenteric ulcers, suppurations about the rectum, splenic abscess, or any disease likely to contaminate the portal blood. The lodgement of foreign bodies may produce suppurative thrombosis if sepsis follows. Finally, the disease may follow septic inflammation of the umbilical vein in the new-born.

As in non-purulent pylephlebitis, the inflammation may begin as an endophlebitis or periphlebitis. In the former case septic emboli or purulent material, becoming detached from a distant infected focus somewhere within range of the portal circulation, are conveyed into the portal branches, where they lodge and give rise to septic endophlebitis. In other cases the disease begins as a periphlebitis from extension of purulent inflammation from the surrounding tissue, causing a thrombus to form at that point. In either case the clot or thrombus, instead of becoming adherent to the inner wall of the vein and undergoing organization, undergoes purulent softening, and often the surrounding connective tissue becomes infiltrated with pus.

Symptoms.—The symptoms of adhesive pylephlebitis depend on the number and size of veins obstructed. If only a few small branches of the portal vein are affected, a diagnosis cannot be made with certainty. But if the thrombosis be extensive, and, above all, if the trunk of the portal vein becomes occluded, the symptoms are speedily developed and are characteristic. Loss of appetite, nausea, vomiting of dark blood, melæna, diarrhœa, enlargement of the spleen, abdominal dropsy, and emaciation rapidly follow. The lower extremities and scrotum may become markedly œdematous. Jaundice will occur if the bile ducts are sufficiently involved by pressure or inflammation to obstruct the passage of bile and thus cause its resorption. There is little or no fever. Death usually occurs in a few weeks or a month, from exhaustion due to starvation, or hemorrhage from the gastro-intestinal tract.

The symptoms of suppurative pylephlebitis are those of the adhesive form, with the addition of more or less pain and the symptoms of pyæmic infection. There is not only fever, but its course is that of pyæmic fever. Severe chills occurring at irregular intervals are followed by high temperature and remissions with profuse sweats. The patient gradually sinks, and dies in a few weeks from exhaustion as in pyæmia. Sudden death may also occur from profuse gastro-intestinal hemorrhage.

Diagnosis.—Adhesive pylephlebitis may be mistaken for cirrhosis of the liver and as they both sometimes exist together, the diagnosis may be impossible. In cirrhosis, however, there is usually the previous history of chronic alcoholism, syphilis, and the like, and its course is much slower than adhesive pylephlebitis. The want of periodicity would distinguish suppurative pylephlebitis from malarial fever, for which it might be mistaken. In hepatic abscess, the liver is enlarged, and fluctuation may be felt on palpation, neither of which would occur in suppurative pylephlebitis alone. From adhesive pylephlebitis the suppurative form is told by the pyæmic symptoms and pain in the latter disease. The history of the case and primary cause of septic infection, if ascertainable, would have important bearing on the diagnosis.

Prognosis.—This is unfavorable, even in the adhesive form, but depends then on the number and size of veins involved. When obstruction to the portal circulation is sufficient to rapidly produce ascites and other marked signs of obstruction already described, the disease is fatal. Suppurative pylephlebitis is uniformly fatal.

Treatment.—This can only be directed to sustaining the strength of the patient and the treatment of symptoms as they arise. Nutritious food, as peptonized milk, beef juice, and moderate stimulation will fulfil the first indication. In the second place, diarrhœa, hemorrhage, and vomiting should be controlled if possible. Ten grains of bismuth subnitrate, with the sixth of a grain of morphine, given every two or three hours in powder, is likely to accomplish these objects, as well as to allay pain. Should this become urgent, indicating perhaps that peritonitis has taken place, morphia may be injected hypodermically. Tapping the abdomen may become necessary if ascites is marked, in order to relieve dyspnœa by allowing more space for expansion of the lungs and descent of the diaphragm.

Gall Stones, Biliary Calculi, Cholelithiasis.

Etiology and Pathology.—The real origin of gall stones has never been satisfactorily explained. Only occasionally does mucus, the cast of a hepatic duct, or a foreign body, form the nucleus. They are composed principally of cholesterin, coloring matter of the bile, and lime. Of these constituents cholesterin is the chief, being about eighty per cent. All these materials are held in solution in normal bile by the presence of the taurocholate and glycocholate of soda. Anything, therefore, that would cause decomposition of these salts, would cause precipitation of the materials in question, and thus lead to the forma-

tion of gall stone. Concentration of bile from its prolonged retention, diseases of the liver, and catarrh of the bile ducts are thought to favor such decomposition.

Age and sex both have important bearing. Gall stones rarely occur under forty, although they have been known to exist even in infancy. In old age not only is peristalsis of the gall bladder, as well as of the intestines, weakened, but the bile then contains more cholesterin and lime. Women are said to be more frequently affected than men, in the proportion of three to one. This is thought to be due to tight-lacing and sedentary habits of women, causing retention of bile. Gout, rheumatism, alcoholism, gluttony, and indolence have all been accused of contributing to produce this affection. Opium-eating with consequent prolonged stagnation of bile in the gall bladder, due to lack of peristalsis from habitual paralysis of its muscular coat, would seem to me to be a more potent cause.

Gall stones, especially those of large size, are most frequently found in the gall bladder. But they also exist in the larger or smaller bile ducts, and even in the liver itself. They vary in size from a pin's head to a pullet's egg, or even larger, and there may be one or several hundred. When single, they are usually large and egg-shaped, corresponding with the cavity of the gall bladder. But when there are several or many, their edges are adapted to one another by mutual friction, the whole forming an ovoid mass.

Symptoms.—Gall stones in the hepatic ducts and liver give rise to catarrh of the bile ducts, with jaundice and abscess of the liver, as already stated. In the gall bladder they may remain for an indefinite period without giving rise to any symptom whatever. Indeed, it is not uncommon on post-mortem examination in the aged to find gall stones, their presence never having been suspected during life. The passage of a large gall stone, however, from the gall bladder, through the cystic and common bile ducts, gives rise to the so-called gall-stone or biliary colic.

Gall-stone colic comes on suddenly, and usually after a full meal, from the stone being moved forward by the increased flow of bile during digestion. Unusual exercise or jolting from any cause may also start the stone. Once impacted in the duct, irritation causes increased peristalsis, and thus the stone is pressed forward.

Without previous warning, patients are seized with a sharp pain in the right hypochondrium, which extends downward over the abdomen and often upward to the right shoulder. They sometimes seek all sorts of positions to obtain relief, and may even roll upon the bed or floor. The face becomes pale, countenance anxious, the skin is cool and bathed in sweat, and the

pulse is small, but there is no fever. Vomiting frequently occurs and sometimes, like hiccough, becomes a distressing symptom. Stones are sometimes vomited up, having found their way into the stomach through ulceration, or by reversed peristalsis after entering the duodenum, just as fecal matter is sometimes vomited up in strangulated hernia. Sometimes there are chills, or even convulsions. In a few hours all pain suddenly ceases, the skin becomes warm and the pulse normal, showing that the gall stone has passed into the duodenum or slipped back into the gall bladder. In other cases there may be exacerbations and remissions of pain and other symptoms extending over a day or more, indicating renewed attempts at passing the stone, or else its passage from the cystic into the larger common bile duct, or from a contracted portion of the same duct into a more dilated part. In other cases the passage of a small stone may give rise to little or no inconvenience.

Usually all symptoms cease as soon as the gall stone passes into the duodenum. But irritation, inflammation, and even ulceration along its passage into the duodenum may result, and then there will be more or less sensitiveness, or even pain, for a few days or more. Only in rare cases is obstruction in the bowels caused or bloody passages produced. Sometimes the stones lodge in the vermiform appendix, as in a pathological specimen I have seen, but this is probably rare. There was no typhlitis in the case mentioned.

Jaundice does not necessarily follow gall-stone colic. If the impaction occurs in the duct of the gall bladder only, there will be no jaundice, since bile is not readily reabsorbed from the gall bladder. But if the impaction occurs in the common bile duct and obstructs it for a sufficient length of time, or if tumefaction of the lining membrane of that duct results and is sufficient to obstruct the passage of bile from the liver and cause its reabsorption, then marked jaundice usually results. On the other hand, gall stones in the hepatic ducts, partly from the obstruction they offer and partly from that due to the catarrh which they excite, are nearly always attended with jaundice.

In rare cases the patient dies of syncope during the attack. Or the gall bladder may rupture into the peritoneal cavity, or inflammation may extend to the peritoneum, with fatal results. Becoming adherent to the abdominal walls, it may ulcerate and burst externally. Subacute or chrónic localized peritonitis may also result. Sometimes the duct of the gall bladder may become occluded by gall stones or inflammation resulting from their presence. In such cases no bile can enter the gall bladder, but its mucous membrane continues to secrete a fluid causing the organ to become much distended, a condition known as *hydrops vesicæ*

felleæ. In such case there would be no jaundice or marked difference in the stools, and a diagnosis would have to be made out by physical examination, when the elastic, pear-shaped tumor caused by the swollen gall bladder would be felt at the margin of the ribs. If, on the other hand, the common bile duct or many of the hepatic ducts become occluded, there will be chronic jaundice, clay-colored, fetid stools, and the like. Other causes of occlusion of the cystic or bile ducts are tumors, multilocular hydatid cysts, aneurism, and exudative or diphtheritic inflammations. Sometimes occlusion is congenital. Impacted fæces are also said to be a cause.

Diagnosis.—Gall stones in the hepatic ducts may be suspected if repeated attacks of jaundice occur in elderly people, especially women, with or without pain. But gall-stone colic might possibly be mistaken for ordinary intestinal or renal colic. In gall-stone colic, however, the location of the pain, extending from the right hypochondrium downward over the abdomen and up to the right shoulder, with constipation, tenderness on pressure, and perhaps jaundice, at once distinguishes it from ordinary intestinal colic, with its diarrhœa and relief on pressure. In renal colic the pain is located over the affected kidney and extends down to the inner part of the thigh. In case of men, it extends to the end of the penis and the testicle on the affected side is usually drawn up. There is also frequent micturition, sometimes of bloody urine.

Prognosis.—Gall stones of the excretory bile ducts and liver, giving rise to chronic catarrh, jaundice, and abscess, may be regarded as a very serious affection. Confined to the gall bladder, however, the prognosis is more favorable. Gall-stone colic rarely terminates fatally. The patient may, however, die of syncope, convulsions, or exhaustion during the attack, or from peritonitis due to rupture of the gall bladder or extension of inflammation to the peritoneum.

Treatment.—In gall-stone colic, relief from pain is the first and most urgent indication. This can be done by the hypodermic injection of morphine. Five to ten minims of Magendie's solution may suffice. Not too large a dose should be administered or too often repeated, since the distance to be traversed by the stone is short, and, if the attack is of short duration, unpleasant symptoms of opium poisoning may be left. Such a mishap, however, must be somewhat rare unless the physician be reckless or foolhardy. The judicious and careful administration of chloroform by inhalation, a much more dangerous remedy than opium or ether, is also recommended. The application of hot poultices over the liver and putting the patient into a warm bath is usually practised. A mustard paste over the stomach, and changed

about at short intervals so as not to blister, with bits of ice by the mouth, generally check vomiting. Violent purgatives are unnecessary, but mild laxatives may be given to wash out the intestinal tract. The administration of sweet oil, a wine-glassful every two hours, until relief is obtained, is a popular remedy, and I do not hesitate to recommend it from personal experience.

Durande's remedy is much in vogue, but is probably of no use. (Æther., ℥ iij.; ol. terebinth., ℥ ij. M. Sig. Half-teaspoonful in a little milk every morning.) It is given to dissolve the cholesterin, which it would do if it ever reached it, but which probably never occurs.

After the colic is over, or should there be reason to suspect the presence of gall stones, the patient should by all means be sent to Carlsbad, unless the treatment is contra-indicated by some coincident wasting or heart disease. Just how the Carlsbad waters act in case of gall-stones is not thoroughly understood. They do not dissolve the stone by saponifying the cholesterin, as is claimed by some of the Carlsbad physicians; but they thin the bile, and increase its flow and quantity as well as general peristalsis. This, with the diet and exercise, to say nothing of the bathing, probably, according to Seegen, causes the expulsion of the stones. This has been often proved by causing the patient to defecate on a sieve, and then washing the fæces. As fresh gall stones sink in water, they are generally lost without the sieve. Should the patient not be able to go to Carlsbad, the treatment may be somewhat imitated by the use of Carlsbad salts dissolved in warm water. Half a teaspoonful of the powdered (not crystallized) salts to the tumbler of warm water (120° F.) may be drunk early in the morning, and the quantity gradually increased.

The late Dr. J. Marion Sims, I believe, first introduced cholecystotomy, about 1877. Up to February, 1886, Mr. Lawson Tait, of Birmingham, England, had opened the gall bladder and cleaned out its contents in twenty cases with uniform success. In case of *hydrops vesicæ felleæ*, or dropsy of the gall bladder, due to permanent occlusion of the cystic duct by adhesive inflammation, aspiration may be resorted to for obtaining temporary relief.

Catarrh of the Bile Ducts. Jaundice. Icterus.

Etiology and Pathology.—Catarrh of the bile ducts is due to inflammation of the mucous membrane lining them. As the ducts are small, they are easily obstructed by swelling of the mucous membrane and collections of mucus, in this way giving rise to catarrhal jaundice. From the fact that gastro-duodenal catarrh is so often present, it is sometimes called gastro-duodenal jaundice. Post-mortem appearances differ but little from normal

as in case of catarrhal inflammation of mucous membranes elsewhere.

Catarrh of the bile ducts is present more or less with other diseases, as gall stones, cancer of the liver, multilocular hydatids, and to a certain extent in active or passive congestion of the liver from any cause. In many cases catarrh of the bile ducts is due to extension to them of inflammation from the gastro-duodenal mucous membrane. Abnormal condition of the bile is thought to be a possible cause, though not proven. Finally, the disease may result from catching cold, and appears to be endemic at certain seasons of the year, spring and autumn, so that a whole neighborhood, or camp of soldiers, may become affected, giving rise to the notion among the laity that it is catching. Whether this is due to peculiar atmospheric conditions or a specific influence is not known.

Symptoms.— As gastro-duodenal catarrh is present in many cases, there will be loss of appetite, furred tongue, and other symptoms of dyspepsia, which last usually throughout the attack. Nausea is a common symptom, and sometimes there is also vomiting. After a few days or weeks, hepatogenous jaundice occurs, due to obstruction to the escape of bile, with consequent resorption.

Further observations, regarding jaundice in general will be found below. In catarrh of the bile ducts, the liver becomes enlarged, as observed on physical examination. On palpation, some tenderness may be experienced by the patient, and the liver will be felt at the free border of the ribs with the patient in the recumbent posture and the legs drawn up. On percussion, the area of hepatic dulness will be found to be larger than normal. There is little or no fever, and in a week or two, generally, improvement begins, as evidenced by the returning appetite, cleaning off of the tongue, and the urine and fæcal discharges becoming more and more like normal. The discoloration of the skin is the last sign to disappear, and frequently remains after the patient has otherwise completely recovered. In other cases the disease may become subacute or even chronic, and last for months, but even then complete recovery is the rule.

JAUNDICE or icterus is a yellow discoloration of the skin and various tissues and fluids of the body, and, though only a symptom of some one or more of various conditions, requires special and brief notice. All the tissues of the body, according to Strümpell, are subject to the discoloration except the cornea, cartilages, and peripheral nerves and nearly all the fluids except the tears, saliva, and gastric juice. According to Niemeyer, there are two classes of jaundice; that produced in the liver by obstruction and resorption of bile being termed hepatogenous, in contradistinc-

tion to that produced by the liberated coloring matter of the blood due to disintegration of the red corpuscles in certain severe diseases, and termed hæmatogenous.

As there are no muscular fibres in the coats of the smaller bile ducts, the outflow of bile from the liver is chiefly a passive act, assisted by respiratory movements of the diaphragm and the force of secretion. As there is so little force to overcome, therefore, obstruction of the bile ducts is easy. Such obtruction may be due to catarrh, gall stones, constriction as from cicatricial tissue and adhesions, pressure from tumors of various kinds, and congenital malformation. The obstruction must, however, affect the common bile duct or the hepatic duct or its branches, since obstruction of the duct of the gall bladder (cystic duct) alone is not sufficient to produce jaundice, as the coloring matter of the bile is not absorbed from the gall bladder. Should obstruction from any cause be sufficient to cause resorption of bile, hepatogenous jaundice results. Far less frequently does hepatogenous jaundice result from diminished pressure in the hepatic capillary vessels. This is seen in collateral fluxions, anæmia, hemorrhages, and portal thrombosis.

Hæmatogenous jaundice is caused by coloring matter of the blood in disintegration of the latter, as observed sometimes in yellow fever, pneumonia, malarial fevers, pyæmia, snake-bites, and poisoning from various substances, and sometimes from nervous disturbance, as in fright and the like. Of this variety of jaundice we have nothing further to say. Hepatogenous jaundice, however, from any cause gives rise to certain secondary symptoms that require notice. These, according to Strümpell, are chiefly referable (1) to the presence of the biliary acids and other biliary constituents in the blood, and (2) the lack of bile in the intestinal canal. Let us examine these two conditions.

The bile acids, when absorbed into the blood, cause decomposition of the red corpuscles to a certain extent, giving rise, therefore, to a certain amount of hæmatogenous jaundice. But of far more significance is their action on the nerve centres. Through these and acting on the heart, the pulse becomes slow and sometimes irregular. In ordinary cases headache and a feeling of general debility are usually present, and the temperature is normal or even slightly subnormal. But in pernicious jaundice the patients have delirium and convulsions and become comatose from poisoning of the blood to a greater degree. These nervous symptoms, as observed in acute yellow atrophy, for instance, are explained in one of three ways. In the first place, according to Leyden, they are due to cholæmia, or accumulation in the blood, by absorption, of biliary constituents, especially the bile acids. Secondly, Traube and Cohnheim attribute them to cerebral

anæmia due to impairment of nutrition in this disease. Thirdly, according to Frerichs, they are due to acholia; that is to say, not the absorption of biliary constituents, but the failure of the liver to manufacture those constituents from the blood. Pernicious jaundice is nearly always fatal. Not only are there delirium, convulsions, and coma, but hemorrhages into the skin and mucous membranes, with usually high temperature. Not only does it occur in acute yellow atrophy, but sometimes in chronic biliary retention from any cause.

Owing to lack of bile in the intestinal canal in hepatogenous jaundice, there is usually constipation, and fat is undigested. According to Strümpell, it is the undigested fat that gives the stools their fetid odor and clay-colored appearance. Bile precipitates pepsin, which would otherwise interfere with the pancreatic emulsification of fat. When bile is absent, as in hepatogenous jaundice, the pepsin remains undisturbed, and thus pancreatic digestion is destroyed, allowing fat to remain and undergo putrefaction and saponification instead of emulsion. Hence, as already stated, there is usually constipation, with fetid and clay-colored stools. The biliary constituents, once in the blood, are excreted chiefly by the sweat glands and the kidneys. Hence the yellow discoloration of the skin and sometimes the underclothes, and the dark, beer-like urine. The presence of bile in the urine is best ascertained by Gmelin's test. This is done by pouring urine gently down the side of a test-tube containing nitric acid. If bile pigment is present, a zone composed of rings of green, blue, and red is produced. Owing to the irritation of the kidneys produced by the biliary constituents, albumin and even hyaline casts may be found in the urine. Sometimes there is intolerable itching of the skin, especially after getting warm in bed. A peculiar yellow eruption, termed xanthelasma, has been mentioned by authors. The occurrence of xanthopsia or yellow vision is rare.

Diagnosis.—The diagnosis is generally easy. Ordinary jaundice due to catarrh of the bile ducts usually occurs in persons previously healthy, and often in the young. The history of attacks of gall-stone colic is absent. The symptoms and physical signs of grave forms of disease, including fevers, are wanting, thus excluding secondary catarrh of the bile ducts, as well as hæmatogenous jaundice. In old people, however, the diagnosis should be guarded.

Prognosis.—This is uniformly favorable in ordinary catarrhal jaundice, as already stated. Where it is secondary to other disease or is hæmatogenous, the prognosis depends upon the primary affection. Pernicious jaundice, with marked symptoms of acholia, is nearly always unfavorable.

Treatment.—Owing to the gastro-duodenal catarrh usually

present in ordinary catarrh of the bile ducts, as well as to prevent congestion of the liver, the diet should be simple and unirritating; lean meat, bread, thin soups, and vegetables are allowable. Fatty food should be forbidden, since, as already stated, it will not be digested. Perhaps the best treatment is the moderate use of Carlsbad water. One or two tumblers of the warm water may be slowly drunk at least an hour before breakfast. The powdered salts in warm water (℥ ss.–℥ i. to aquæ, ℨ vi.) may be tried in the same way. The phosphate of soda, one drachm ter die in water, for several days at first, is often beneficial. The mixture of rhubarb and soda is also recommended. (℞ Pulv. rhei., pulv. sodii bicarb., āā ℈ ij.; aquæ, ℨ ij. M. Sig. ℥ i. ter die after meals.) Any one of the above-mentioned remedies is usually sufficient also to relieve constipation. Drastic cathartics and emetics should be avoided, and calomel is of doubtful utility. Should there be pain over the liver or vomiting, a large mustard paste over the part is often beneficial. After the acute symptoms are over, the nitro-muriatic acid dil. or sulphuric acid dil. may be given in five-drop doses after meals. For the intense itching of the skin sometimes present, the hypodermic injection of the twelfth of a grain of muriate of pilocarpine will often give immediate relief by the perspiration induced. I have had no experience with rectal injections of large quantities of water or Gerhardt's plan of manipulating the gall bladder for the expulsion of its contents.

In hæmatogenous jaundice or that secondary to severe forms of disease, the primary affection chiefly attracts attention, and in pernicious jaundice little can be done beyond supporting the pulse and strength of the patient.

Functional Diseases of the Liver.

Having considered diseases of the liver dependent on pathological conditions, we will now refer briefly to functional disorders of that organ. The secretion of bile may be excessive, giving rise to diarrhœa; or it may be deficient, so that there is constipation with the characteristic light-colored stools. In some cases of torpid liver, so called, nitrogenous matters are not converted into urea which is readily eliminated by the kidneys, but uric acid results, giving rise to all the discomforts produced by the presence of that material in the blood (lithæmia), even to the causation of certain forms of skin diseases, and gout, with all its evils. In all functional hepatic disorders, besides irregular action of the bowels, there are more or less headache, dyspeptic symptoms with bad taste in the mouth, capricious appetite, and mental depression. Not infrequently there is irregularity of the pulse and palpitation of the heart. Vertigo, somnolency, and lack of

energy are frequently noticed. Such functional disorders, though they may result from repeated attacks of malaria and residing in warm climates, are chiefly due to errors in diet, want of exercise, and abuse of alcohol, especially beer. Luxurious living and indolent habits are almost certain to produce some functional disorder of the liver in time. We therefore find them usually among the upper classes and in those at middle life or past.

Functional derangements of the liver are not serious affections in themselves, but they may in course of time lead to fatal disease.

Treatment.—The use of mercury in any form is rarely called for. The rhubarb and soda mixture so often referred to is often an excellent remedy, especially in combination with nux vomica. (℞ Pulv. rhei., pulv. sodii bicarb., āā ʒij.; tr. nucis vom., ʒi.; aquæ, q.s. ad fl. ℥ij. M. Sig. ʒi. ter die after meals.) Taraxacum has reputation, but I have never seen much benefit derived from its use. The best way to use it is to take a drachm of the solid extract at meals with bread. Unless the patient is very anæmic, with deficient acid in the gastric juice, by far the best remedy is some alkaline saline mineral water like that of Carlsbad or Saratoga. In other cases, especially where anæmia is well marked, ten drops of the diluted nitro-muriatic or sulphuric acid ter die in water may be tried. In all cases, however, errors in diet should be corrected and a proper amount of exercise be insisted upon.

Mineral Waters.

In concluding the subject of diseases of the liver, a few remarks on alkaline saline mineral waters, especially those of Carlsbad, Marienbad, Vichy, and the Congress and Hathorn springs of Saratoga may not be out of place. The chief constituents of the Carlsbad waters are the sulphate of soda, carbonate of soda, and chloride of sodium. The temperature of the water varies for different springs from 85° F. to 162° F. The Marienbad waters are cool and contain principally the sulphate of soda, and are therefore more purgative. The two Saratoga springs mentioned are cool, and their principal constituents are the bicarbonate of magnesia and chloride of sodium. The Vichy springs contain principally the carbonate of soda. In all there is more or less free carbonic acid. It is very important to remember that digestion does not take place in alkaline gastric juice, and therefore these waters should not be drunk near meal-times, but preferably before breakfast, the last glass being taken at least an hour before eating.

The treatment at one of these watering-places should consist in: (1) A preparatory course of hygiene, which the patient is sup-

posed to undergo before arriving; (2) the cure, so called, which lasts usually four weeks, and includes drinking the waters, bathing, and hygiene (diet and exercise); and (3) the after-cure, consisting chiefly in a gradual and prudent increase of diet if necessary, and return by degrees to healthy occupation. The cure should never be undertaken without the advice of a physician, as in some cases it is strongly contra-indicated.

During the cure a restricted diet is absolutely necessary if improvement is to be expected. In general, starchy food (potatoes, for instance), sweets, butter, fats, and gravies, salads, pickles, condiments, and the like are prohibited; also alcoholic beverages, especially champagne and Rhine wines and beer, although a moderate amount of claret, or a glass or two of Madeira or sherry, may be allowed for the aged or infirm or those in the habit of drinking. Ice water is also forbidden, and in place of it any simple acidulated water, as Gieshübler, Apollinaris, and the like, may be used. Tea instead of coffee, with little or no sugar, is ordered, especially in gout or uric-acid diathesis. Eggs are poached or soft-boiled. Bread is thoroughly roasted in slices (rusk, zwieback), with a moderate amount of untoasted bread at dinner. Fish, except salmon, which is thought to contain too much oil, and such meats as roast beef or mutton, beefsteak, mutton chops, and poultry without dressing are allowed in moderate quantities; also green vegetables, such as string beans, spinach, cauliflower, and cabbage. Systematic exercise, such as walking and horseback-riding, is necessary in many cases.

How do these waters act? According to the best authorities, only the chief ingredients need be considered, traces and very small amounts of various salts having no effect. The sulphate of soda is simply purgative and also, perhaps, stimulates the flow of bile. The carbonates, chloride of sodium, and carbonic acid all tend to increase the secretion of gastric juice, as has been proved by experiments made with stomachs having fistulæ. They all excite peristaltic action, especially when taken cold. The chloride of sodium, in addition, favors the formation and absorption of peptone, and is also diuretic. According to Leichtenstern, it also promotes the circulation of fluids through pathologic products, and favors their absorption. Hence its theoretical indications in various exudations and hyperplasias. To sum up, then, these waters are more or less purgative, they increase the flow of gastric juice and peristalsis, they are diuretic, and above all they stimulate the action of the liver to an increase in the flow of bile and render it more thin and abundant.

Cold water quickly leaves the stomach and, stimulating peristalsis besides diluting the contents of the alimentary canal, is aperient; while warm water, being quickly absorbed, is more diuretic.

These waters are therefore useful in gastric catarrh with acid stomachs, and for washing out collections of mucus, as in the stomachs of high-livers, gluttons, tipplers, and topers. By increasing peristaltic action and facilitating the flow of blood through the liver, they are, according to Leichtenstern, serviceable even in chronic gastro-intestinal hyperæmia and catarrh dependent on anatomical changes in the liver. Hence they are valuable in many liver affections, such as cirrhosis, obstruction of bile ducts from various causes, hemorrhoids due to portal obstruction, fatty liver, and the like.

The curative effects in catarrhal jaundice depend on the favorable influence they exert on catarrh of the duodenum, and removal of obstacles to the flow of bile caused by the swollen mucous membrane. The waters have no specific effect on the bile itself, but render it thinner and more abundant, and increase its flow.

Regarding gall stones, these alkaline waters do not saponify the cholesterin, of which the stones are chiefly composed; but that they do enable many patients to get rid of their gall stones cannot be disputed. It is thought that, owing to incresed flow and pressure of bile, and increased activity of the gall bladder due to general reflex peristalsis, a cure is effected by expulsion of the stones instead of their being dissolved. In gout and other uric-acid affections, renal calculi, and the like, these waters lessen the amount of irritation caused by the acid, but they act chiefly, according to Leichtenstern, by washing out that which stagnates in the tissues and joints, the oxidation of uric acid into urea by their action having no proof. More recently it has been found that the Bear Lithia, Buffalo Lithia, and other lithia waters have a very decidedly beneficial effect in the uric-acid diathesis, not only by washing out the deposits, but by their actual solution. In diabetes mellitus these alkaline waters are of no value. It was supposed that they accelerated the decomposition and combustion of sugar in the organism. It is the anti-diabetic diet that patients restrict themselves to at watering-places, and not the alkaline water, that causes improvement. The baths act on the peripheries of nerves throughout the body, and through them on the various nerve centres. By this reflex action organs are stimulated to perform their functions physiologically, and fat is diminished. It is not through absorption of salts by the skin that the effect is produced, as the skin does not absorb water. The salts, however, are stimulating to the nerve peripheries. Hot or cold baths are, however, contra-indicated in heart disease, as they cause palpitation, syncope, and other unpleasant symptoms. As the effect of the cure, as a whole, is debilitating, those affected with any wasting disease, as phthisis, carcinoma, Bright's disease

of the kidneys, and the like, should not be allowed to undergo it.

Failing to visit these watering-places, the prepared salts dissolved in water may be tried. Regarding Carlsbad salts, however, only the powdered form is available; the crystallized natural Carlsbad salt, so called, being practically nothing more than the sulphate of soda.

Diseases of the Spleen.

The spleen is obliquely situated in the left hypochondrium, between the anterior and posterior axillary lines. The upper end, directed upward and backward, is on a level with the spine of the ninth dorsal vertebra; while the lower end, directed downward and forward, corresponds to the level of the spine of the eleventh dorsal vertebra. The spleen in health cannot usually be felt or noticed by inspection even in the thinnest persons, and this fact should be remembered. Inspection and palpation, therefore, in the case of a perfectly normal spleen, and without deformity of the patient, would be of little or no value in determining its size and exact limits. This is best done by percussion, and even then only approximately. Percussing from above down on the axillary line (also called middle axillary line), we come to splenic dulness at the ninth rib. Continuing to percuss downward, dulness gives place to tympanicity at the lower border of the eleventh rib. In other words, splenic dulness extends normally from about the ninth to the eleventh rib on the axillary line. The percussion should be gently performed in emaciated subjects and children, especially at the lower end, as otherwise tympanicity from the stomach and intestines may be elicited. The patient should be in the erect position, either sitting or standing, since when reclining on the right side the spleen may gravitate out of reach. Both positions may be tried, however, and the result in each case compared.

The upper and lower limits of splenic dulness change with inspiration and expiration. At the end of a deep inspiration, the upper line of dulness of the normal spleen may descend to the tenth rib, but the lower never descends below the free margin of the ribs. At the end of a full expiration, on the other hand, the upper end may ascend to the eighth rib, with corresponding change in the lower. These two facts are important and are to be remembered: that the spleen in health is not to be felt, and that its upper and lower ends ascend and descend with respiratory movements, as is readily determined by respiratory percussion.

The anterior border of splenic dulness corresponds to the anterior axillary line from the ninth to the eleventh ribs; but the

posterior border is continuous with the left kidney, and is consequently indefinable. When the spleen becomes enlarged, it is usually downward and inward toward the median line, and in some cases it is readily felt with its notch or furrow on the lower part of its rounded anterior margin. But in rare cases the spleen may become greatly enlarged upward toward the axilla, without being lower than the free margin of the ribs. In these cases pleurisy with effusion may be so closely resembled that a positive diagnosis can only be made by aspiration. Generally, however, even in these cases, the enlarged organ moves up and down with respiration, but does not appreciably change with position of the patient. The very opposite usually occurs in the case of effusion into the pleural cavity.

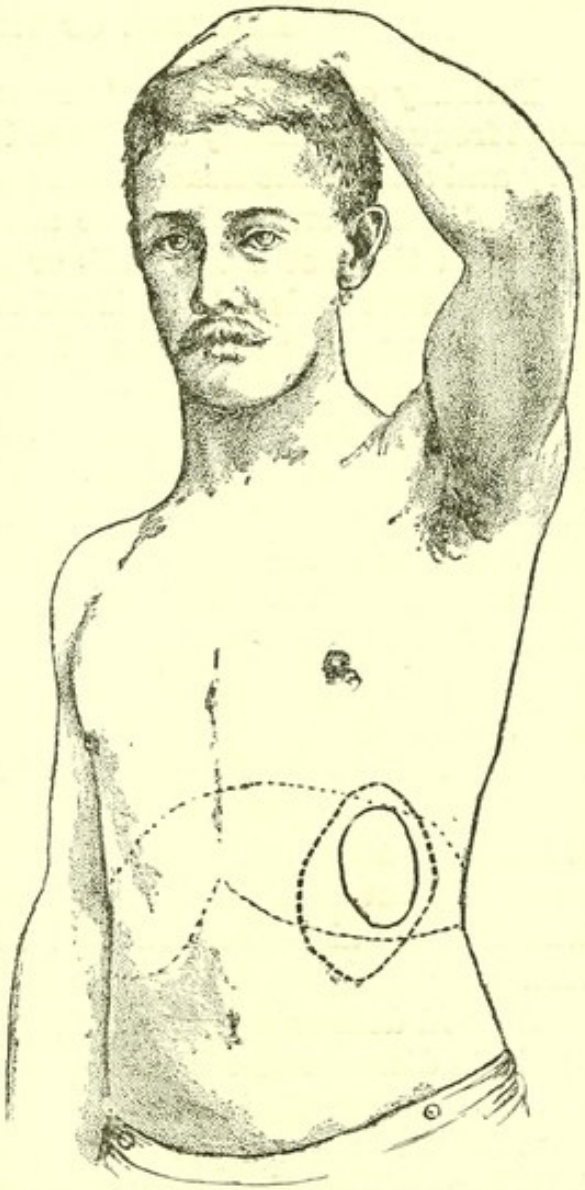


FIG. 23.—NORMAL SPLEEN—DOTTED LINE SHOWING HYPERTROPHY.

Instead of percussion simply, auscultatory percussion may be tried, but the former method is usually sufficient and generally to be preferred.

Primary splenic affections are rare, if indeed they ever occur. Thus, enlargement of the spleen may be acute or chronic. In the first case it is always observed in fevers, as typhoid, for example. Chronic enlargement, on the other hand, may be secondary to cirrhosis of the liver, or accompany Hodgkin's disease, or leucocythæmia due to malarial disorders. Waxy (amyloid, lardaceous, sago) spleen is one of the results of pre-existing wasting disease, and is usually associated with waxy kidneys and waxy liver. Cancer, hydatids, syphilitic tumors (gummata), tubercles, and the like are secondary to and accompany those diseases in other organs. Even as a secondary affection, cancer of the spleen is very rare. Splenic fever, so-called, is the fever accompanying intestinal anthrax or mycosis. Abscess of the spleen, unless due to injury of some kind, is generally one of the accom-

paniments of pyæmic or septic influences. Hemorrhagic infarctions in the spleen are due to emboli coming from the left side of the heart, as in endocarditis. The brain and kidneys may be the seat of infarction by this means also. The reader is therefore referred to those diseases in which the splenic affection is an accompaniment, for a description of the latter.

Diseases of the Pancreas.

Primary cancer of the pancreas, though very rare, is yet the most frequent primary disease of that organ. It is usually medullary and affects the head of the pancreas. The liver, peritoneum, and adjacent organs become affected secondarily. The disease occurs in those of middle life or past, and its cause, like that of primary cancer elsewhere, is unknown.

The symptoms are those of cancer of the neighboring parts. In addition to pain in the epigastric region, the patient gradually loses flesh and strength, and the cancerous cachexia appears. If there be pressure on the portal vein, ascites follows. In like manner obstruction of the common bile duct would lead to jaundice. Meantime the liver and adjacent organs become affected secondarily, and then it is difficult, if not impossible, to make a diagnosis of primary cancer of the pancreas. Sometimes a pulsation may be imparted to it by the aorta, so that it will resemble abdominal aneurism, the more so if it be also attended with a murmur. By placing the patient in the knee-chest position, however, the pulsation would be diminished or might cease altogether if it be due to enlargement of the pancreas, unless the latter were so tightly bound that it could not gravitate away from the aorta. There would also be absence of the cancerous cachexia in aneurism.

A good deal of importance is attached to the condition of the stools in diseases of the pancreas that cause a diminution or absence of pancreatic juice. Fat not being emulsified in such cases, the stools may be fatty. In some instances, however, according to Strümpell, the bile may cause the absorption of the fat, and the stools will be found to be not fatty, even in some cases where cancer is extensive. The prognosis is bad, the patient usually dying within a year. The treatment is simply palliative, anodynes being employed to relieve pain.

Pancreatitis may be acute or chronic, the former as a primary disease being very rare and the etiology unknown. Pain, vomiting, and collapse, with death following in a short time, is the history of these cases. On post-mortem examination, the pancreas is found to be the seat of hemorrhage and commencing suppuration. Acute pancreatitis is more frequent as a secondary

disease in pyæmia, septicæmia, typhoid fever, and the like, and the organ is not infrequently the site of secondary pyæmic abscess.

Chronic pancreatitis is usually secondary to syphilis, or due to extension of chronic inflammation from adjacent parts. Abuse of alcohol is said to cause primary chronic pancreatitis in rare instances. The organ may become atrophied. The symptoms are obscure. In a few cases the stools are fatty and sometimes there is sugar in the urine.

In rare cases the pancreas may undergo fatty or waxy degeneration, and in some instances cysts and calculi are found.

CHAPTER IV.

DISEASES OF THE URINARY ORGANS.

Congestion of the Kidneys (Hyperæmia).

Etiology and Pathology.—Congestion of the kidneys may be active or passive.

Active congestion is an acute disease, usually of short duration, and affects chiefly the arteries of the kidneys, including the afferent arterioles of the glomeruli. The interstitial tissue becomes infiltrated with serum, and the kidneys become swollen and enlarged. Both organs are affected. The affection may be caused by sudden exposure to cold and dampness, as sometimes occurs among icemen. The abuse of such irritants as turpentine, copaiba, cantharides, chlorate of potash, and the like may also cause it. It may accompany acute infectious and malarial diseases. In many of these cases acute tubular nephritis soon follows the active congestion.

Passive congestion is a chronic disease and affects chiefly the veins of the kidneys, including the efferent venules of the glomeruli. Both kidneys are affected, but are not much if at all enlarged. The congestion is due to mechanical obstruction to the circulation, as in mitral obstruction or regurgitation and such pulmonary diseases as emphysema and fibroid phthisis. Pressure from tumors and pregnancy may also give rise to this form, known as the kidney of pregnancy. Obstruction to the portal circulation from disease of the liver evidently would not directly cause passive congestion of the kidneys, since the renal veins empty immediately into the inferior vena cava.

Symptoms.—Active renal congestion is an acute affection of short duration. Headache and nausea or even vomiting are usually present, with perhaps some œdema of the face and extremities. The patient sometimes, but not invariably, complains of pain in the back, and there is little or no fever in addition to that which accompanies the primary cause. The urine is characteristic. It is scant, high-colored, with a specific gravity higher than normal or unchanged, contains blood and perhaps hyaline casts as seen under the microscope, and is loaded with albumin.

Passive congestion, on the contrary, is usually a chronic affection, depending as it does on a chronic disease. The urine is

about normal in quantity and specific gravity, does not contain blood and casts, and often no albumin, or a trace at most. Dropsy sooner or later appears, and this adds to the general discomfort of the patient, and increases dyspnœa. There may be convulsions in this disease during pregnancy. Sudden death may occur from œdema of the lungs.

Diagnosis.—The diagnosis between active and passive congestion rests chiefly on the condition of the urine and the etiology, as already given. Active congestion being the first stage of acute tubular nephritis, it would be difficult to make a positive diagnosis except what might be inferred from the comparative mildness of attack and shorter duration of the two. Passive congestion is distinguished from chronic Bright's disease of the kidneys by the condition of the urine and the mechanical cause of the obstruction to the circulation.

Prognosis.—Active congestion of the kidneys is usually of short duration and almost always ends in recovery, especially under proper treatment. In pernicious and other grave forms of malarial fevers, suppression of urine due to active congestion sometimes aids in causing a speedy death. In passive congestion the prognosis depends on the primary cause. The patient's health varies until finally dropsy hastens the fatal result. In pregnancy the prognosis depends much on the removal of the cause.

Treatment.—In active congestion the cause should be ascertained, and removed if possible. Cups or hot poultices may be applied to the loins, but they usually do no good. The patient should be in bed in a warm room for a few days. The kidneys are already congested, and diuretics are not to be thought of at first. On the contrary, the bowels and the skin should be made to do vicarious work for the time being by means of hydragogue cathartics and diaphoretics. The most trustworthy hydragogue cathartic is the pulvis purgans (pulv. jalap. co.). To an adult a drachm may be given, and repeated if necessary. Each drachm contains forty grains of potass. bitart. and twenty grains of jalap. As soon as the bowels are moved, tinct. ferri chloridi should be given in twenty-drop doses every three hours in water. The diet should be milk. If sweet milk is not well borne by the patient's stomach, it may be peptonized by Fairchild's pepsin. Or else buttermilk, koumyss, matzoon, or kephir may be given. Unless improvement is rapid, as evidenced by the disappearance of albumin from the urine, diaphoretics may also be employed. The best is the hypodermic injection of one-eighth grain of pilocarpine muriate. Care should be taken not to give too large a dose, as it depresses the heart. The treatment, indeed, is the same as that for acute tubular nephritis (acute Bright's disease), to which the reader is referred.

In passive congestion, such active treatment is not indicated. Regulating the bowels by means of Fothergill's pills (calomel, pulv. digitalis, and pulv. scillæ rad., āā gr. i.), one given occasionally at bed-time, to be followed by a moderate saline cathartic if found to be necessary, and relieving the patient of dropsy by giving a tablespoonful of the infusion of digitalis freshly made, is about all that can be done. In case of mitral lesion and anæmia, a good preparation is: Tr. strophanthi, ʒ ss.; tr. ferri chloridi, ʒ iss.; and aquæ, q.s. ad ℥ ij. M. Sig. Teaspoonful ter in die. The strophanthus mixes well with the iron, but should be used at once, as it gets thick on standing for a week or more. The dose of strophanthus may gradually be increased to ♏v. at a dose, but when dropsy is urgent the infusion of digitalis should be used again. In case of pregnancy the cause should be removed without unnecessary delay. Under the supposition that the renal arteries are contracted, while the veins are congested, nitroglycerin (glonoin) and amyl nitrite have been recommended. Five drops of the amyl nitrite or a one-per-cent solution of glonoin may be given three times daily, in water or capsules. There are also compressed tablets of these preparations that are very convenient for administration. The action of these remedies, as is well known, is to dilate the arteries; and their efficacy in this disease is often extremely beneficial as evidenced by experience.

1. Acute Tubular Nephritis (Acute Bright's Disease).

Etiology and Pathology.—In 1827 Dr. Richard Bright, of Guy's Hospital, London, established the fact that albuminuria and dropsy coexisted with renal disease. Since that time various diseases of the kidneys have been grouped under the name of Bright's disease, and are (1) acute or subacute, and (2) chronic.

Acute Bright's disease of the kidneys is known under many different names. Because the tubules are chiefly involved, it is called acute tubular nephritis; and when the glomeruli are mostly affected, as in scarlet fever, it is termed acute glomerulo-nephritis. Other names are acute parenchymatous, desquamative, catarrhal, croupous, diffuse nephritis, and inflammatory dropsy. The causes are similar to those of active congestion, which, indeed, is but the first stage of acute Bright's disease. These causes may be embraced under five heads: (1) Sudden exposure to cold and dampness, as among icemen, bakers, and iron-moulders, and boys who go in swimming too early, and the living in cold and damp apartments, with insufficient clothing. According to Rosenstein the congestion due to malarial fevers also gives rise to it. (2) The poison of infectious diseases, notably scarlet fever, measles, and small-pox. Sometimes it occurs in epidemic cholera, and is

developed in the course of diphtheria, and, according to Flint, in pulmonary tuberculosis, articular rheumatism, typhoid and typhus fevers, erysipelas, relapsing fever, acute lobar pneumonia, pyæmia, septicæmia, endocarditis, dysentery, carbuncles, and suppurative processes. Extensive burns are mentioned by the same author as a cause. (3) Chemico-irritants such as turpentine, copaiba, cantharides, cubebs, mineral acids, phosphorus, arsenic, nitrate of silver, lead, mercury, and chlorate of potash. From the fact that copaiba irritates the kidneys, oil of sandalwood is a much safer remedy in gonorrhœa. Alcohol does not produce the disease directly, but more through the exposure incident to the intoxicated state. (4) Extension of inflammation from the lower urinary passages, as from gonorrhœa, old stricture, cystitis, and pyelitis from any cause. Such cases are rare, however. (5) Finally, it may occur during pregnancy. It is much more frequently observed in primiparæ and especially in twin pregnancies. Pressure from the pregnant uterus may give rise to passive renal congestion or the kidney of pregnancy; but exactly why it sometimes causes acute Bright's disease is not known, except that pregnancy acts merely as an exciting cause among those already predisposed to it.

All persons are liable to the disease, but it occurs more frequently among children and those under middle life. Men are said to be more subject to it than women, and it occurs sometimes among those who were apparently in previously robust health.

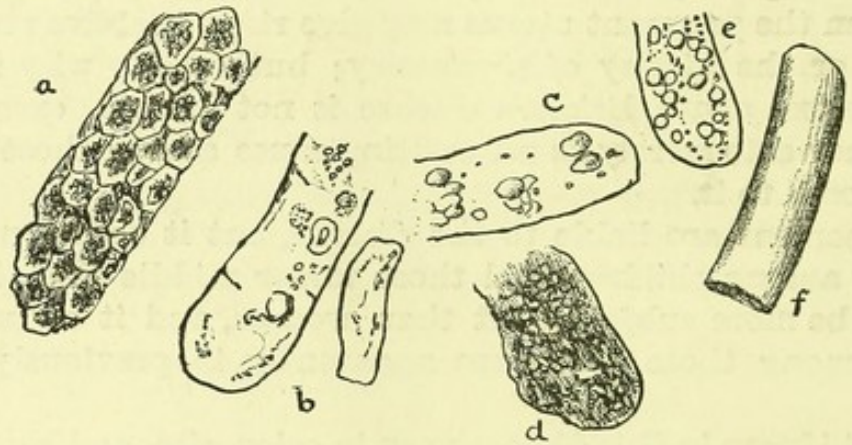
The kidneys in this disease vary in color, size, and consistency in different cases, so that it is difficult to lay down any exact rule as to those points. The changes are chiefly confined to the epithelium of the glomeruli and the tubules, causing it to proliferate, degenerate, and desquamate. Both kidneys are attacked, and one portion of a kidney may be affected differently from another part of the same organ.

Among the aged there sometimes occurs degeneration of the tubular epithelium owing to senile decay, but not from inflammatory action.

Symptoms.—Dropsy is usually the first symptom that causes the patient to seek medical advice, although on close questioning other symptoms, to be noticed presently, may have preceded it.

The dropsy is due to several causes. Chief of these is imperfect renal function by which there is diminished excretion of water with corresponding increase of pressure in the capillaries. This does not account for it wholly, however, since dropsy may not follow ligation of the renal vessels with total suppression of urine. According to Cohnheim, there is increased permeability of the walls of the vessels, which allows transudation of serum.

What causes this increased permeability early in the disease is not known, but there is no doubt but that loss of albumin and the anæmic condition, increasing as the disease progresses, are potent factors in causing increased permeability of the walls of the capillaries and the transudation of the watery portion of the blood. The dropsy may be confined to a slight puffiness of the face, or the lower extremities may be much swollen and pit on pressure, especially over the tibia. In some cases the skin is distended almost to bursting, and the features are so changed that not even intimate friends can identify the patient. Along with this there are more or less uræmic symptoms, as they are called, such as headache, drowsiness, nausea or vomiting, diarrhœa, paroxysmal attacks of dyspnœa, and temporary disturbance of vision (amblyopia or amaurosis). As the uræmic state becomes more marked, the patient becomes restless, muscular twitchings



Renal Casts. *a*, Epithelial casts; *b*, pus casts; *c*, hyaline casts, oil drops; *d*, granular casts; *e*, hyaline casts, with blood globules; *f*, waxy casts.

are noticed, and then follow convulsions and even coma, often with a fatal termination.

The cause of these so-called uræmic symptoms is a matter of dispute. The most commonly received opinion has been that they were due to urea retained in the blood. Frerichs believed that the urea became converted into carbonate of ammonia by decomposition from the action of a ferment in the blood, but this theory has been disproved. Traube considers that these so-called uræmic symptoms depend upon œdema of the brain and cerebral anæmia, and Niemeyer goes so far as to discriminate between symptoms due to uræmia and those dependent upon such œdema. Other causes, including cerebral lesions, have been advocated by different authors. But according to Oppler, Zalesky, and others, the uræmic phenomena are due to the retention in the blood and tissues of creatin, creatinin, and other extractives. It is probable that these symptoms are due to no one particular cause, but to the vitiated condition of the blood and tissues and the reten-

tion in the circulation of various excrementitious and poisonous substances.

The urine is scant and high-colored, sometimes smoky or even bloody. Instead of the normal amount of forty-five to fifty ounces being passed in twenty-four hours, the quantity may be reduced to half that amount or a few ounces, and in some cases there may even be total suppression. The specific gravity varies, but is usually higher than normal, going up to 1030 or even 1065 (Roberts). The urine contains casts and is loaded with albumin. The casts in acute Bright's disease are usually hyaline, epithelial, or blood casts. Hyaline casts are transparent, and form the basis of all other casts. They are probably coagulated albumin. Should epithelium or blood disks become attached to their walls, then we have epithelial or blood casts. Sometimes free blood disks and epithelial cells are seen under the microscope.

The presence of true or serum albumin in the urine was formerly thought to be due to its transudation through the walls of the renal capillaries owing to increased pressure. But according to the investigation of this subject by Cohnheim and Hadheim, it is more probably owing to changes in the epithelium covering the minute vessels of the glomeruli. As long as this covering of epithelium is intact, albumin cannot escape; but as soon as it undergoes degeneration from inflammatory process, albumin is allowed at once to transude. Should this structural change be not repaired, then albuminuria becomes chronic. Albumin appears in the urine transiently and in moderate quantity in connection with other conditions than Bright's disease. It sometimes occurs in the course of dyspepsia, as in a case that came under my charge several years ago. The urine was critically examined by Dr. Francis Delafield, of this city, and albumin to a moderate extent was found. The late Dr. Alonzo Clark was called in consultation, and confirmed my previous diagnosis of dyspepsia. The patient completely recovered in a few weeks. The albuminuria was probably due in this case to nervous depression, attended with temporary vaso-motor paralysis and dilatation of renal capillaries. Occasionally albumin is found in the urine of soldiers after exhausting marches, and of athletes after a performance, and is probably due to the same cause. Such cases accord with Runeberg's theory of diminished pressure.

There is no possibility of mistaking albumin in the urine for anything else if the heat and nitric-acid tests be used with proper care. In the first place, the urine must be acid, since alkalinity destroys coagulability of the albumin. If, then, the urine is alkaline, add a few drops of vinegar or dilute acetic acid. Now heat the urine in a test-tube. Gradually the urates, which had deposited on cooling, and caused the urine to appear muddy, begin to clear

up until the urine may look perfectly normal. A little further heating, and it begins to get cloudy. This cloud is either caused by precipitation of earthy phosphates or coagulated albumin. If it be the former, the urine immediately clears up under the addition of a few drops of strong nitric acid. If it is albumin, it will remain. In doubtful cases, where only a trace of albumin can be found, Heller's test is probably the best and most convenient. Pour a little of the urine into a large test-tube, and then, tilting the tube at an angle, gently pour some strong nitric acid down the side so that it will form a layer at the bottom of the tube. If only a trace of albumin be present, upon holding the tube up to the light, a white zone or thin film will be observed at the line of union of the acid and urine. If this film remain under heat, it is albumin. If it clear up under heat, it was peptone or some derivative of albumin, or vegetable alkaloid. Peptones and the like are of little or no clinical significance, except as indicating dyspepsia. If resinous substances are suspected, alcohol should be added to dissolve them. This occurred several years ago at the clinic of the late Prof. E. D. Hudson, where urine had been brought in a vial that had contained some resinous liniment. Pain in the loins is rarely complained of by the patient.

The pulse is somewhat accelerated and irritable, and the skin is generally dry. Usually there is a very moderate rise in temperature, 100° F. to 102° F. But when uræmia is marked, the pulse becomes slow, 40 to 50, until convulsions occur, and then the pulse becomes feeble and frequent, and the temperature rises sometimes to 106° F.

In severe forms of acute diffuse nephritis, the symptoms from the first are very marked and grave. The patient is seized with a violent chill, followed by a high temperature of 105° F. Delirium, coma, and death rapidly follow each other before much œdema has occurred.

In favorable cases the urine becomes more abundant, uræmic symptoms cease, œdema disappears, and also albumin from the urine. The patient cannot be said to be entirely well until all traces of albumin have disappeared from the urine.

Diagnosis.—There is no possibility of mistaking acute Bright's disease for any other affection if proper attention is paid to the examination of the urine, as already described. Some difficulty might arise, on seeing for the first time a patient in a state of uræmic coma, in distinguishing it from apoplexy, epilepsy, or narcotic poisoning. But in apoplexy there is always stertorous breathing and hemiplegia, often with varying pupils. In uræmic coma the face is pale, the breathing is easy, both pupils are dilated, and there is no paralysis. In epilepsy the countenance is turgid and purple and the breathing smothered.

In both, however, the pupils are dilated. In opium-poisoning, the pupils are contracted, the breathing stertorous, and the face cyanosed. In poisoning from belladonna, the diagnosis would be more difficult, but in any case of doubt some of the urine should be drawn and tested.

Prognosis.—The prognosis is usually favorable, the patient generally recovering in about six weeks. Roberts mentions a case that recovered in ten days. The patient may also recover after several months or more, after the disease has become subacute. The prognosis is unfavorable should, as is sometimes the case, secondary inflammations and complications occur, such as endocarditis, pneumonia, and œdema of the lungs. In primary acute nephritis due to exposure to cold or toxic agents, the prognosis is nearly always favorable, as also in those cases due to pregnancy. But when it is secondary to some infectious disease, much depends on the primary affection. The prognosis is more unfavorable when acute nephritis lights up from a previously existing chronic nephritis.

Treatment.—Regarding treatment, the remarks made concerning active congestion apply here. Authors prudently recommend that the patient be kept warm indoors, in bed if necessary, and among other means the use of diaphoretics. Of these I would prefer the hot-air bath or other mechanical means to the administration of drugs, except in case of marked uræmic poisoning, as will be noticed presently. Cups to the loins, with or without scarification, and hot fomentations are also recommended. Of the two I prefer hot poultices, as they are more comfortable to the patient, and are, I believe, equally efficacious. If thought necessary, they may be applied after cupping, but I have used neither for many years, having found them to be unnecessary.

The question naturally arises, Shall we give diuretics; and if so, at what stage of the disease? In mild cases, and in cases of glomerulo-nephritis with dropsy following scarlatina or measles in children, the diuretic treatment alone is usually sufficient to effect a speedy and complete cure. The diuretic employed is that recommended by J. Hughes Bennett. (℞ Pulv. potass. acetat., ʒ ij.; spts. ætheris nitrosi, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter in die). In many cases the addition of ʒ ss.–ʒ i. tr. digitalis to the above prescription is advisable. A very good diuretic also is the decoction of pipsissewa (℥ i. in Oi.) given in doses of a wineglassful ter in die, sweetened.

But in more marked cases we have a more serious pathological condition to deal with. The tubules are not merely obstructed with epithelium that may be easily washed out by diuretics: they are blocked by epithelium within, and without by the pressure of serous interstitial infiltrations. According to Recklinghausen,

the white corpuscles of the blood play an important part in separating the epithelium from the inner surface of the tubules. In this condition diuretics are not indicated, as they would only increase the difficulty. As they are used simply to wash out the tubules, their administration should not be adopted until the more acute symptoms have subsided.

The bowels and skin should be made to perform vicariously the work of the kidneys for the time being, so as to allow the latter organs to rest. For this reason a hydragogue cathartic should be given unless the patient is very feeble, when more moderate means may be employed. A drachm of the pulvis purgans (pulv. jalap. co.) may be given in water at once, and repeated if necessary. In one hundred and seventy-five recorded cases I never found any weakening effect from its repeated use. I found it much more trustworthy than elaterium, which is, as is well known, often worthless. Clutterbuck's preparation is the best, and may be given in one-eighth to one-half grain doses, and repeated if necessary. The action of these hydragogues is to unload the bowels, relieve pressure on the kidneys, and lessen inflammatory action in those organs, thus preparing the way for diuretics. Deterioration of the blood occurs early; and as soon as the bowels begin to move, twenty drops of tinctura ferri chloridi in water should be given every three hours. According to Roberts, iron acts very beneficially, and hastens in a marked manner the disappearance of blood and albumin from the urine. But he suggests that, when begun too early, iron is apt to induce a return of the acute symptoms. On the contrary, where I have given iron from the first, I have not observed any such effect.

After about a week, or a few days after the more acute symptoms have subsided, a tablespoonful of the fresh infusion of digitalis may be given ter in die as a diuretic with or without acetate of potash. Or Hughes Bennett's diuretic, just mentioned, may be employed. The dose of tinctura ferri chloridi may now be diminished and given separately. The diet should be milk.

Should the patient be weak, the administration of Fothergill's pills every three hours until the bowels move may take the place of the more drastic cathartic. (℞ Hydrarg. chlor. mitis, pulv. digitalis, pulv. scillæ rad., āā gr. vi. M. et ft. pil. No. vi. Sig. One every three hours until bowels move.) Should the bowels not move after giving several pills, they should be stopped, and a saline given to guard against ptyalism, which, however, very rarely occurs with the use of these pills.

Diaphoresis by means of placing the patient in a tub of hot water, with a blanket wrapped around close to the neck, or by means of the hot-air bath, or more conveniently still by the hypodermic injection of one-eighth of a grain of hydrochlorate of pilo-

carpine is often of the greatest advantage. Under this treatment I have known very marked cases to recover completely in a week's time. But recovery is not perfect until all traces of albumin disappear from the urine. Where the case becomes subacute from any cause, the tonic treatment and milk diet should be kept up and great care be had regarding proper clothing. If possible, the patient should at once temporarily remove to a warm, dry climate.

Under the above plan of treatment, uræmic symptoms rapidly disappear. But suppose convulsions occur, what is to be done? Bleeding is no longer practised. Do not give ether, as it kills the patient. Chloroform merely checks convulsions, it does not prevent their recurrence. Morphine injected hypodermically is urged by high authority, but this drug alone does not fulfil the indications. It should be given with pilocarpine or Norwood's tincture of veratrum viride. Pilocarpine hydrochlorat. gr. $\frac{1}{8}$ to $\frac{1}{4}$ may be dissolved in five to ten drops of Magendie's solution of morphine, with a little water added. They form a clear mixture and are given together. The morphine strengthens the heart and lessens spasm, while the pilocarpine eliminates the cause by inducing profuse perspiration. Convulsions are thus not only controlled, but they do not return until reaccumulation of the poison in the blood occurs. Veratrum viride, in large doses by the mouth, was first recommended about 1867 by Clark. More recently Johnston has advocated its use hypodermically. The morphine must always be given a short time previously, however, for reasons stated. In any case, brandy or other stimulant should be at hand in case of necessity. Soon the patient hiccoughs and sweats profusely, and all danger is over. The pulse may drop to thirty to the minute, but no one seems to die from the effect of the veratrum. Pilocarpine, on the other hand, not only depresses the heart, but sometimes strangles the patient to death by great increase of saliva and mucus in the fauces. For these reasons the treatment by veratrum is preferred by many.

In one case of uræmic coma, by order of the late Dr. Austin Flint, the patient was saved by giving two grains of Clutterbuck's elaterium. He was made to swallow by manipulating the larynx, but the drug may also be given with a tube. There is no way to give it hypodermically, as it is a resinous, insoluble substance.

After a complete cure of acute Bright's disease, the patient should be made to understand that care must be taken for a long time not to bring on a relapse by acts of imprudence.

Temperate habits and comfortable but not too warm clothing are necessary.

Chronic Bright's Disease.

Chronic Bright's disease of the kidneys may assume one of three typical forms according to the renal tissues affected: 1st, the tubules; 2d, the interstitial tissue; 3d, the blood-vessels, or there may be and generally are mixed cases in which all these anatomical elements become more or less involved.

1. Chronic Tubular Nephritis.

Etiology and Pathology.—This variety of chronic Bright's disease of the kidneys is also kown under different names, as chronic parenchymatous, catarrhal nephritis, and the like. It may result from one or more attacks of acute tubular nephritis, as from the continued abuse of copaiba for repeated attacks of gonorrhœa, but generally it is chronic from the first. The etiology in general is the same as that of the acute disease, but is often obscure. It may appear at any age and in both sexes. It is thought to occur rather more frequently among males than females, and before rather than after middle life. The kidney is large, smooth, and white, the changes occurring chiefly in the cortical portion; or it may subsequently undergo collapse from disintegration of the tubal elements, and become smaller than normal. The kidney is usually known as the large white kidney. It should be borne in mind that fat is found in the pelvis of the healthy kidney, and that the changes in this disease are to be sought for in the cortical portion, as already remarked.

Symptoms.—The symptoms are more marked in this than in any other form of chronic Bright's disease, dropsy being prominent and the face pale and puffy. The limbs are more swollen at night, the face in the morning, as a matter of course. There is more liability to secondary inflammations of serous membranes and to uræmic symptoms than in any other chronic form.

The urine is scant and high colored, and either of normal specific gravity or higher. It is loaded with albumin and contains hyaline and fatty casts. Dyspnœa, besides paroxysmal uræmic attacks, sometimes occurs, due to œdema of the lungs, or other intercurrent affection of the organs of repiration or the heart. Cardiac hypertrophy, with or without valvular lesions, is now and then observed. The valvular lesions may be due to some previous disease, or developed during the renal affection. Simple hypertrophy of the left ventricle without valvular lesion may exist, but it is more frequent in connection with cirrhotic kidney. In almost all cases of chronic Bright's disease there is also heart disease, so that it has become quite customary to enter such patients on public dispensary-books under the head of Bright's and car-

diac. Now, as to whether the heart disease caused the renal affection or the latter gave rise to the heart disease has been disputed. Undoubtedly in some cases, though rare, heart lesion has brought about kidney disease by disturbance of the circulation. In other cases the heart disease and renal affection have been developed separately and independently of each other. In the majority of cases, however, the kidney disease undoubtedly has given rise to the heart affection either by causing endocarditis resulting in valvular lesion, or by hypertrophy from the obstruction to the circulation from general arterial fibrosis, or the action of the vitiated blood on the heart muscle. Besides temporary disturbance of vision (amaurosis, amblyopia) due to uræmia, there may supervene a true neuro-retinitis or fatty retinal degeneration, to be detected by the ophthalmoscope. The occurrence of uræmic symptoms has already been described under the acute form. As the disease progresses, the patient becomes more or less emaciated. The skin is dry and harsh and anæmia more and more marked. Dyspepsia, with the belching of sour, burning fluid, is sometimes very distressing. The urine becomes more abundant and of a low specific gravity, though it still contains albumin and casts. The pulse assumes a feeble and irregular type, and the patient dies of exhaustion or coma. Not infrequently there are remissions, owing to the tolerance of the condition acquired by the system. The patient appears to be better, when suddenly uræmic symptoms develop, and the outlook again becomes gloomy enough.

Diagnosis.—This rests chiefly upon a careful examination of the urine. If albumin and casts are found, all doubt is set aside.

Prognosis.—Chronic Bright's disease of any variety is a grave malady, and the prognosis should always be guarded. With the best treatment and every precaution, although the patient's condition may be improved and life prolonged, the tubular (parenchymatous) form of chronic Bright's disease is the only one ever cured, and even here recovery is very rare.

Treatment.—This is limited to maintaining the strength of the patient and relief of symptoms as they occur, besides guarding against fresh attacks of nephritis. Milk is the best diet. The patient should drink several quarts daily; and if sweet milk is not well borne by the stomach, then peptonized milk or koumyss and the like should be used, as already stated. Even stimulants may be needful. The red wines with water are to be preferred, or perhaps it may become necessary to give milk punch in moderation. Treating the symptoms such as dropsy and uræmia have already been described.

Pricking the skin for dropsy is not to be thought of, and bandaging the limbs may contribute to fatal œdema of the lungs,

as has happened. The repeated use of hydrochlorate of pilocarpine as a curative agent has not, in my experience, been justified by results. As a temporary make-shift for uræmic poisoning, however, it sometimes proves invaluable, especially when combined with morphine. Iron in some form should be given to counteract the anæmia. The tinctura ferri chloridi in ten or fifteen drop doses well diluted with water, ter die, is one of the best preparations. The solution of albuminate of iron in teaspoonful doses ter die is also an excellent preparation, being well borne by weak stomachs. Digitalis is often of great advantage, especially if the heart be involved. Five drops of the tincture may be given ter die in water. If digitalis is not well borne by the stomach, the tincture of strophanthus should be substituted. As this mixes well with tincture of iron, the two may be given together. (℞ Tr. strophanthi, ʒ ss.; tr. ferri chloridi, ʒ iss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) This dose may gradually be increased to double the amount of strophanthus and iron.

Paroxysms of uræmic dyspnœa may be relieved at once by the hypodermic injection of two or five minims of Magendie's solution of morphine. For persistent headache, nitro-glycerin (glonoin) sometimes gives relief, but more particularly in the cirrhotic form of Bright's kidney, in which the arterioles are contracted from fibrosis. Inasmuch, however, as the two forms are often found together, though the symptoms of one or the other predominate, glonoin is often useful by dilating the arterioles. From one to five drops of a one-per-cent solution in water may be given ter die, or the same amount in capsules or compressed tablets. (℞ Glonoini, 1 per ct. sol., ʒ i.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) Flushing of the face and constriction about the throat, with a sense of fulness about the head, indicate that the full effect has been produced, and the dose should be then lessened or even suspended altogether. By this means not only is headache relieved, but albumin in the urine is diminished. Dr. Francis P. Kinnicut, of this city, has also found it useful in controlling uræmic symptoms generally, in his service at St. Luke's Hospital. For a very interesting account of this subject by Dr. Kinnicut the reader is referred to the New York *Medical Record*, April 17th, 1886, p. 437.

The clothing should be comfortable but not so warm as to endanger patients by their taking cold easily, and outdoor life in a warm, dry climate would be most desirable.

2. Chronic Interstitial Nephritis.

Etiology and Pathology.—We come now to the second type of chronic Bright's disease of the kidney, in which there is inflammation of the interstitial tissue. It is a disease of middle life or

past, and affects men more frequently than women, as does gout, which is one of the chief causes. Hence it is sometimes called gouty kidney. Syphilis, lead-poisoning, and rheumatism also give rise to it. Since the tippling of alcohol sometimes causes it, the names rum kidney and gin kidney have also been applied to it. Independent of such causes it sometimes occurs among hard brain workers. Often the cause is obscure and cannot be traced. In chronic tubular nephritis we saw that the kidney was large, smooth, and white. In the chronic interstitial form exactly the reverse is the case. The kidney is small, contracted, and red.

The capsule is adherent and the surface lobulated. Owing to obstructed tubules, cysts are sometimes found on the surface. The cortical portion is chiefly affected, but there is also shrinkage of the tissues between the pyramids.

Symptoms.—This disease is chronic from the first, and comes on insidiously. For months the patient may complain only of dyspepsia and a frequent desire to urinate. There is little or no dropsy. A slight fulness under the eyes, called pods by the laity, and perhaps about the ankles, may be all that the closest inspection can reveal.

The urine is abundant, pale, and of a low specific gravity. Instead of the usual amount of forty-five to fifty ounces per twenty-four hours, sixty ounces or even double that amount or more may be passed, with a specific gravity ranging from 1015 to 1010 or even lower. It contains but little albumin to be detected by Heller's test, and at times it is entirely free from it. Later on, if the tubules becomes involved, then albumin is found. The casts are hyaline and granular, though epithelial and fatty or even waxy casts are also sometimes found. From a fit of intemperance, or other cause, acute tubular nephritis may supervene with its usual symptoms, notably dropsy and albuminuria. That is one of the chief dangers to which patients suffering with chronic interstitial nephritis are exposed.

Simple hypertrophy of the left ventricle, with accentuation of the second heart sound in the aortic interspace, often occurs in this form, without valvular lesion or degeneration of muscular fibre. According to Traube, it is due to increased resistance in the renal circulation. Others consider additional obstruction in the arterioles throughout the body, due to fibrosis and hypertrophy of their muscular coat.

Not only may neuro-retinitis occur in this form, but, owing to the increased force of the left ventricle, and brittleness of the capillary arteries generally, apoplexy of the retina, and of the brain also, with sudden blindness or death, may take place. As the disease progresses, the patient becomes more and more emaciated and weakened. Headache and insomnia become intolera-

ble. The appetite is capricious, the temper irritable. The breathing, especially during sleep, is remarkable. The patient breathes rapidly a half-dozen times or so, and then ceases to breathe entirely for a short time, when suddenly the rapid breathing is repeated, like one who has been trying to hold the breath. This is termed the Cheyne-Stokes breathing. This peculiar mode of breathing is not pathognomonic of chronic interstitial nephritis, however, though it is one of the symptoms. It occurs among those who have committed excesses in alcohol or opium, especially after middle life, and I have also noticed it in pneumonia. Perhaps any disease or poisoning that would blunt the respiratory centre sufficiently would give rise to it.

The patient finally dies of exhaustion or some intercurrent disease, or perhaps is carried off by convulsions or coma.

Diagnosis.—The difficulty is not in mistaking this disease for some other, but in overlooking it altogether. It is of common occurrence for a physician to be treating a patient for dyspepsia, or headache, or insomnia, when if he had taken the trouble to examine the heart he would have found enlargement of the left ventricle. On further questioning the patient, he would have found that he was passing more water than before, and on examining it he would have found it to be of a low specific gravity and containing no sugar, thus at once setting aside diabetes mellitus. Given a man of middle life or past, with dyspepsia, headache, and insomnia, or simply dyspepsia, with enlarged left ventricle, and abundant urine of a persistent low specific gravity, and the chances are that the case is one of chronic interstitial nephritis. All doubt is set at rest if casts be found.

Prognosis.—Could this disease be discovered at the outset, no doubt a cure could be effected. But unfortunately the approach is so insidious that irreparable pathological changes have already taken place before the patient ever seeks medical advice. Then all hope of cure is past. Nevertheless, under proper hygienic conditions, and precautions on the part of the patient, with scientific treatment, life in some instances may be indefinitely prolonged.

Treatment.—The diet should be nutritious, consisting largely of milk or some of its preparations as already described. Alcoholic stimulants may be used in moderation, especially the red wines diluted with water at meal-times. The clothing should be comfortable and the patient should remove, if possible, to a warm, dry climate, at least during the winter months. Intemperance is to be avoided for fear of bringing on an attack of acute tubular nephritis. Glonoin is peculiarly advantageous in this form of the disease, in guarding against headache; insomnia, and the like. Should uræmic dyspnœa become distressing, a hypodermic

injection of two or five minims of Magendie's solution of morphine will usually arrest it at once. For the dyspeptic symptoms, the rhubarb and soda mixture is good. (℞ Pulv. rhei, pulv. sodii bicarb., āā ʒ ij.; aquæ, ℥ ij. M. Sig. ℥ i. ter die.) Digitalis or allied remedies are contra-indicated while the left ventricle is already doing overwork. Afterward, as the heart becomes more enfeebled, they may be tried. Iron for the anæmia is indicated. Blaud's pills (℞ Ferri sulphat., potass. carbonat., āā ℥ ij.; pulv. tragacanth., q.s. M. ft. pil. No. 30. Sig. One ter die), the solution of albuminate of iron (℥ i. ter die), or ten drops of tinctura ferri chloridi in water, ter die, may be given. Iodide of potassium in ten-grain doses, if well borne by the stomach, should be given ter die after meals in case of gout, rheumatism, or lead-poisoning. This remedy may be continued for six weeks or two months, and then discontinued for a time. Should the patient have had syphilis, mercury should be added to the potassium iodide. (℞ Hydrarg. bichlorid., gr. ss.; pulv. potass. iodidi, ʒ viij.; aquæ, ℥ ij. M. Sig. ℥ i. ter die.) The dose of mercury may gradually be increased to double the quantity mentioned. The giving of small doses of bichloride of mercury (corrosive sublimate) in some bitter tonic was much in vogue at the old New York Hospital, in Broadway, near Worth Street, many years ago, in the service of Dr. Augustine Smith, but without permanent benefit. Should dropsy or uræmic symptoms become urgent, they should be treated as before mentioned.

3. Waxy Kidney.

Etiology and Pathology.—This is the third and last type of chronic Bright's disease of the kidneys, and is also known as lardaceous or amyloid kidney, according as one imagines that the degenerated tissues resemble lard or starch. The Malpighian tufts appear as shining particles on a cut surface, and turn mahogany-brown when touched with iodine. A Malpighian tuft or corpuscle is made up of the glomerule with surrounding epithelium, the cœcal extremity of the uriniferous tubule and a capsule that holds them all together. The glomerule is a minute collection of capillaries composed of afferent arterioles and efferent venules. The disease is nearly always secondary to some pre-

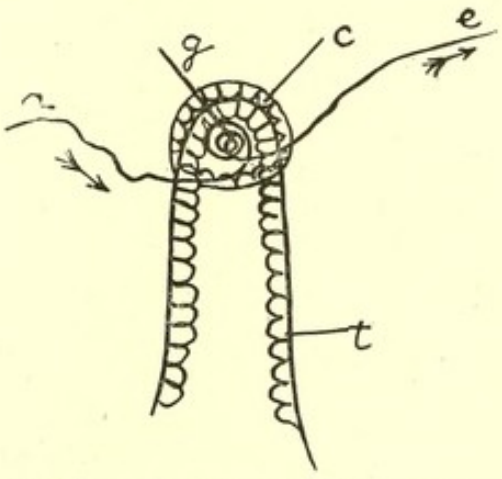


Fig. 25.—Malpighian Corpuscle in Waxy Kidney. *a*, Afferent arteriole; *e*, efferent venule; *g*, glomerule; *c*, capsule; *t*, uriniferous tubule.

existing wasting disease, such as caries of bone, constitutional syphilis, phthisis, empyema, ulcers, cancer, and the like, although in rare cases there appears to be no known cause. The *materies morbi*, being absorbed by the blood, is carried to the kidneys by the arteries, so that the afferent vessel or arteriole of the glomerule is affected first.

Subsequently the venule and the epithelium within the capsule and uriniferous tubule become affected, and then more or less dropsy occurs.

Along with waxy (lardaceous, amyloid) kidney there will be found the same condition of the spleen and liver, causing the latter organ especially to be sometimes enormously enlarged.

Symptoms.—About the first sign in this disease is the increased flow of urine. A patient suffering with some pre-existing wasting disease already mentioned is compelled to get up in the night to urinate. Instead of the normal amount of forty-five or fifty ounces, there will be double that quantity passed, or more. The specific gravity is remarkably low, 1005 to 1010. But little albumin is present at first. As the disease progresses, the urine becomes less, the albumin more marked, and more or less dropsy appears, although it is never so marked as in the tubular form. Casts are not abundant, but occasionally a few hyaline or fatty casts are found, and rarely other varieties. The so-called waxy casts are not peculiar to this disease, as is generally supposed. Such casts, according to Strümpell and all modern observers, are found most commonly in acute and subacute tubular nephritis. They are simply changed hyaline casts. Uræmic symptoms are never marked in this form of chronic Bright's disease. But the patient acquires a waxy, cachectic appearance, and finally dies of exhaustion or some intercurrent affection.

Diagnosis.—This rests upon examination of the urine in a patient already suffering with some pre-existing wasting disease. The diagnosis is rendered more certain if, in addition, the liver and spleen be found to be enlarged. The fact that the urine, though abundant, is of a low specific gravity, and contains no sugar, places diabetes mellitus out of the question.

Treatment.—The disease, as a rule, is incurable, depending as it does upon a primary constitutional vice that is itself usually fatal. The primary cause should, if possible, be removed by surgical means, such as scraping and exsecting dead tissue, drainage, antiseptic dressings, and the like. In case of syphilis, the mixed treatment of iodide of potassium and bichloride of mercury, as elsewhere indicated, should be tried. Palliative measures, nutritious diet, including cod-liver oil, and stimulants if necessary to prolong life, complete the management.

Renal Calculus (Nephrolithiasis, Pyelitis Calculosa).

Etiology and Pathology.—Concretions in the kidneys are variously termed renal sand, gravel, or calculi, according as they are fine, coarse, or larger. The finer particles may occupy the tubules in any part of the kidney, but the larger calculi are usually found in the pelvis of the kidney, where they have grown by accretion. Generally there is a nucleus of mucus or blood. They mostly consist of uric acid, but there may be also oxalate of lime or the mulberry calculus. A calculus is usually confined to one kidney, though both may be affected. Should the urine become alkaline, as may happen in pyelitis, the phosphates of lime and the ammonio-magnesium phosphates may be precipitated and added to the others. Carbonate of lime, urate of ammonia, and, last of all, cystin and xanthin may be found. Sometimes calculi are composed of various ingredients.

Renal concretions are found most frequently among children and elderly people. Men are said to be more often affected than women. Heredity undoubtedly plays an important part. The disease occurs sometimes among the subjects of attacks of gout, but often independently. As to whether intemperance and errors in diet predispose to the affection appears to be not proven, though it is probable. Finally, some relation seems to exist between the gall-stone and renal-calculus diseases.

Symptoms.—So long as renal sand only is passed, there may be no symptoms whatever. Even gravel may be passed without much inconvenience, except perhaps some pain in the back, frequent desire to urinate, and possibly itching at the end of the penis. In course of time, however, mechanical irritation of the mucous lining of the pelvis of the kidney takes place, accompanied by the passing of blood, the characteristic renal pelvic (tailed) epithelium, and sometimes pus. If obstruction occur in the ureter due to impacted calculus, these signs may suddenly cease and the urine be perfectly normal if only one kidney is affected.

Renal colic is the term applied to the severe pain and other symptoms that occur during the passage of a sufficiently large calculus along the ureter. It is similar in some respects to gall-stone colic. It usually comes on suddenly after riding, jumping, or other exercise, but it may also set in without any known exciting cause and after premonitory symptoms of backache. There is intense pain in the back, shooting downward along the course of the ureter to the testicles, end of the penis or labia, as the case may be; and the testicle of the affected side, according to time-honored tradition, is drawn up. Often there is frequent

micturition with blood and even pus. The urine is generally scant, though it may be normal if coming from the unaffected kidney. Sometimes there is complete suppression. The pulse becomes small and rapid, the patient rolls upon the bed or floor, and groans with pain, while the face is pale, and the surface cold and wet with sweat. Often there is nausea and vomiting, with fainting spells. There is little or no fever, though the temperature rises usually a little if the attack is prolonged.

As the stone reaches the bladder, suddenly all pain ceases. The attack may last from a few hours to several days, with exacerbations and remissions. Not infrequently the stone, if not too large, is passed out after arriving in the bladder.

Prognosis.—Renal-calculus disease, or the condition of nephrolithiasis, is usually a tedious one, and the prognosis should be guarded, especially if both kidneys are affected. Many cases recover, but there is always danger of such secondary complications as pyelitis, pyelonephritis, renal abscess, pyonephrosis, perinephritic abscess, hydronephrosis, pyæmia, and waxy (amyloid, lardaceous) degenerations. If a calculus remain impacted in the ureter instead of passing into the bladder, any of these secondary complications may occur, or else the stone may ulcerate through into the peritoneal cavity, giving rise to fatal peritonitis and the like.

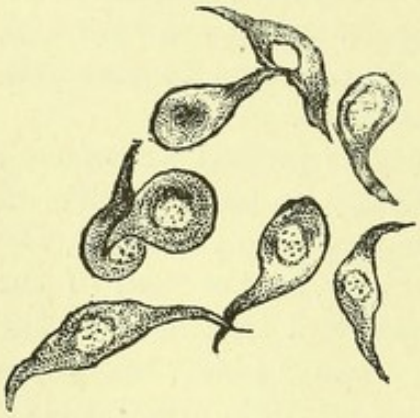


FIG. 25.—TAILED EPITHELIUM FROM RENAL PELVIS.

Diagnosis. — Renal-calculus disease might be mistaken for cancer or hydatids of the kidney, but as the latter are very rare they are easily excluded. The character of the urine and the location of the pain distinguish it from gall-stone or other colic. In all cases of doubt the urine should be examined for renal pelvic (tailed) epithelium, blood, pus, and uric acid. The latter may be caught by urinating over a fine sieve in suspected cases, as is practised at Carlsbad.

Treatment.—For renal colic, five to ten minims of Magendie's solution may be given hypodermically, or even more in some cases, in order to relieve pain. But care should be taken not to go too far with opium, as symptoms of narcotism might develop on the sudden cessation of pain when the stone passes into the bladder. For that reason moderate and cautious inhalation of chloroform is sufficient in many cases. Hot-water bags or poultices may be applied, and the patient should drink freely of water or flaxseed tea, to help wash out the stone. The warm bath, changing position of the patient, and gently manipulating the abdomen along the course of the ureter may be tried.

But to cure the patient radically, the constitutional vice must be corrected so as to stop the formation of uric acid and its derivative (?), oxalic acid. For this purpose the diet should be mostly vegetable, with a moderate amount of meat. Of the alcoholics, the red wines diluted are alone admissible. Tea should be drunk instead of coffee. The patient should take regular outdoor exercise of an entertaining and interesting kind rather than as a task or dose, and should drink freely of alkaline waters. Of these, the Buffalo lithia, Bear lithia, and other lithia waters are recommended. A course at Carlsbad often effects a complete cure. Ten grains of carbonate of lithia well diluted, and drunk ter die, is fair treatment in the absence of lithia spring water. Should the urine become alkaline with phosphatic deposits, instead of alkaline waters ten grains of lactic acid well diluted may be given ter die. Should abscess or hydronephrosis occur, nothing will be of benefit short of a surgical operation. Aspiration may be of temporary benefit, or even effect a permanent cure; if not, exsection of the kidney may be performed.

Pyelitis.

Etiology and Pathology.—Pyelitis is inflammation of the mucous membrane lining the pelvis of the kidney. One or both organs may be affected, and the disease may be acute or chronic. It is very rarely primary, but is nearly always secondary to some other disease. Of these, perhaps renal calculi or nephrolithiasis is one of the most frequent. In these cases the pyelitis is due to mechanical irritation. Very rarely may there occur a primary catarrhal form due to exposure to cold. Besides calculi, parasites or other foreign substances may cause it. It may be due to extension of nephritis, or more frequently to extension of inflammation upward along the ureter from severe and prolonged attacks of urethritis and cystitis. Sometimes it is brought on by excessive and prolonged use of such irritant diuretics as turpentine, copaiba, cantharides, and the like. A mild form sometimes affects women in child-bed, probably owing to extension of inflammation from the bladder or kidneys. The disease also accompanies such acute infectious diseases as diphtheria, typhoid and typus fevers, and small-pox, as well as pyæmia and the cystitis consequent upon myelitis. In case of retention of urine from severe urethral stricture of long standing, enlarged prostate, tumors pressing on the ureters, or their obstruction from stricture, impacted calculi, or other cause, the urine becomes, in time, decomposed and ammoniacal. Being highly irritating, it thus causes pyelitis. According to Klebs, bacteria carried into the bladder on unclean catheters and other instruments may

find their way to the pelvis of the kidney and cause pyelitis. Occasionally pyelitis may be due to surgical injuries, and finally no known cause can be ascertained.

Symptoms.—The symptoms of the primary disease will usually have been known. On the advent of pyelitis, aching pain in the back and extending down the course of the ureters will be one of the first symptoms. Along with this there will be more or less frequent desire to urinate, accompanied perhaps by chills. The urine is characteristic. It is usually acid, and contains in acute cases mucus and blood and the oft-mentioned renal pelvic (tailed) epithelium. Later on it will contain pus and albumin, the amount of the latter depending on the amount of pus and blood. In severe cases pyelonephritis may result, as evidenced by the fever and increase of grave symptoms. Should the ureter become blocked so that pus could not escape into the bladder, the urine might become normal from the unaffected kidney, but pyonephrosis, giving rise to a pyonephrotic tumor on the affected side, would occur. In such a case an enlargement or bulging would be noticed on the outside of the lumbar region on the affected side, and a fluctuating tumor be felt. Should the obstruction give way so as to allow the pus to escape into the bladder, the tumor suddenly disappears and is followed by a copious flow of purulent urine; and this may happen again and again if the patient lives and is not relieved by a surgical operation. Should the ureter become ulcerated through, or rupture, the contents may be discharged into the abdominal cavity, resulting in fatal peritonitis. In other cases it might discharge into the intestines, or even outwardly after adhesions had formed. In rare cases both kidney and ureter become converted into mere cicatricial tissue, leaving the other kidney to perform the work of both, which it does. As the disease progresses, there are recurring chills, hectic fever, sweats, and emaciation, and the patient dies of exhaustion or some intercurrent affection.

According to Treitz and Jaksch, the retention of ammoniacal urine in this disease sometimes gives rise to ammoniæmia. In this condition there are usually no dropsy nor any of the characteristic uræmic symptoms, including convulsions, but the patient emaciates, smells strongly of ammoniacal urine, the mouth becomes parched, chills follow each other, and the patient dies in a typhoid or comatose state. In such cases there is such effectual obstruction to the escape of urine from severe stricture or pressure from a tumor, for instance, that there is not only bilateral pyelitis, but also cystitis and nephritis, if not pyonephrosis.

Diagnosis.—This rests on the location of the pain, but chiefly on the condition of the urine and the primary affection. The urine, as already stated, contains pus, blood, and albumin, but

especially the renal pelvic (tailed) epithelium so often mentioned. In perinephritic abscess, the urine has none of these ingredients. Careful attention to the etiology and the examinations of the urine will usually lead to a correct conclusion.

Prognosis.—This depends on the primary cause. In simple catarrhal pyelitis of one kidney only, the prognosis is good, as also in the usually mild cases affecting women in child-bed or accompanying acute infectious diseases, or due to such irritants as turpentine, copaiba, cantharides, and the like, under proper care and prompt removal of the cause. In many cases, even where it is due to the presence of renal calculi, recovery is complete. When bilateral, however, as in cases where it is due to retention of urine from severe stricture, enlarged prostate, or other tumor, giving rise to ammoniacal urine, cystitis, and ammoniæmia, the case is hopeless, as well as in case of cancer, severe kidney disease, and myelitis.

Treatment.—In acute pyelitis, the cause, if known, should be removed if possible. The patient may be put to bed, cups applied to the back, and morphine given hypodermically to relieve pain. Alkaline fluids, already described, should be drunk freely. A dose of ten grains of calomel, followed by the usual purgative if necessary, to unload the liver and bowels, would doubtless also be of service. The hot bath sometimes gives much relief.

When the disease becomes chronic and pus is discharged, the patient's strength must be kept up by nutritious diet, and even moderate stimulation if necessary. The red wines diluted with water are recommended. A milk diet is also to be preferred to cod-liver oil. Five grains of tannin in pills, ter die, are thought to be of service. Alkaline mineral waters are also prescribed, but the Virginia Rockbridge alum spring is the remedy to be preferred before all others. Patients also improve at Carlsbad, Vichy, Spa in Belgium, and elsewhere.

Washing out the bladder with the double catheter in case of old cystitis is of some service. In case of pyonephrosis, renal abscess, and the like, aspiration should be tried first. If this fail, the kidney may be taken out altogether if only one be affected.

Suppurative Renal Diseases.

Renal abscess or surgical kidney is the result of acute suppurative interstitial nephritis. It has already been referred to when speaking of renal calculi and pyelitis. Indeed, any of the causes of pyelitis may give rise to renal abscess by extension of purulent inflammation. Surgical injuries may also cause it, but in all cases the inflammation must be of septic origin in order that abscess result from infection. Hence, we find it in such diseases as

pyæmia, ulcerative endocarditis with septic renal infarction, and the extension upward of purulent inflammation from the urethra, bladder, and ureter.

Pyonephrosis has also been referred to. It differs from renal abscess in this: that the latter is the result of acute purulent interstitial inflammation, whereas pyonephrosis is simply the damming back on the kidney of pus, due to an obstructed ureter from any cause, as has already been described.

Perinephritic abscess is the result of suppuration within the capsule of the kidney. Its causes are similar to those of renal abscess and pyonephrosis. Cancer, hydatids, perityphilitic, hepatic, and psoas abscesses may also cause it, as well as surgical injuries. The symptoms in all these suppurative affections of the kidneys are similar. Pain, rigors, hectic fever, the discharge of purulent urine, and progressive emaciation are general features. In perinephritic abscess, however, unless communication become established between the seat of suppuration and the ureter, no pus will be found in the urine, and this would distinguish it from either of the other two. On physical examination, a fluctuating tumor is felt in the lumbar region of the affected side, and often the tumor is visible on inspection.

Diagnosis.—Pain, swelling in the lumbar region, rigors, and fever, with purulent urine, would lead one strongly to suspect one of the foregoing suppurative conditions. Exploratory aspiration would be apt to set all doubt aside.

Prognosis.—Any of these suppurative renal diseases must be regarded as grave affections. The ultimate result will depend much on the primary cause, and early diagnosis, with prompt measures for relief.

Treatment.—No time should be lost after a diagnosis is made. Aspiration may be tried first, but if this does not succeed, the kidney should be taken out. The strength of the patient is to be sustained by nutritious diet, and stimulants if necessary. Quinine will be of little or no benefit in controlling the hectic fever. Three grains of antifebrin ter die or crowded within two hours of each dose in the afternoon is much to be preferred.

Hydronephrosis.

Etiology and Pathology.—Hydronephrosis or dropsy of the kidney is a chronic non-inflammatory disease characterized by the damming back of urine on the kidney, with compression of the latter, due to obstruction in the ureter. The causes are similar to those of pyonephrosis, only the process is non-inflammatory and without pus. Sometimes there is congenital occlusion of the ureter. Or this occlusion may be acquired by impaction of cal-

culi or other foreign body, inflammation causing the ureter to become strictured or impervious, malignant disease, and pressure from various tumors. The kidney may be but little swollen if the obstruction be only partial, but according to Roberts the sac may become distended to the capacity of thirty gallons (!). Usually one kidney is affected; but if the obstruction be in the urethra, or if from any cause both ureters are strictured or compressed, the affection will of course be bilateral. The contents of the sac are not purely urine, but urinous, and generally of a very low specific gravity. In it may be found blood, pus, oxalate of lime, epithelium, and the like. Sometimes the fluid is of a gelatinous consistency.

Symptoms.—These are preceded by those of the primary cause of the disease. Hydronephrosis may not be detected at all until the tumor is found in the lumbar region on physical examination. Usually it is not painful except by the pressure it causes. Sometimes the tumor disappears with a sudden and copious discharge of urine, showing that the obstruction, which may be valve-like, has been overcome for the time being, and then it goes on filling up again. Where the tumor becomes large, pressure on surrounding organs may not only cause pain, but also flatulency, obstruction to the bowels, vomiting, and the like.

Diagnosis.—If the sac be small and there are no marked symptoms, a diagnosis may be impossible. If, however, the sac becomes large enough to form a fluctuating tumor, it is easily told from ovarian disease by its having the colon in front of it, with usually tympanitic resonance on percussion. From pyonephrosis it is readily told by the graver constitutional symptoms in the latter disease, or by aspiration if necessary. In ascites, the fluid changes with position of the patient, which it does not do, of course, in hydronephrosis, as it is confined in a sac. In hydatids of the kidney, aspiration gives fluid containing hooklets.

Prognosis.—The disease is always a serious one. If only one kidney be affected, however, and the other becomes hyertrophied and does the work of both, the patient may drag on for years. Uræmia, rupture into the abdominal cavity, and surgical operations may result in death.

Treatment.—Unless the tumor can be emptied through the ureter by gentle manipulation or spontaneously, nothing remains but aspiration, which may be repeated as often as necessary.

Hydatid Disease of the Kidneys.

Hydatids or echinococcus cysts sometimes are found in the kidneys, but much more rarely than in the liver and lungs. The etiology is the same. Until a tumor is formed, there may be no

sign of the disease. The size of the cysts varies greatly. Besides the usual pressure symptoms due to a growing tumor, usually globular in shape, rupture of a cyst into the pelvis of the kidney sometimes takes place, with discharge of urine containing hooklets. Sometimes on percussion the characteristic hydatid fremitus may be felt, but this does not always happen. The prognosis should be guarded. Besides the danger of forming nuclei for stone in the bladder or pelvis of the kidney, the cyst may rupture internally and thus cause death. The course of the disease is always tedious, and spontaneous cure is rare. The treatment consists in aspiration; and if this does not succeed, the cyst should be extirpated.

Other parasites of the kidney are the Strongylus gigas, Distoma hæmatobium occurring in Egypt and Abyssina, the Pentastoma denticulatum, Spiroptera hominis, and Dactylus aculeatus. The Strongylus gigas is found chiefly in the renal pelvis of the wolf, marten, and dog, but also rarely in man. The others are of too infrequent occurrence to require further mention. The Filaria sanguinis hominis is found in the general circulation rather than the kidney, and will be described when speaking of chyluria.

Chyluria.

Etiology and Pathology.—Chyluria is a disease characterized by the presence of fat in the urine, causing the latter to have a milky appearance. Hence it is also sometimes called galacturia. It occurs in both sexes at all ages, and chiefly in warm climates. Females are perhaps more frequently affected than males. It is thought to be caused by there being in the blood a microscopic worm $\frac{1}{75}$ inch in length and discovered in 1870 by Lewis, of Calcutta, who named it the Filaria sanguinis hominis. It is usually through drinking water containing filariæ that they get into the blood, but just how these parasites produce the disease is not exactly known. It is supposed that they disturb the function of the liver and other digestive organs, causing piarrhæmia, of which the chyluria is only a symptom. In support of this view Hoppe-Seyler found the blood of chyluric patients to closely resemble human lymph. Another theory is that they cause local congestions and rupture of capillaries, thereby establishing a direct leakage of chyle into the urinary tracts, though no anatomical changes are found.

Symptoms.—Usually the first indication of the disease is the discharge of milk-like urine. Generally there is also more or less mental depression, with a feeling of uneasiness in the loins and about the bladder. The urine coagulates on cooling, and sometimes in the bladder. It is also coagulated by heat and

nitric acid, but ether dissolves it, thus giving to chylous urine a normal appearance. By this means it is readily distinguished from urine into which milk has been mixed for purposes of deception. Owing to obstruction from clots in the urethra, the discharge of urine may suddenly cease. Not infrequently the urine is more or less tinged with blood, so that under the microscope are found not only granules of fat, but blood-corpuscles also. Albumin and fibrin are both present. In some cases chylo-serous discharges take place from various parts, such as the inner corner of the eye, the axilla, groin, and scrotum. The discharge of milk-like urine is irregular. There is no periodicity in the recurrence of attacks, nor any similarity in their duration. The disease is sometimes associated with elephantiasis, leprosy, and the like.

Prognosis.—This disease rarely causes death. Its course, however, is usually chronic, lasting off and on for years in spite of remedies. Occasionally sudden death occurs, but then it is probably due to some intercurrent disease.

Treatment.—Prophylaxis requires that water in climates where the disease prevails should be boiled before drinking. Regarding medicines, the tincture of iron is the best remedy I have ever tried in my very limited experience. (℞ Tinct. ferri chloridi, gtt. x.-xx., in water ter die.) Gallic acid (℈i.-℈ij. ter die) has been recommended by Lewis. Decoction of mangrove bark is used in British Guiana. (℞ Rhizophoræ racemosæ cort., ℥i.; aquæ bul., Oi. Ft. decoct. Sig. ℥i. ter die.) The seeds of the Nigella sativa are used in the same way in India, but appear to be of little value. Iodide of potassium in large doses has been thought to be beneficial in some cases; also turpentine and the tincture of the perchloride of iron. In most cases, however, the disease recurs in spite of all treatment.

New Growths in the Kidneys.

Cancer is the most important new growth in the kidney. It may be primary or secondary, though the latter is of rare occurrence. In either case it is usually scirrhous or medullary. Any portion of the kidney may be affected at first, but in time the whole organ may become involved, as well as the pelvis, ureter, and adjacent tissues. Primary renal cancer is found chiefly in children before the fifth year, and the left kidney is, for some reason unknown, more frequently affected than the right. Sometimes both are diseased. Both sexes are about equally affected. Primary renal cancer may also occur in advanced life, but secondary cancer of the kidneys may occur at any time, from extension of cancer elsewhere, or after the operation of taking out cancer of the breast or other organs. As already remarked, after castra-

tion for cancer, the lungs generally become the seat of secondary disease. Dull, aching pain is usually the first symptom, but no diagnosis can be made until a tumor is developed in the lumbar region. The tumor increases in size, hæmaturia occurs, and the patient emaciates. Soon the characteristic cancerous cachexia is established. The tumor feels hard and nodulated, rarely smooth, and does not move up and down with respiration. The colon lies in front of it. Occurring on the right side, the liver may be pushed up and to the left. The prognosis is always unfavorable, of course, and the treatment is simply palliative. Besides a nutritious diet, opium has to be given in some form to relieve pain. This is best done hypodermically in the case of adults.

Rhabdomyoma is the name given to those rare forms of renal new growths, resulting from misplaced embroynic tissue, consisting of round or spindle cells and muscular fibre. If muscular fibres are found, the diagnosis is complete, since there are no muscular fibres in the kidneys. These growths are of no clinical importance, as they occur among infants who die young.

Renal tuberculosis may very rarely occur as a primary affection among children, but it is usually secondary to advanced phthisis or a general tuberculosis, and is commonly a bilateral disease. Women are more frequently affected than men. Owing to the tuberculous inflammation set up in the kidney and pelvis, there will be the symptoms of pyelitis already described. The urine contains albumin and sometimes pus and blood. Casts are sometimes, though rarely, found. The discovery of Koch's bacillus in the urine would be conclusive evidence of the disease, but it may be suspected in the case of a tuberculous patient. The prognosis is unfavorable, both from the nature of the disease and the complications likely to arise. The treatment should be directed toward alleviating special symptoms.

Floating Kidney.

Etiology.—Floating or movable kidney occurs more frequently in women than men, especially after repeated pregnancies. The right kidney is more frequently displaced than the left, on account of the respiratory movements of the liver. Inasmuch as the kidney is only held in place by the peritoneum and diaphragm, it is readily understood that the organ may be displaced by blows in the lumbar region, heavy lifting, and straining. For these reasons it sometimes occurs in men, and either kidney may be displaced. Sometimes it occurs even in children, and here there is probably congenital predisposition owing to laxity of the tissues and abnormal length of the renal vessels. Emaciation, laxity

of tissues (congenital or acquired), and tight-lacing are among the causes.

Symptoms.—These are often obscure, or there may be none at all. Should the ureter become twisted, however, acute hydronephrosis and even pyelitis may be developed, with the symptoms already indicated. Besides this, women with movable kidney are subject to all sorts of curious symptoms, such as headache, pain in the back, nausea, vomiting, numbness of this or that part, and the like, all of which may be grouped together under what are usually termed hysterical symptoms. Dieti terms these symptoms, aggravated by the menstrual period, incarceration symptoms; but they are probably much exaggerated and overrated, except in very rare cases.

Diagnosis.—The discovery of a movable abdominal tumor in a woman or other person with a very lax abdomen, with corresponding depression in the lumbar region, together with symptoms referable to the kidney, and the absence of anything else, would lead one to imagine that he was dealing with floating kidney. The tumor disappears should the examiner be fortunate enough to slip it back into place.

Prognosis.—This is generally favorable unless the ureter becomes twisted and complications arise, which is rare. The disease seldom causes death, and as life advances the trouble gradually disappears.

Treatment.—Attention to the general health and regulating the bowels is good treatment in any disease. But there is no particular treatment for floating kidney, unless the physician is ingenious enough to invent a special sort of pad that will keep the kidney where it belongs, which he will seldom be able to do. For the various nervous symptoms that may arise, Hewitt's mixture is much better than giving opium. (℞ Spts. ammoniæ aromat., spts. æther. comp., tr. lavandulæ comp., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. every two or three hours, as required.) In case of constipation, tincture of nux vomica (ʒ i.) may be added, and where there is much palpitation, tincture of digitalis (ʒ i.) may be mixed with it. Should the kidney become troublesome by pressure on other organs, giving rise to acute hydronephrosis, and the like, it may be extirpated.

Disease of the Supra-renal Capsules (Addison's Disease).

Etiology and Pathology.—In 1855 Addison, of England, first noticed the relation between a bronzed condition of the skin and disease of the supra-renal capsules, and since that time the disease in question has been called Addison's disease. In nearly all cases it is tuberculosis of the organs, and generally secondary to

tuberculosis of the lungs or lymphatics—scrofula, so called. In like manner cancer and even hydatids may give rise to the disease. It is more than likely that this affection of the supra-renal capsules is the cause of the bronzed skin, but the real connection of the two conditions is obscure. It is thought by some that the discoloration is due to disturbance of the solar plexus and semi-lunar ganglia of the sympathetic system of nerves, rather than to the disease of the capsules themselves, since bronzed skin may exist in tuberculosis without disease of the supra-renal capsules. In this disease these organs may become enlarged from tubercular deposit, or they may be found to have undergone cicatricial contraction. Insufficient food, overwork, and traumatism are stated among the causes. In one case in which I made post-mortem examination, the disease had been preceded by tuberculosis of the mesenteric glands. It occurs usually among men of middle life, rather than women. The spleen is sometimes enlarged, as in other cases of anæmia.

Symptoms.—With or without very marked pulmonary symptoms, a man about middle life begins to lose his appetite and become anæmic. The anæmia gradually increases in spite of giving iron, and there is, sometimes, enlargement of the spleen. Usually the anæmia consists only in deficiency of the red corpuscles of the blood, without any increase in the white, unless the spleen becomes markedly enlarged. Along with these there are general lassitude, want of energy, headache, and in some cases, nervous gastric disturbance, such as sour stomach, nausea, and even vomiting, which latter may become very distressing. The bowels are irregular—sometimes constipation, at others obstinate diarrhœa. Waxy (amyloid, lardaceous) kidney, spleen, and liver, are not uncommon, with or without albuminuria. There may be hectic fever depending on the general condition, and the pulse is nearly always more or less frequent. In some cases emaciation is noticeable, particularly about the face and extremities, but over the abdomen especially there is but little wasting of the subcutaneous adipose tissue. As the disease progresses, owing to increasing anæmia of the brain, there are fainting spells, vertigo, ringing of the ears, and even convulsions and delirium may occur.

The condition of the skin is characteristic. It is most marked as dark spots on the mucous membrane of the lips. It usually appears first, however, on the face and backs of the hands. Not infrequently the genitals, nipples, and axillæ become affected, and in some cases the whole skin may become discolored, so that, as Niemeyer says, the patient may look like a mulatto.

Diagnosis.—This is based exclusively upon the bronzed discoloration of the skin. Dark spots on the mucous membrane of the lips are regarded by Niemeyer as pathognomonic, taken with

the symptoms of the disease as already related. Any form of pityriasis, or bran exfoliation of the skin, is at once distinguished by the itching of the skin in pityriasis, and ability to scrape off the scurf with the nails or some instrument, in that disease. The general bluish discoloration from the continued use of nitrate of silver is easily distinguished.

Prognosis.—Though the disease may run a tedious course, the patient nevertheless succumbs finally. In other cases the symptoms are more acute, and a rapidly fatal termination results.

Treatment.—From what has been said, it is evident that there is no specific treatment for Addison's disease, unless it be the hypodermic injections of Koch's lymph. A milligram may be injected first, and the dose gradually increased if it is well borne. Further than this, there remains only the administration of remedies as symptoms arise. Moderate exercise out of doors, in a warm, dry climate, and nutritious diet, including even stimulants in moderation, would be of service, as in the general treatment of tuberculosis.

Cystitis.

Etiology and Pathology.—Cystitis is inflammation of the mucous membrane lining the bladder, and it may be acute, subacute, or chronic. In acute cases the mucous membrane may only be intensely reddened, with proliferation and desquamation of the epithelium. But in chronic cases the muscular coat becomes hypertrophied, the organ enlarged, and the inner wall is often sacculated with pouches containing stones, usually of the phosphatic type.

Cystitis may be caused by exposure to cold and wet, giving rise to a simple catarrhal cystitis. This is rare, but it does happen. Certain irritating diuretics, as turpentine, copaiba, cantharides, and the like, as well as some highly-seasoned and irritating foods, may also give rise to it.

The disease is not infrequently caused by extension of inflammation from neighboring organs, as pyelitis; and who has not seen cystitis due to extension of gonorrhœa into the bladder? It may also be caused by foreign bodies in the bladder, such as stone, fragments of broken catheters; and in one case, of a lady, reported by Dr. C. C. Lee before the Obstetrical Society of this city, some fifteen years ago, a hair-pin in the bladder. Parasites may also cause it. In like manner, the rough and unskilful introduction of instruments into the bladder may produce it, as well as the use of unclean catheters, and the like. Among women the disease may occur during the child-bed period, or be caused by the pressure of the fœtal head during delivery, or the unskilful application of forceps. It not infrequently also results from extension

of inflammation in various uterine diseases, as gynæcologists well know from experience. In another way cystitis of a very chronic and tedious form may develop from retention of urine due to stricture of the urethra, or pressure on the urethra from enlarged prostate or other tumor. In like manner, in diseases of a typhoid character, with paralysis of the bladder and retention of urine, as also in myelitis and injuries to the spinal cord, cystitis occurs, due to retained and ammoniacal urine. Finally, in acute infectious diseases, cystitis of a mild form may arise due to eliminating the poison along the urinary tract.

Symptoms.—In acute cystitis, there may be chilliness, usually followed by a feeling of soreness or tenderness over the bladder, with frequent desire to pass water, which may amount to vesical tenesmus. In this case, only a few drops may be passed at a time, with little or no relief. Often it becomes impossible for the

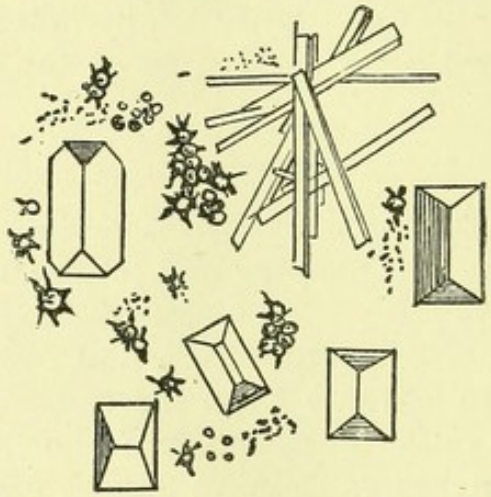


FIG. 27.—CHRONIC CYSTITIS. TRIPLE PHOSPHATES AND URATE OF AMMONIA.

patient to hold the water, but a discharge of a few drops or more may take place prematurely, so as to wet the clothes. Hence the saying, that some people urinate before their water comes. Usually there is little or no fever. Unintentional escape of flatus, as well as fecal matter, owing to the urgency of the case, sometimes forms very unpleasant and inconvenient accidents in this disease.

The urine is characteristic. Unless the kidneys are involved, the total amount passed is about normal. But it is loaded and clouded with bladder epithelium, mucus, and pus as the disease progresses, and consequently contains albumin. There are also, after the urine becomes alkaline, as in cases due to retention, an abundance of thorn-apple crystals of urate of ammonia, as well as the slab-shaped phosphates. Retention alone does not give rise to ammoniacal urine, but it is because bacteria have a better chance to cause decomposition in stagnant urine than when it is constantly changed and replaced by a fresh supply.

In this decomposition, as is well known, the urea becomes converted into carbonate of ammonia. In some of these chronic cases the symptoms of ammoniæmia, already described, become developed and the patient dies in a typhoid condition, as I once observed in a case at the Woman's Hospital in this city, where the retention was due to a cystic tumor growing from the anterior wall of the sacrum. According to Strümpell, the ropy threads in the urine of cystitis are not made of bladder mucus, but are composed of pus corpuscles and epithelium, dissolved in alkaline urine, and give the reactions for albumin. These clap-threads, according to the same author, are diagnostic of gonorrhœal cystitis.

Diagnosis.—It is distinguished from irritable bladder, the symptoms of which may very closely resemble those of cystitis; but in the former disease there are no epithelium, mucus, and pus in the urine. From pyelitis it is at once distinguished by the difference in the locality of pain, and the character of the epithelium. In pyelitis there is the renal pelvic (tailed) epithelium; in cystitis there is the spheroidal or glandular epithelium of the bladder. In pyelitis the urine is generally acid; in cystitis it is often alkaline.

Prognosis.—Ordinary acute cystitis from any cause usually terminates in recovery in a week or so. It depends, however, on the cause. Gonorrhœal cystitis, for instance, may continue so long as there remains the purulent urethritis—the primary cause. The prognosis of chronic cystitis also depends on the primary cause, as to whether it can be removed or not. It always runs a tedious course, with the danger of extension of inflammation to other organs, with secondary complications. Death may result in a short time from ammoniæmia or suppression of urine from operation for stone.

Treatment.—Prophylaxis requires caution in the use of irritant diuretics, as well as in the introduction of instruments into the bladder. In acute cystitis, rest in the recumbent position should be enjoined. The diet should be light and consist chiefly of milk, or some of its preparations. Mucilaginous drinks, such as flaxseed tea, are beneficial, and later on a decoction of pipsissewa (℥ i.–Oi., given in wineglassful doses ter die), is an excellent remedy. Further than unloading the bowels and liver on general principles with some very mild purgative, cathartics are obviously contra-indicated. During the more acute symptoms, it may become necessary to administer anodynes to stop the vesical tenesmus. Usually five or ten minims of Magendie's solution hypodermically give instant relief. Suppositories of a fourth of a grain of morphine, or enemata of twenty-five or thirty drops of laudanum, may be given where the patient is afraid of the hypodermic needle or objects to it, as sometimes happens. Hot

poultices over the bladder, or the warm bath, or both, may be used if necessary; but they are seldom required. If there be gonorrhœal discharge, no time should be lost in stopping it. If stricture exists, this may speedily be removed by gentle dilatation by means of graduated steel bougies, or, yet more rapidly, by means of Powell's urethral dilator. Internal urethrotomy is rarely if ever called for, and electrolysis is of no value. This done, a few deep applications of nitrate of silver, by means of Guyon's or Keyes' instrument, every other day, are usually sufficient to check the urethritis. Oil of sandal-wood, rather than copaiba, should be given at the same time. The strength of nitrate of silver should be ten grains to the ounce at first, and gradually increased to twenty, thirty, and even forty grains to the ounce.

In chronic cystitis, besides removing the cause, such as dilating the stricture, crushing the stone, or other surgical operation, the bladder should be repeatedly washed out with the double catheter at proper intervals, so as not to cause too much pain, after the urine has been withdrawn. Tepid water containing a little borax should be used. The decoction of uva ursi or bearberry, given in doses of a wineglassful ter die, is often exceedingly beneficial. The drinking of alkaline waters, such as those of Carlsbad and Vichy, are recommended by authors; but far to be preferred is the Virginia Rockbridge Alum-water. It is both diuretic and astringent. Alcohol, except diluted red wines, but especially brandy, whiskey, and beer, or mixtures of beer and brandy or whiskey, are out of the question. Oil of sandal-wood (one or two ten-drop capsules ter die after meals) is a capital remedy, and infinitely to be preferred to the so-called Lafayette mixture, for two very good reasons: (1) It does not irritate the kidneys like copaiba; (2) the Lafayette mixture is a very nauseous remedy.

Cancer of the Bladder.

Cancer of the bladder is rare as a primary disease. It is usually due to extension from some other organ, as the uterus or rectum. The symptoms are those of cystitis, which, taken together with the fact that the disease did exist in some adjacent organ, would warrant the belief that the bladder had also become involved. The presence of cancer-cells in the urine would be diagnostic.

The most frequent primary new growth in the bladder is the fibro-mucous papilloma or villous growth (villous cancer, so called), which is also sometimes a veritable glandular epithelioma. It is usually situated in the bas-fond of the bladder, or its lowest portion, near the entrance of the urethra. Owing to its vascularity, hæmaturia is frequent, with the passage sometimes of

elongated clots, corresponding to the shape of the urethra. The few cases I have observed occurred in elderly men. The tumor may be found on careful sounding. There is no particular treatment for these diseases, and the prognosis is generally hopeless.

Nocturnal Incontinence of Urine.

This is often observed in children who are otherwise perfectly healthy. But they become demoralized, partly from mortification at wetting the bed, and partly from scolding, if not flogging, by ignorant parents. It is due to weakness of the bladder, sphincter, or irritability of the bladder, and is purely a reflex disturbance, and consequently not under the control of the will. By-and-by it gets to be a regular habit, even after all appreciable causes have been removed. In some cases irritation from phimosis or paraphimosis, stone in the bladder, adhesions of the prepuce to the glans penis, worms, and the sugar in diabetic urine may cause it. Spinal disease may also give rise to it, but in a number of cases that I have seen there appeared to be no known cause. The parents concluded that it must be purely viciousness on the part of the child, until more fully instructed on the subject. If the cause be ascertained, it should be removed if possible; but it is intended to impress on the reader the utter uselessness, generally, of circumcising the child, and passing of sounds. It is easy enough to cut off a prepuce. All the world cannot put one back. Therefore, let it alone, further than breaking up adhesions, even if that be necessary. They will yield of themselves in time, and early enough at that.

The child should not be scolded. Not even should any notice be taken of the mortifying incident; nor any mention of it should be allowed by some of the elder ones. If there is any flogging, those who tease the child about it should suffer. Very little fluid should be drunk in the evening, and the child should be taught to urinate before getting into bed. The bed clothing should be light, only sufficient to prevent taking cold, and the child should be trained to sleep on the side and not on the back. For this reason in Germany, says Strümpell, they fasten a brush to the child's back. In addition to this, a mixture of belladonna, iron, and nux vomica will be found to be often a specific for this disease. (℞ Tr. belladonnæ, tr. ferri chloridi, tr. nucis vom.; āā ʒ i.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die and at bed-time.) The dose may be increased until there is dryness of the fauces and hoarseness of the voice. Regarding electricity, so much praised by Strümpell, I have had no occasion to use it, but do not see why it might not be tried, if the belladonna mixture and general management spoken of fail.

CHAPTER V.

DISEASES OF THE DIGESTIVE SYSTEM.

Diseases of the Mouth.

Stomatitis.

Stomatitis, or inflammation of the mouth, is of several varieties, as catarrhal, follicular, gangrenous, and ulcerative. Besides such inflammations, there is the disease known as thrush. Inflammation of the tongue, or glossitis, and cancer of the tongue, also require brief notice.

Catarrhal Stomatitis.

Catarrhal stomatitis is inflammation of the mucous membrane of the mouth. It may be confined to a single spot, or it may extend more or less over the whole buccal cavity. It is caused by dentition, decayed teeth, smoking and chewing tobacco, abuse of mercury, the taking of irritating or excessively hot articles of food or drink into the mouth, and sometimes by cold as well. Thus the eating of snow will sometimes produce stomatitis as well as pharyngitis and the like, as occurs among Arctic explorers. Extension of inflammation from surrounding parts also may cause it, so that we not infrequently find more or less catarrhal stomatitis associated with tonsillitis, pharyngitis, and even gastritis. We sometimes find oral catarrh in connection with infectious diseases like typhoid fever and scarlatina.

More or less soreness of the mouth and discomfort are associated with acute catarrhal stomatitis. The tongue is often furred and the taste bad. Thirst is frequently a persistent symptom. The mucus about the mouth becomes tough and tenacious, and the patient endeavors by hawking and spitting to get rid of it. Should the disease become chronic, the breath is apt to be foul, especially in the morning before the mouth has been cleaned.

Treatment.—In treating ordinary stomatitis the original cause must be sought for, and removed if found. So far as the inflammation itself is concerned, if it be acute and painful, a mouth wash of tepid water containing a little borax is the best—of the strength of about ʒ ij. to ℥ ss. in the pint. The habit of scraping the tongue to remove fur in this and other diseases is bad prac-

tice. Washing it occasionally, on rising, for instance, by means of a soft cloth with soap and water or glycerin, is much to be preferred, as the tongue is cleaned in this way without injury to the epithelial layer, which always results from scraping it with a knife or other instrument. In children the syringe may be gently used. The food meantime should be liquid and non-irritating. After the disease has become subacute, a mouth wash composed of tincture of myrrh and glycerin may be used. (℞ Tr. myrrhæ, glycerini, āā ℥ i.; aquæ, q.s. ad fl. ℥ viij. M. Sig. Rinse the mouth before and after meals and at bed-time). Rarely does it become necessary to apply nitrate of silver to the inflamed parts in chronic oral catarrh. Chewing of bits of rhubarb is an old household remedy, but is scarcely necessary if the above directions are followed out. If the bowels are constipated, however, a mild laxative is indicated from time to time.

Follicular Stomatitis.

Follicular stomatitis, also called aphthæ or croupous stomatitis, is simply a stomatitis or inflammation of the mouth in which follicular ulcers or aphthæ are formed.

It may occur separately or it may accompany any other form of stomatitis. It is often confounded with thrush, but is an entirely different affection. These follicular ulcerations are minute white spots, and are found chiefly on the dorsum and edges of the tongue and on the frænum. Larger spots are formed by the coalescence of several of these. This disease is found chiefly among children, especially during the first dentition, although adults have it also. Beyond a certain amount of fretting and irritation due to the discomfort produced, the symptoms are few and need no further description.

Bednar's aphthæ are observed in the new-born on both sides of the roof of the mouth near the alveolar processes. They are not syphilitic, but are caused probably by pressure of the tongue during the act of sucking. They disappear generally by the third month.

Treatment.—The disease usually disappears of itself, but, in emaciated and poorly fed children, treatment often becomes necessary. In any case its course is much shortened by proper treatment. The cause of stomatitis, if known, should be removed. Then a wash composed of glycerin, borax, and water is usually sufficient. Instead of glycerin, honey is extensively used among the laity, but glycerin is much better. Should some of the aphthæ be deep seated and not yield to the ordinary method, they may be very gently touched with a pencil of nitrate of silver, or, better still, sulphate of copper. Care should be taken that such articles

do not become detached and accidentally swallowed by the child, as has occurred sometimes.

The bowels should be regulated and diet liberal.

Gangrenous Stomatitis.

Grangrenous stomatitis, noma, water canker, or cancrum oris, is gangrene of the cheek and found chiefly among feeble and ill-fed children.

The disease may follow some other sickness or it may be spontaneous. In either case, however, it is rare. It has been observed also among adults, especially in the days of the reckless administration of mercury and frequent salivation.

It usually begins as a red spot on the mucous membrane near the corner of the mouth. The whole cheek soon becomes hard and swollen, as well as the adjacent lymphatics. The temperature rises to 103°–105° F. A greenish-red spot is noticed on the inside of the cheek, and soon the whole mass becomes gangrenous and sloughs away, with foul odor. Diarrhœa and even pneumonia may be caused by swallowing and inhaling gangrenous ichor, and stupor and delirium, with great prostration, may be observed. Recovery is rare in this disease. In one case that I have seen, the patient was an adult, and the whole cheek was lost, leaving a frightful deformity.

Treatment.—It is evident that supporting measures are indicated from the outset. Stimulants and nutritious diet may be combined in the shape of milk punch. The milk may be peptonized to insure digestion. The amount of alcohol should vary with the age of the patient, but a teaspoonful to a tablespoonful may be given at least every three hours in a tumbler of peptonized milk. Tepid water with borax as a disinfectant wash may be used, or else a five-per-cent carbolic-acid wash for the same purpose. Dusting the part with iodoform, or equal parts of iodoform and burnt alum, is good. This can be best done by means of an ordinary insect-powder blower—a very useful apparatus, by the way, for dusting parts that are difficult to reach, as the throat, nostrils, vagina, and the like. Surgical measures for removal of the gangrenous tissues should be resorted to early. For this purpose Paquelin's thermo-cautery is probably about the best. The incandescent electric wire or knife would also be convenient.

Ulcerative Stomatitis.

Ulcerative stomatitis or stomacace is that form of inflammation of the buccal mucous membrane characterized by the formation of ulcers and chiefly affecting the gums (ulcerative gingivitis).

It occurs among children, especially during the second dentition; but it also affects adults who are ill-fed and have bad hygienic surroundings. For this reason it is found among prisoners and sailors, whose food consists principally of salt meat, conditions similar to those that are favorable for the production of scurvy. This disease is thought to be of infectious origin, and occurs sometimes as an epidemic among those whose food and surroundings favor its production. Abuse of mercury also causes it.

The lower gums are usually attacked first, and the inflammation extends to the lips and cheeks. There is marked increase of the flow of saliva, and the breath grows very offensive. The gums become swollen and spongy, and bleed easily, and the incisors loosen and may even fall out. The upper lip also sometimes swells much and is painful. The lymphatic glands in the neighborhood usually become swollen.

Constitutional symptoms are not marked as a rule, but in some cases there is considerable fever, and from inability to take nourishment the patient loses strength and becomes very weak. In some cases the inflammation extends to the periosteum, and even necrosis of small portions of the lower jaw may result. In such cases the course of the disease is prolonged, but otherwise it generally terminates favorably in a week or two.

The treatment consists principally in keeping the mouth clean by means of a wash, as in other forms of stomatitis. Instead of chlorate of potash, as advised by most authors, I have generally used the wash composed of a solution of borax (ʒ ij.–Oi.). After the more acute symptoms have passed off, a little alcohol or tincture of myrrh and glycerin may be added, to stimulate the ulcers to heal. (℞ Tr. myrrh., glycerini, āā ℥ i.; pulv. sodii biborat., ʒ i.; aquæ, q.s. ad fl. ℥ viij. M. Sig. Rinse out the mouth every two hours.) A mouth wash composed of alum solution (ʒ i.–Oi.) is also efficacious in healing the ulcers. The bowels should be regulated by saline or other gentle laxatives if they are constipated, especially if the ulcerative gingivitis be the result of mercurial poisoning. The diet should be nutritious, and a liberal supply of food allowed. The patient should be changed into clean quarters with an abundance of fresh air when possible.

Thrush.

Thrush or sprue is a form of stomatitis due to the presence of the Oidium albicans or thrush fungus. It occurs principally among weak children, and especially those who have been brought up on the bottle, with lack of proper cleanliness. It also occurs among adults who suffer with chronic wasting diseases as phthisis and carcinoma.

Small white spots are observed on the mucous membrane of the tongue, soft palate, and cheeks. These may spread so as to extend into the pharynx and upper part of the œsophagus and entrance to the larynx. According to Strümpell, it never invades the nostrils, larynx, and stomach, however, or any place where there is cylindrical epithelium. According to others, on the contrary, it may not only invade the stomach, but also the air passages and lungs, and is sometimes found even about the breasts and genitals of infants. In such cases it has probably been confounded with some other disease. Whether the thrush fungus causes the stomatitis or is secondary to it is also a disputed question.

In many cases the presence of thrush is unaccompanied by symptoms that would attract attention. In others stomatitis is quite severe. There is an increased flow of saliva, which is markedly acid in reaction. Nursing or chewing and swallowing become painful. Diarrhœa and vomiting are also not infrequently present. The appearance of thrush in a moderately healthy child is of little significance. The disease usually ends in recovery in a week or two. Occurring among bottle-fed, sickly children, however, and especially if there be much gastro-intestinal disturb ance, it is generally a bad sign. The same is true for those suffering with cancer, tuberculosis, or other wasting disease.

The best remedy for the disease is a wash containing borax and glycerin. Among the laity, honey is used, but, as already remarked, glycerini is much to be preferred. (℞ Pulv. sodii biborat., ʒ ij.; glycerini, ℥ i.; aquæ q.s. ad fl. ℥ viij.) After each feeding the child's mouth should be thoroughly cleansed with such a wash by means of a soft brush or linen cloth or a syringe. Besides this, the diet should be nutritious and easily digestible. For this reason, milk should be peptonized if necessary. The bowels should also be regulated.

Glossitis.

Glossitis is inflammation of the tongue substance, and is a rare disease.

Formerly it was not infrequently due to abuse of mercury, but at present this form of glossitis is of rare occurrence. The sting of a bee, burns, and wounds also give rise to it, as do poisons. According to Loomis, chronic glossitis is sometimes due to the materials of which false teeth are made.

In acute glossitis the tongue rapidly swells and may protrude from the mouth. Dyspnœa even to suffocation may be produced. There is usually intense pain, with more or less fever. Talking becomes impossible, and eating is difficult. There is often great increase in the flow of saliva. The cervical lymphatic glands are more or less swollen.

The treatment consists in applying ice to the tongue. In case abscess forms, it should be opened, and in some cases scarification of the tongue becomes necessary, so as to prevent suffocation. Rarely will tracheotomy have to be performed for this reason. Immediate relief is felt on opening the abscess, should it form, and recovery is usually rapid. The early and free application of ice will often render any further interference unnecessary. In mercurial glossitis the usual washes are indicated, and the bowels should be kept open by saline laxatives. In chronic glossitis the tongue becomes fissured and indented, and ulcerations may also be present. If the cause can be found, it should be removed, such as carious or false teeth. But often there is no known cause. Some disinfectant mouth wash should be used, and ulcers, when present, touched with nitrate of silver or sulphate of copper.

Cancer of the Tongue.

Cancer of the tongue is generally of the variety known as epithelioma.

It occurs usually at middle life or past, and in men more frequently than women. There are, however, exceptions to this rule.

Excessive smoking is regarded by many as an exciting cause. Heredity plays an important part in cancer here as in other localities, but in some cases there appears to be no known cause.

Pain is one of the earliest symptoms. It is darting or shooting in character, and extends along the branches of the fifth nerve. Examination will probably reveal the presence of epithelial abrasion on the edge or tip of the tongue. It is indurated, and shows no disposition to heal in spite of treatment. Presently the adjacent lymphatic glands begin to enlarge, the ulcer spreads, hemorrhages from eroded vessels occur, the cachexia becomes established, and the patient dies exhausted. Sometimes hemorrhage is profuse from ulceration of the lingual artery, and hastens the end. The disease lasts about a year or eighteen months. Should the cancer be successfully removed, however, it might not recur in the same place, and in that case life might be prolonged several years or more.

The treatment is, removal by surgical operation. Besides this, anodynes may become necessary to relieve pain.

Diseases of the Tonsils and Pharynx.

Tonsillitis.

Tonsillitis or inflammation of one or both tonsils is of three principal varieties: catarrhal, follicular or parenchymatous, and phlegmonous tonsillitis or quinsy.

Etiology.—Exposure to cold and dampness with sudden changes of temperature is probably the most frequent cause. Or the inflammation may extend from neighboring parts. Injuries may also give rise to the affection. It likewise accompanies other diseases, as small-pox, measles, and scarlatina. Bad drainage is said to predispose to sore throat. There is no doubt that some persons are more liable to it than others, and it occasionally runs in familes. A person who has once had the disease is more liable to subsequent attacks, although the latter are apt to be less severe. The disease occurs chiefly among the young, and is rarely seen after middle life.

Symptoms.—The symptoms of tonsillitis are at first very much the same for all varieties. In a day or two, however, differences occur by which we are enabled to distinguish them.

The disease usually comes on suddenly, sometimes with a chill. There are headache, fever, and loss of appetite. The fever may run up 103°–105° F. At the same time the throat begins to feel sore. As the uvula becomes swollen and elongated, the patient constantly has the sensation of there being something to be swallowed. The acts of swallowing, and even talking, become difficult and painful. In some cases there is increased flow of saliva, so that the patient continually spits it out to prevent the painful act of swallowing. In other cases the mouth and throat, particularly the latter, become dry, and then swallowing is still more painful. In two or three days, or a week at most, the patient generally recovers.

In catarrhal tonsillitis we find, upon examination, that the mucous membrane over the tonsils, uvula, and in the pillars of the fauces is bright red and somewhat swollen. Not infrequently it is covered over in patches with a tough layer of mucopus resembling ulceration, but it can easily be removed. The tonsils themselves may be slightly enlarged, but generally the cervical lymphatic glands remain unaffected.

In follicular or parenchymatous tonsillitis, one or both tonsils will be enlarged and redder than normal. Usually both are affected, and this point is worth remembering, since diphtheria often attacks only one. On the surface of the tonsils will be found little white spots corresponding to the crypts. The white spots are usually distinct and separate, and are often seen to be projecting plugs. In some cases, however, they coalesce, and are yellowish-white so as to closely resemble the membrane of diphtheria. In such cases it is a practice among some to call the affection diphtherite, although there is no such disease. The cervical lymphatic glands in such cases are more or less enlarged.

Some of these cases of follicular or parenchymatous tonsillitis are very mild, others are more severe. But the symptoms,

however grave at first, begin to subside after a few days. The white spots disappear and the tonsils return to their normal size. In some cases, however, the spots remain even after the acute symptoms have subsided, the follicular inflammation becoming more or less chronic.

Phlegmonous tonsillitis, or quinsy as it is called by the laity, is the third variety of this disease. It is more painful than either of the preceding forms, and not infrequently ends in abscess. The disease is usually confined to one side, or, as sometimes happens, first one side and then the other becomes affected. The tonsil becomes much enlarged, so that the uvula is pushed to one side. The inflamed mucous membrane is very red and œdematous. Pointing and fluctuation are observed at some point, and soon the abscess bursts unless previously lanced. There is usually a good deal of fever with quinsy, and much discomfort in attempting to swallow, on account of the tumefaction. In mild cases the disease runs its course without the formation of abscess. A patient who has had quinsy once is much more liable to subsequent attacks, although they are usually less severe. Follicular tonsillitis may be associated with quinsy.

The disease almost invariably terminates favorably and is of short duration. Recovery is very rapid after the abscess discharges its contents.

Enlarged tonsils, due to chronic hypertrophy, sometimes result from repeated attacks of tonsillitis of any variety; but in many cases no cause can be found. The enlargement is sometimes due to inherited predisposition.

Moderate enlargement of the tonsils may give rise to no discomfort. In other cases they become so large as to interfere with swallowing and breathing. The patient, unable to breathe through the nostrils properly, sleeps with the mouth open. As a consequence, dryness of the mouth and throat, and chronic pharyngitis and laryngitis (sicca) result. In some marked cases among children it seems to interfere with the proper expansion of the chest, so that we find them stoop-shouldered and narrow-chested.

Diagnosis.—The diagnosis of one form of tonsillitis from another is generally easy to make after a day or two. Indeed, when they exist together, as is often the case, they are usually distinguishable by the appearances already described.

In some cases, however, tonsillitis, especially the follicular form, when the white spots are numerous or even coalesce, may be mistaken for diphtheria. In tonsillitis, however, the disease comes on suddenly, and the more severe symptoms are over in a few days at most. In diphtheria the disease often comes on gradually, the patient steadily growing worse instead of better. In diphtheria the membrane is a continuous one, and, although

usually confined to one side, almost invariably involves the uvula and fauces. In tonsillitis the spots are commonly separate, plugs are seen to project out of the crypts, both tonsils are usually affected, but the disease is limited to the tonsils themselves. The lymphatic glands are always swollen in diphtheria, but in tonsillitis they are not so much enlarged, and often are not affected at all. In some cases, however, the diagnosis is doubtful, and it may be impossible to make it positively. In these we must wait until sufficient time elapses for the further development of symptoms. Meantime the patient should be isolated and treated as if the case were one of diphtheria.

Prognosis.—The prognosis of tonsillitis is invariably favorable. The disease usually runs a rapid course and terminates in recovery in less than a week or ten days. More rarely it becomes chronic, but even then it is of little importance unless it gives rise to enlarged tonsils.

Treatment.—The treatment of tonsillitis is very simple. Should the tongue be furred and the bowels constipated, a small dose of calomel may be given at bed-time, to be followed with a gentle saline laxative next morning. (℞ Hydrarg. chlor. mit., gr. ij.; pulv. sodii bicarb., gr. v. M. ft. pulv.) Instead of a gargle or spray, a solution of tr. ferri chloridi and glycerin should be swallowed. (℞ Tr. ferri chloridi, ʒ iss.; glycerini, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Shake and take a teaspoonful every hour or two hours, according to the severity of the case.) It is very easy to get children to swallow this remedy, and it comes in contact with the inflamed tissues. I have abandoned the use of chlorate of potash in these cases for many years. Children do not know how to gargle, and the spray frightens them. The brush also causes them to gag and strain the parts in the effort to vomit, thus doing more harm than good. External applications like turpentine, mustard, fat pork, poultices, and the like are much in vogue among the laity, but are unnecessary and often painful. The lifting up of the palate by pulling up the top hair would not be mentioned, except that it also has many advocates among the laity. Gargles of slippery elm, borax, and warm water, red-pepper tea, sage tea, alum, and other substances are well known, but they too are generally unnecessary and disgusting. The ammoniated tincture of guaiac has been recommended as a specific in quinsy sore throat, but it is perfectly useless. When abscess forms in the latter disease it should be opened with a sharp-pointed bistoury. Immediate relief is thus obtained. Should ulcers remain and show little tendency to disappear, they may be touched with a pencil of sulphate of copper or nitrate of silver. The latter is generally the best. Care should be taken, however, that the caustic be securely held, else it may drop off and be swallowed by

the patient, and death result from diffuse gastritis. I know of one instance of this in this city. Suit for heavy damages followed. When the uvula becomes permanently enlarged from chronic hypertrophy, it may be snipped off with a pair of scissors if it is in the way. For enlarged tonsils, the only remedy is to cut them out.

Pharyngitis.

Pharyngitis is inflammation of the mucous membrane of the pharynx.

The disease may be acute and associated with inflammation of adjacent tissues, but more frequently it is a chronic affection. In this case it may result from repeated acute attacks due to exposure to cold or other cause, but more frequently it is chronic in form from the first, and due to some habit or other.

From the fact that clergymen are often affected with the disease, owing to their habit of speaking loudly, it is known as the clergyman's sore throat. It also occurs among lecturers and singers for the same reason. Excessive use of tobacco, either smoking or chewing, especially when the pernicious habit of not expectorating is acquired, gives rise to it, and hence it is also known as the smoker's sore throat. Working in dust, the breathing of impure air, and drinking alcohol or other irritants may also cause it. Sometimes it is due to passive congestion as observed in heart disease and general vesicular emphysema. As already stated, it may result from extension of nasal catarrh, giving rise to chronic naso-pharyngitis. In stoppage of the nares, so that the patient is forced to become a mouth-breather as it is called, the mucous membrane of the pharynx becomes dry and atrophied—pharyngitis sicca. This condition is found also among the aged and in connection with wasting diseases. In other cases the mucous membrane becomes thickened—hypertrophic pharyngitis. This is specially found in the naso-pharynx, the surface being studded with polypoid nodules. Syphilis has not been mentioned as a cause of sore throat of any form. The latter is, however, one of the early signs of constitutional syphilis, and later on the pharynx becomes the seat of mucous patches. Syphilitic sore throat is usually chronic in its course, and in every case where syphilis may be suspected careful inquiry into the history of the case should be made, and anti-syphilitic treatment adopted if necessary.

The symptoms of pharyngitis are those of sore throat, already mentioned. They vary according as the disease is acute or chronic. It is attended with a feeling of more or less soreness and dryness of the parts and discomfort or even pain in the act of swallowing or the effort of speaking loudly. A dry cough unattended with

any appreciable amount of expectoration is a common and sometimes troublesome symptom. This is partly caused by the elongated uvula. Owing to collections of tough mucus or drying of the part during the night, the coughing and gagging are generally most troublesome in the morning. The voice may become hoarse, and if the Eustachian tubes are affected by extension of the inflammation, or stopped by the swollen and thickened mucous membrane, there will be more or less impairment of hearing, attended sometimes with ringing in the ears.

On examination with the tongue depressor, the mucous membrane of the pharynx is seen to be reddened and often granular in appearance from the enlarged follicles. Sometimes ulcers are present. The back of the pharynx may have a whitish-gray appearance from patches of thickened epithelium, and the vessels appear dilated and tortuous. Headache, vertigo, and dizziness are often present, and the breath is generally offensive, especially when post-nasal catarrh is associated with it.

Treatment.—Success in the treatment of pharyngitis depends a good deal upon the cause and the ability to remove it. In mild cases the patient rarely ever consults a physician. But among those who depend upon their voice for a living, as among clergymen, singers, and the like, treatment becomes imperative.

Rest is of first importance in such cases. A vacation of a few months will often restore the parts to a perfectly normal condition. When due to smoking, chewing, or the abuse of spirits, and the like, the patient should be directed to stop or at least moderate such habits. Other diseases that may coexist and are concerned in causing the trouble should be treated.

Besides this, local treatment is also often necessary. The occasional application of a five-per-cent solution of nitrate of silver by means of a brush is one of the best methods in marked cases of long standing. In between times tincture of iodine and glycerin, equal parts, applied daily, will often prove beneficial. A spray of a solution of common salt every morning as used at Homburg is an excellent remedy also. This alone is often sufficient in mild cases. The nostrils should also be syringed with a tepid one-per-cent solution of common salt (chloride of sodium) when they are the seat of catarrh. Various powders may be insufflated for this complaint also, but solutions appear to give most satisfactory results. The galvano-cautery is useful for removing enlarged follicles. The general health should be attended to.

Retro-pharyngeal Abscess.

Retro-pharyngeal abscess is the result of suppurative inflammation of the connective tissue between the posterior wall of the pharynx and the cervical vertebræ.

The disease is found among children more frequently than among adults. As an acute primary affection, the etiology is often unknown. Sometimes it occurs in scarlet fever, typhoid fever, pyæmia, and the like. Chronic cases are secondary to caries of the cervical vertebræ. A tuberculous diathesis is thought to predispose to it, but it also occurs among those who have previously been healthy and robust. Restlessness and difficulty in swallowing are among the earlier symptoms. At the same time a peculiar stertorous breathing is noticed, especially during sleep. The lymphatic glands about the jaws become somewhat enlarged, and there is stiffness of the neck. The voice becomes nasal in character. Food, when the attempt is made to swallow, is often regurgitated through the nostrils, and sometimes is swallowed the wrong way, giving rise to violent fits of choking and coughing. During some of these attacks the abscess may burst, with a copious discharge of pus and great relief. Usually, however, the abscess increases in size, the mouth becomes filled with mucous secretion, and dyspnœa accompanied with a rattling noise is much increased. The head is thrown back in order to enable the patient to breathe and the position is characteristic. The face becomes more or less cyanotic, especially about the lips. In such a case examination reveals the presence of a swelling on the posterior wall of the pharynx. By means of the finger, distinct fluctuation is felt.

The treatment is to open the abscess immediately. As soon as this is done, the head should be brought forward, so that the pus may escape by the mouth as much as possible. Unless this is done, or if there be failure in diagnosis, the abscess extends so as to cause sudden death from œdema of the glottis, or it may rupture into the œsophagus, trachea, pleural cavity, or even pericardium.

The disease is rare. Recovery is usually rapid in primary cases when diagnosis has been made early and the abscess promptly opened. Accompanying acute infectious diseases, there is very little hope for the patient; when secondary to caries of vertebræ, the prognosis is unfavorable; neither will it do any good to open the abscess in such cases except to prevent apnœa in case it becomes large enough. The general health of the patient, it is needless to say, will require attention to hasten recovery and prevent a return of the abscess, even in favorable cases.

Diseases of the Œsophagus.

ŒSOPHAGITIS.

Œsophagitis is inflammation of the mucous membrane of the œsophagus.

It is a rare disease and of not much clinical importance. It

may be due to extension of inflammation from other organs, or to swallowing substances that are injurious mechanically or chemically. In some cases it accompanies infectious diseases such as small-pox, typhoid fever, pyæmia, and phthisis. Ulceration is an occasional result.

The symptoms are chiefly those of more or less difficulty in swallowing or pain attending it.

Dilatation of the Œsophagus.

Dilatation of the œsophagus is chiefly due to obstruction at the cardiac orifice. It is greatest at the lower end. In other cases diverticula or pouches are formed in the walls of the œsophagus. They are due to protrusion of the mucous membrane through some weak spot in the muscular coat of the tube. This is caused by lodgement of a foreign body or injury; but in some cases there appears to be no known cause. These diverticula are most frequently situated on the posterior wall of the œsophagus near the top. They are found most frequently in men and usually at an advanced age. Instead of pressure diverticula, they are sometimes due to traction from adhesions in the neighborhood of the bronchial glands.

Difficulty in swallowing and regurgitation of food are the chief symptoms of œsophageal dilatation and diverticula. Decomposition of retained food gives rise to foul breath. Nausea and vomiting are also present sometimes. The patient becomes more and more emaciated. Ulceration and rupture into the lungs, with pulmonary gangrene, sometimes occur. In others there may be rupture into the pleural cavity or pericardium, with speedy death. In some cases the tumor formed by the diverticulum may be felt. But by means of the sound chiefly, a diagnosis is made. The only treatment is by operation. But the patient may be nourished for a long time by means of the stomach tube, or through a gastric fistula. Enemata are also valuable for prolonging life, but only for a limited time.

Stenosis of the Œsophagus.

Stenosis of the œsophagus may be due to pressure from without, as from aortic aneurism, or to fibrous polypi within. Not infrequently it is caused by accidental swallowing of caustic alkali among children. This accident is not uncommon among negro children in the South. Syphilis and lodgement of foreign bodies, as well as cancer, also give rise to it. Dilatation above the point of stricture and diverticula, as already mentioned, are commonly found.

Difficult deglutition and regurgitation of food, with foul breath

and gradual emaciation, are the chief symptoms. Death results from exhaustion due to inanition or else rupture may occur into the pericardium and the like, as already observed. The treatment is purely mechanical. In some cases a cure may be effected, in many there is improvement, but generally the patient dies from inanition or some intercurrent disease. Œsophagotomy and gastrotomy for the relief of this condition belong to the domain of surgery.

Cancer of the Œsophagus.

Cancer is one of the most frequent diseases of the œsophagus.

The etiology is unknown, as it is with cancer elsewhere. It is usually of the epithelial variety. It affects men more frequently than women, and commonly between forty and sixty years of age. It is generally primary, but may be secondary to cancer of the stomach or other parts. It affects the lower and middle thirds of the œsophagus more frequently than the upper part.

The symptoms are chiefly those of difficulty in swallowing, and sometimes food is regurgitated. Cancer of the stomach, with epigastric tumor, is sometimes present. Gradual emaciation from inanition and the cancerous cachexia, with appearance of cancer elsewhere, especially the liver and lungs, are noticeable. Sometimes the voice is changed from pressure on the recurrent largyngeal nerve. In others perforation occurs with resultant pulmonary gangrene due to particles of food entering the lungs. Or rupture into the pleuræ or pericardicum may follow, with speedy death. In doubtful cases the discovery of cancer cells in vomited matter would be decisive. Hemorrhages are not infrequent. There is no curative treatment. Surgical interference so far has been unsuccessful. The treatment, therefore, is merely symptomatic. Pain may be relieved by anodynes, and life supported by nourishment administered by means of the stomach tube, gastric fistula, and enemata.

Diseases of the Stomach.

Gastric Catarrh.

Etiology and Pathology.—Gastric catarrh is inflammation of the mucous membrane of the stomach. It may be acute, subacute, or chronic.

Acute gastric catarrh or acute gastritis is usually due to some injury, mechanical or chemical. Irritating food, or food that is too hot, may give rise to it. Abuse of alcohol and other poisonous substances may cause acute gastritis. The weakly and anæmic are more liable to it than others. The swallowing of such corrosive poisons as oxalic acid, corrosive sublimate, and the like are well-known causes.

Subacute gastric catarrh or subacute gastritis may result from an acute attack, or it may be secondary to some other disease, as phthisis, acute infectious diseases, or it may accompany gout or rheumatism.

Chronic gastric catarrh may result from the acute or subacute form of gastritis; but in most cases it is chronic in form from the first. The walls of the stomach become thickened, especially about the pylorus, and the gastric tubules become hypertrophied and distended. Their epithelium has, in many cases, undergone granular degeneration. Chronic gastric catarrh appears to be inherited in some cases. In others it is produced by irregular meals and imprudence in eating. Abuse of alcohol also causes it. In such cases the disease may be said to be primary. It is found more frequently among the anæmic and at middle life or past. The disease may also be secondary to cardiac valvular lesions, especially mitral disease with obstruction to the circulation and resulting chronic passive congestion of the liver and the gastro-intestinal vessels. General vesicular emphysema with obstruction to the pulmonary circulation and enlargement of the right ventricle of the heart will give rise to it in a similar way. The same is true for cirrhosis of the liver with obstruction of the portal circulation.

Symptoms.—In acute gastritis the symptoms are well marked. After swallowing some corrosive poison, the patient is at once seized with an intense burning pain in the epigastrium that shoots through to the back. Vomiting soon begins, and becomes a most distressing symptom. Thirst is intense. The pulse quickly runs up to 120 or 150, and becomes feeble, thready, and irregular. The temperature soon reaches 104° F. or even more. Hiccough and a general collapse follow. The surface becomes cold and clammy, the face pale and anxious, the respiration often hurried, and finally the patient dies of exhaustion. In other cases where vomiting occurs early and the injury to the stomach is not so great, recovery takes place.

In subacute gastritis the symptoms are not so severe. Loss of appetite, nausea, and vomiting of mucus and undigested food are the chief symptoms. The tongue is generally thickly coated and dry, and there is usually much thirst. The breath is unpleasant and the patient complains of a bad taste in the mouth. The epigastrium is distended with gas and tender on pressure. There is usually a moderate amount of fever, and the general health becomes impaired. The bowels are generally constipated.

Chronic gastric catarrh chiefly engages our attention, as it is a much more common disease than either of the two preceding. The symptoms are chiefly referable to indigestion, giving rise to

what is known as irritable dyspepsia. In the first place, there is deficiency of gastric juice, and a superabundance of alkaline mucus. For these reasons food undergoes decomposition and fermentation instead of digestion. The amylacea or starchy foods are transformed into lactic and butyric acids, giving rise to sour eructations and heartburn or cardialgia. Owing to this fermentation and formation of gases, the patient, soon after eating, begins to experience a sense of weight and oppression in the epigastric region. The stomach becomes distended so that peristalsis is crippled, and this also interferes with digestion. Irritation from the presence of fermenting and undigested food still further increases the catarrhal state. The muscular coat not only is weakened by the inflammation, but, from the distention due to the formation of gas, stomachic peristalsis, so important for digestion, diminishes. For this reason opium-eaters are sometimes troubled with gastric catarrh. The coats of the stomach become paralyzed, and from want of peristalsis the food remains too long in the stomach, so that it undergoes fermentation and grows highly irritative.

Absorption is impeded also in this condition, which further prolongs the stay of substances in the stomach. To recapitulate, then, the following are the factors in chronic gastric catarrh that give rise to indigestion: 1. Deficiency in quantity and quality of gastric juice, this deficiency of quality referring to diminished amount of the acid element of the gastric juice, rather than any other. 2. Abnormal increase of mucus, which is alkaline in reaction. This interferes with digestion not only by counteracting the acid of the gastric juice, but also by enveloping food so that the gastric juice does not penetrate to it. 3. Impairment or loss of peristalsis of the stomach due to weakening of the muscular coat as well as from the distention due to the formation of gases. 4. Obstruction to the absorption of stomach contents. As results of such a condition of things, there would naturally be a loss of appetite, bad taste in the mouth, furred tongue, a sense of fulness at the epigastrium after meals, sour stomach, and heartburn. In some cases nausea and vomiting occur. The vomited matter may contain a little blood, the cells of the yeast fungus, and also the Sarcina ventriculi. The morning vomiting of drunkards, or water-brash, are well known. It is alkaline in reaction, and consists of mucus that has collected in the stomach over night, together with saliva that has been swallowed.

Irregular action of the heart with even intermission of the pulse is not an uncommon symptom in this disease. Dyspnœa is also frequent. These are probably due to reflex action along the pneumogastric and phrenic nerves.

On percussion, we often find the large end of the stomach di-

lated; and in a case that I examined, with Dr. E. G. Janeway in consultation, a distinct splashing sound could be obtained on shaking the patient.

The urine is alkaline or feebly acid, and is accompanied with an abundant deposit of phosphates.

If the disease continue, the patient's nutrition suffers, and emaciation follows. Vertigo is not an infrequent symptom, as is elsewhere described—vertigo *a stomacho læso.* The patient becomes languid, and there is depression of the vital powers in general. In its later stages it is with difficulty distinguished from atonic or nervous dyspepsia; indeed it may give rise to it. As intestinal catarrh is also generally present, so does the patient suffer from constipation or irregular bowels.

Diagnosis.—The diagnosis of acute and subacute gastritis requires no notice, as there are no other diseases for which they can be easily mistaken. But chronic gastric catarrh may be confounded with cancer or ulcer of the stomach, to which the reader is referred.

Prognosis.—The prognosis of acute and subacute gastritis depends upon the cause. Death may occur from shock in a few hours, or several weeks afterward from some complication, as peritonitis.

The duration of chronic gastric catarrh is variable. When secondary to such diseases as cirrhosis of the liver, general vesicular emphysema, or mitral lesion, it is incurable. As a primary disease it is easily cured in many cases, especially if the patient is willing to co-operate with the physician as regards the regulation of diet and abstinence from alcoholic and other injurious beverages. In some cases, however, the disease is very obstinate and leads to ulcer of the stomach, pyloric thickening, and general malnutrition, so that the patient readily succumbs to some intercurrent disease.

Treatment.—In acute gastritis the proper antidote should be administered at once if poison has been swallowed and it is possible to ascertain what kind of poison it is. In case of acids having been swallowed, some alkali, as the bicarbonate of soda, or lime water should be given at once. When corrosive sublimate has been swallowed, then white of egg should be freely administered, and so on. There is rarely any necessity for giving an emetic, since the patient vomits sufficiently without any. But the stomach may be washed out with a tube, and the poison diluted as much as possible if it be thought necessary. Bits of ice should be swallowed for the intense thirst as well as to allay inflammation, and hypodermic injections of morphine may be given to relieve the pain. A blister over the epigastrium may be added, to assist in allaying hiccough and vomiting. The patient should be kept at perfect rest in bed.

The treatment of irritative dyspepsia or chronic gastric catarrh much more frequently taxes the skill and patience of the physician than any other form of gastritis.

The first thing to do is to remove the cause if possible. This, of course, cannot be done where the condition is secondary to some incurable lesion, as cardiac, pulmonary, or hepatic disease, but when primary the cause can frequently be removed. When alcohol, opium, starchy food, or fats give rise to the disease, such articles should be totally dispensed with or else their use modified to such a degree as to render them innocuous. Along with this dietary supervision the patient should take certain remedies. The mixture of soda and rhubarb with nux vomica is excellent. (℞ Tinct. nucis vom., ʒ i.; pulv. sodii bicarb., pulv. rhei, āā ℈ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals.) If the patient has been addicted to acoholic beverages, a drachm of tinct. capsici may be added. When palpitation or irregular cardiac action is noticeable, a drachm of digitalis added to this mixture of rhubarb and soda is indicated. One of the best remedies is a mixture of diastase and glycerite of pepsin with nux vomica. (℞ Tr. nucis vom., ʒ ij.; pepsin. glycerit., Forbes' diastase, āā ℥ ij. M. Sig. Dessertspoonful ter die immediately after meals.) Fairchild's two-grain tablets of pepsin and diastase ter die after meals are also excellent. Washing out the stomach by means of the stomach tube was once much in vogue, but at present it is reserved for only such cases as those in which dilatation is marked. Tepid water with a little borax (ʒ ij.–Oi.) makes the best stomach wash. Instead of irrigating the stomach with a tube this is more agreeably and readily done by having the patient sip some warm water and borax or common salt at least an hour before meals. The stomach is cleansed by this means and prepared for the reception of food.

Finally, a course at Carlsbad or some other spa may be of great service to the patient if a scientific physician be employed at such a place for the treatment. For it should be remembered that drinking the waters alone will not cure the dyspepsia. Different cases require different kinds of mineral waters. All patients suffering with dyspepsia, therefore, should not be sent to Carlsbad, especially if they be anæmic; otherwise injury instead of benefit will result. Such cases would do better at Franzensbad or Spa near Brussels. Among the robust, however, a glass or even a pint of Hathorn water drunk at bed-time is often of the greatest benefit. Without due regard to both the quantity and quality of food and drink, and hygienic rules in general, it is useless to expect the patient to be cured by any particular remedy. There is no antidote to dyspepsia. Some of the various bitter tonics may be prescribed in moderation, to give the patient an

appetite. The tinct. gentian. comp. is one of the best. But great care should be taken lest the patient get into the habit of tippling from these small beginnings. Better to be a dyspeptic and sober than to become addicted to intemperance with a rum stomach. The patient should be warned also against the repeated use of narcotics for allaying pain. How easy it is to form the opium habit, and how difficult is it to break!

In a word, then, ordinary cases of gastric catarrh yield readily to ordinary measures. Some cases appear to be rebellious to all treatment; that is, they improve, but the disease recurs. In such cases it is well for the patient and physician not to make the fatal blunder of causing some habit to be formed which is worse than the original disease and more difficult to cure. Finally, in addition to local treatment, careful search should be made to ascertain if the patient suffers with some constitutional taint, as tuberculosis, syphilis, gout, and the like.

Phlegmonous Gastritis.

Phlegmonous gastritis or purulent inflammation of the submucous layer of connective tissue of the stomach is a very rare disease. The etiology appears to be unknown. It occurs in adults usually between twenty and forty years of age. The only case I ever saw was that of a young man aged twenty-two, who died from the results of hard drinking, it was thought. Post-mortem examination revealed the whole submucous layer a mass of pus. In other cases it is limited to one or more spots, forming gastric abscess. The disease sometimes occurs in the course of pyæmia. There is no way of making a positive diagnosis.

The symptoms are grave. There are epigastric pain, vomiting, high fever, delirium, and signs of general collapse soon follow. The disease is usually rapidy fatal, and the treatment is purely symptomatic. Narcotics are given to relieve pain, and ice to allay thirst and control vomiting.

Cancer of the Stomach.

Cancer of the stomach affects both sexes equally, and occurs most frequently between the ages of forty and sixty.

One-third of all primary cancers have their seat in the stomach, the liver being the only organ in the body that is more often attacked.

The pyloric orifice and lesser curvature are most frequently the parts affected, more rarely the cardiac orifice and greater curvature.

The cancer is generally of the scirrhous form. Sometimes, however, it may be medullary or epithelial. In any case the dis-

ease usually begins in the mucous membrane and extends into the other coats. The cancer may be diffused or else form a circumscribed tumor. The latter is most frequently the case.

The cause of cancer of the stomach is not known any more than the cause of cancer elsewhere. Heredity is the only admitted factor, and the family of the great Napoleon is always cited as an example of this. The father of Napoleon I. died of the disease, as well as his sister and himself. Inasmuch as cancer of the stomach has been found in the floor of old ulcer, it has been thought that ulcer of the stomach at least predisposes to the disease.

Symptoms.—As the disease is gradual and insidious in its approach, so do the symptoms at first appear to be those simply of dyspepsia. There is a feeling of distention and uneasiness in the epigastric region. Soon, however, pain of a dull aching character is experienced, especially an hour or two after eating. As the disease progresses, loss of appetite becomes more and more marked. This and indigestion soon lead to emaciation. Not infrequently the patient now becomes much nauseated and even vomits. If the pyloric orifice is the seat of the disease, the vomiting attended with pain occurs usually after a decided interval has elapsed since swallowing food, generally about an hour or two, thus differing from ulcer of the stomach, in which severe pain and vomiting may occur immediately after eating. Not infrequently the vomited matters contain an admixture of incompletely digested blood resembling coffee-grounds. This kind of vomited matter is characteristic of cancer of the stomach. Rarely is there hæmatemesis to an alarming extent, as often occurs in ulcer of the stomach. In the case of cancer there is rather a capillary oozing of blood from the affected portion than copious bleeding from a large vessel. In some cases cancer cells may be discovered in the vomited matter. Should the cancer affect the cardiac orifice or large end of the stomach, the pain, nausea, and vomiting occur sooner after eating than when it is situated at the pyloric orifice, so that the diagnosis from ulcer in the former case becomes more difficult.

The bowels are usually constipated and the urine scant. There is generally no fever unless extension of inflammation to surrounding parts gives rise to it. In fact the temperature is not infrequently subnormal.

As the disease progresses, emaciation becomes more marked and symptoms in general are more grave. Œdema of the extremities, especially about the ankles, is commonly noticed. It is due to the anæmia present, and weakness of the walls of the capillary blood-vessels from general malnutrition. Abdominal dropsy to a slight extent is also frequently noticed. It becomes marked if the

cancer extends so as to involve the liver, as it frequently does, and obstruct the portal circulation. Hemorrhoids or piles are also troublesome in some cases when the liver becomes involved.

Along with general emaciation and debility the cancerous cachexia becomes noticeable. The complexion acquires a peculiar sallow tint, and in some cases when the bile ducts become involved obstructive jaundice is observed.

The disease lasts anywhere from several months to one or two years at most.

Upon physical examination of the stomach, an epigastric tumor is frequently observed on palpation. It is deeply situated and is felt to be attached and adherent. In this respect it differs entirely from subcutaneous cysts or other tumors that are felt to slide about under the fingers. In other cases, however, no tumor whatever will be felt, since the cancer may be diffused instead of circumscribed and nodulated.

When there is cancer of the cardiac orifice or lesser curvature, the tumor will not be felt, even if present; so that it is quite evident that a patient may have cancer of the stomach and die with it and yet no tumor whatever be felt.

When the tumor is present at the pylorus, it will be felt on the median line and to the left, because only one-sixth of the stomach is to the right of that line. Should the tumor become large and depressed, it may be felt near the umbilicus. Generally there is tenderness on pressure over the seat of the disease.

In some cases, owing to obstruction at the pylorus, the stomach dilates more or less accordingly. Owing to this dilatation the muscular coat becomes thin and weakened, and vomiting, which before had occurred regularly after eating, may gradually diminish and finally cease altogether.

Diagnosis.—The diagnosis of one form of cancer from another may be impossible. But the diagnosis of cancer itself is generally easy to make when all the symptoms and signs described are well marked. But in case no blood is vomited and no tumor is felt, it may become difficult to differentiate this disease from chronic gastric catarrh, especially in the early stages. In cancer, however, the age of the patient should be considered. There is also more tenderness on pressure over the epigastrium than in catarrh, vomiting is more frequent, the symptoms are more grave in general, and the progress of the disease is much more rapid. The vomiting of substances resembling coffee grounds is apt to occur in cancer and be absent in catarrh. The cancerous cachexia, which soon becomes developed, and the appearance of cancer in other and adjacent organs will establish the diagnosis. In some cases, however, much doubt may exist as to the real nature of the disease until sufficient time has elapsed to render a positive diagnosis justifiable.

From ulcer of the stomach cancer may be distinguished by attention to the following points: (1) Ulcer of the stomach may attack the young, cancer is nearly always found among those past forty years of age; (2) the progress of cancer is more rapid than ulcer, so that if the disease has lasted longer than a year without well-marked signs of cancer it is probably not that disease; (3) the general condition of the patient should be taken into account—in case of ulcer, the patient is not infrequently in apparently fair condition, but in cancer emaciation and cachexia soon become pronounced; (4) severe pain or cardialgia immediately after eating rather favors the presence of ulcer than cancer; (5) in ulcer of the stomach, hemorrhage is often copious, and the blood vomited as clots or it may come up in a bright red liquid form without having undergone noticeable change—in cancer of the stomach the blood vomited resembles coffee grounds, from having undergone partial digestion, and is rarely if ever copious; (6) finally, the presence of a tumor would be against ulcer.

Prognosis.—Cancer of the stomach is uniformly a fatal disease. It lasts generally from a few months to one or two years. Death may be due to exhaustion or some intercurrent disease. Perforation into the peritoneal cavity sometimes happens, with speedy death. In other cases perforation into the transverse colon or small intestine occurs.

Treatment.—Whatever surgical operation may do in the future for the cure of this disease remains to be seen. Thus far relief has been afforded in a few cases only. So far as medical treatment is concerned, it is merely palliative. Hypodermic injections of morphine are absolutely necessary to relieve pain and control vomiting. It becomes more and more difficult to nourish the patient by the stomach, so that rectal alimentation has to be resorted to. By this means life may be prolonged only for a brief period. Milk punch, made of peptonized milk and a small quantity of whiskey or brandy, is better retained by the stomach than anything I have tried. But the time comes when even a very small portion of such a liquid will not be retained by the stomach. In some of these cases I have known the patient to be kept alive nearly a week by apparently nothing more than hypodermics of morphine.

Peptonized milk punch given ice cold, or bits of ice by the mouth, appear to control vomiting as well as bismuth or any other drug.

Ulcer of the Stomach.—Duodenal Ulcer.

Ulcer of the stomach is generally situated near the pyloric orifice and on the posterior wall, and is the result of circumscribed self-digestion.

But for the alkalinity of the blood, gastric ulcer would be of frequent occurrence. It is this alkalinity that neutralizes the acid of the gastric juice and prevents the formation of ulcer from self-digestion at some spot.

It is therefore easy to understand why ulcer of the stomach occurs chiefly among the anæmic and the debilitated rather than the robust. Besides a general condition of anæmia, any injury that would lead to localized anæmia in the walls of the stomach for any length of time would predispose to this disease. Hence, we find it often in girls who are not only anæmic but who habitually bend over the sewing-machine for many hours every day and, by the pressure from that position, render the walls of the stomach still more anæmic at some point.

The disease occurs much more frequently in women and during the menstrual period, than in men, owing perhaps to the fact that the former are more liable to anæmia from disorders of menstruation.

Gastric catarrh causing disease of the blood-vessels and their obstruction also favors the occurrence of ulcer. Injuries from any cause may also be the commencement of the disease.

Gastric ulcers nearly always exists singly, though several may be found at the same time. They are circular in shape, their borders are sharp, and they vary in size. In some cases they are superficial; in others they extend not only to the muscular coat, but they may also perforate into some adjacent cavity or cause the stomach to adhere to some neighboring organ.

Symptoms.—In many cases there are no symptoms whatever indicative of ulcer of the stomach. The patient may die of some other disease, and on post-mortem examination either fresh ulcer of the stomach is found or else an old cicatrix showing that ulcer at some previous time existed. In other cases there are symptoms of dyspepsia, such as nausea and even vomiting, belching of wind, sour fluid, and the like, just what we might expect in an ordinary case of gastric catarrh.

In well-marked cases of gastric ulcer, two symptoms are characteristic, namely, epigastric pain after eating and hæmatemesis.

The pain usually comes on shortly after eating, sooner than in cancer of the stomach. In other cases it comes on independently of eating and is neuralgic in character. The pain is generally referred to the epigastric region, but it may extend down to the umbilicus or shoot through to the back or radiate about in various directions from the epigastrium. Tenderness on pressure over some particular spot may be felt, but not always.

Vomiting simply is not pathognomonic of ulcer. It occurs in cancer of the stomach, gastric catarrh, and other diseases. But

if much blood is among the materials vomited, it is highly significant of ulcer of the stomach. This vomiting of blood, or hæmatemesis, may be the first sign that causes the patient to seek medical advice. Up to that time there may have been nothing worthy of notice beyond a few symptoms of dyspepsia, as already stated. All at once the patient feels faint and nauseated. Vomiting follows, and to the great astonishment and alarm of the patient and those near, a pint or even a quart of blood is discharged. The blood may be fluid and bright red as though an aneurism of the aorta had suddenly burst, or it may be in large dark clots, or else part fluid and part clots. Melæna, or dark bloody stools, may result from escape of blood into the intestinal tract.

The amount of blood lost may be so great as to cause death at once. In other cases the amount may be so small as to be hardly noticed. In yet other cases it either recurs from time to time or else is sufficiently abundant at once to prostrate the patient. Pallor, marked anæmia, and debility result, so that the patient may be even confined to bed for the time being. There are vertigo, ringing in the ears, a small and frequent pulse, and sometimes a slight rise of temperature—in fact all the signs of marked anæmia from sudden loss of blood.

The patient gradually recovers from this condition unless hemorrhage is repeated. The usual health is rapidly regained, and, beyond some dyspeptic symptoms, little or no inconvenience is felt.

In other cases perforation may follow. This may take place into the peritoneal cavity, for instance, with a rapidly fatal peritonitis. Perforation into the lung, followed by pulmonary gangrene, may also occur, as well as empyema from rupture into the pleural cavity. This is especially likely to happen to the left pleural cavity, and, in cases of suddenly formed and apparently spontaneous left-sided empyema, gastric ulcer should always be suspected.

Ulcer of the duodenum, especially in its upper and horizontal portion, occurs sometimes. The etiology is the same as that of gastric ulcer. Extensive burns of the external surface are liable to be followed by duodenal ulcer. Embolism of a duodenal vessel by decomposed blood is probably the real cause. It occurs much more frequently in men than women. The symptoms are chiefly those of gastric ulcer, but the pain is in the right hypochondrium, and vomiting is not so common as in gastric ulcer. The general health may remain unimpaired for a long time.

Diagnosis.—The diagnosis between gastric ulcer and cancer of the stomach has already been mentioned when speaking of the latter disease.

The diagnosis between hæmatemesis and hæmoptysis may present some difficulties. In hæmatemesis, however, the symptoms accompanying or preceding the discharge of blood are referable to the epigastric region and not to the chest. There are epigastric tenderness or pain and nausea or vomiting, instead of cough and expectoration. In hæmoptysis the blood is usually bright red and frothy, alkaline in reaction, and mingled with sputa and bubbles of air. In hæmatemesis the blood is mixed with food and is usually dark, more or less clotted, and acid in reaction. In hæmoptysis there are signs of pulmonary disease with abundant moist râles, as ascertained on physical examination, and a warm trickling sensation behind the sternum, which are wanting in hæmatemesis. Expectoration of bloody sputa for several days usually follows hæmoptysis, but melæna follows hæmatemesis.

In ulcer of the stomach without the characteristics of pain and hæmatemesis the diagnosis will not be possible. In case of absence of hæmatemesis, the pain may be mistaken for neuralgia, but in the latter case there will be the history of neuralgias elsewhere or the patient is markedly hysterical. Moreover, pain will not be excited by eating or pressure in gastric neuralgia, but often relief will be experienced.

Prognosis.—The prognosis of ulcer of the stomach is always uncertain. Death from excessive hemorrhage or perforation are possibilities to be looked for. Adhesions that may form also lead to unpleasant complications. Moreover, cancer may develop on the cicatrix of an old ulcer. In about half the number of all cases, however, recovery is complete. A good deal depends on the surroundings of the patient and the means at hand to undergo scientific treatment.

Treatment.—The treatment of ulcer of the stomach must be followed out as in case of the same disease elsewhere. The walls of the stomach should be kept at perfect rest, and for that reason the regulation of the diet is of the first importance. In the first place all rough food is to be prohibited. A patient may be doing well when a villanous piece of toast or a crust of bread may start the whole process over again. The fact is, no food at all should be taken into the stomach for several weeks or a month if the patient is in sufficiently good health to be nourished by the rectum. If not, then liquid food, such as peptonized milk, or milk and lime water, may be given by the mouth two or three times daily to keep up the patient's strength. But if possible let the stomach rest and give enemata. Four ounces of beef tea with a teaspoonful or two of brandy every six hours may be administered by the rectum. To insure perfect rest, small doses of morphine are indicated. This will allay pain and prevent peristalsis of the stom-

ach. Nitrate of silver and belladonna may be added. (℞ Argenti nitrat., extr. belladonnæ, āā gr. i.; morphinæ sulph., gr. ss.; extr. hyoscyami, gr. i. M. ft. pil. No. vi. Sig. One every three hours.)

A lady was admitted to the Woman's Hospital, this city, in 1869, suffering with vomiting dependent, as her physician supposed, on some uterine trouble. Drs. Thomas Addis Emmet and J. G. Perry both examined her and found no uterine trouble. My diagnosis was ulcer of the stomach. She was treated as above stated, by the pills and rectal enemata. In a month she was completely cured and has suffered with no vomiting since. For a year before that time she had been subject to cardialgia and vomiting, at times also to hæmatemesis.

There is no use to recommend this or that particular mineral water or spring for the cure of gastric ulcer. The whole indications are to support strength by rectal alimentation, and to keep the stomach absolutely quiet by rest in bed if necessary, and with minute doses of morphine to allay pain, and control vomiting as well as peristalsis. This treatment may have to be modified to a certain extent for individual cases, but the physician in attendance will be the proper judge as to how far to disturb the stomach at the risk of not healing the ulcer, or of keeping up rectal alimentation at the risk of starving his patient. No hard and fast rules can be laid down for all cases alike.

In case of severe hemorrhage, a hypodermic injection of morphine should be at once administered. Not only does it quiet the patient, but it also arrests peristaltic action of the stomach, thus giving more chance for a clot to form, for the same reason that morphine is used in other forms of internal hemorrhage. The dose should be regulated according to the age of the patient and previous habit. In general, five minims of Magendie's solution would be sufficient. It is evident that giving it by the mouth will be of little use. If a hypodermic syringe cannot be had, opium in some liquid form should be given by the rectum. The patient should be kept at perfect rest, with an ice bag over the stomach if it can be borne. From one to three grains of ergotin may also be hypodermically injected in order to constrict the capillaries. In other words, hemorrhage from the stomach is to be managed like hemorrhage from the intestines in typhoid fever, for instance.

Constipation need not be a source of anxiety. Copious enemata of warm water and soap once or twice a week are sufficient to keep the rectum washed out.

Should the patient become very feeble and stimulants be indicated, these should not be given by the mouth but by the rectum. A tablespoonful of brandy or whiskey in the beef-tea enemata, or else diluted with an ounce or two of water, may be so given when required, say twice a day.

The diet should be soft and non-irritating for at least six months after all signs of pain and vomiting have ceased. Neither should the patient during that time engage in any occupation requiring violent effort. If after the end of about six months none of the symptoms recur, it is fair to conclude that the ulcer has healed.

The treatment of duodenal ulcer is essentially the same as that of gastric ulcer.

Dilatation of the Stomach.

Etiology and Pathology.—Dilatation of the stomach is generally secondary to pyloric obstruction. This obstruction, as we have seen, may be due to cancer of the pylorus or stricture from cicatrization dependent on previous ulceration. In some rare cases the pylorus may be obstructed by pressure from without by some tumor. In some of these cases, due to pyloric obstruction, the stomach may become very much enlarged, three or four times its normal size, if the patient lives long enough.

A moderate amount of dilatation is observed in some cases where there is no pyloric obstruction. Thus, in chronic gastric catarrh the stomach often becomes dilated to a moderate extent from weakening of the muscular coat. This weakening is due partly to the inflammation extending to the muscular coat and partly to the over-distention by the gases formed.

Paresis of the gastric muscular coat may also follow severe illness or accompany marked anæmia from any cause.

Overloading the stomach, as occurs among gluttons and topers, also leads to dilatation of the stomach both by over-distending the organ and the catarrh that is almost certain to be induced.

Symptoms.—Among the symptoms are those of dyspepsia, already described. There are epigastric oppression, belching of wind and sour fluid, heartburn, and vomiting. The patient does not vomit frequently, but rather after somewhat prolonged intervals when the stomach is full of undigested food and mucus. Two or more quarts of such matter may be vomited, and for the time being there is a sense of relief. As the disease progresses, however, the muscular coat becomes weaker and weaker, partly by the catarrh set up, but chiefly by the thinning it undergoes from distention. This distention, as already remarked, is due in a measure to overloading, but also to the gases formed by the fermenting and decomposing food. As a consequence of this weakening of the muscular coat the patient can no longer vomit.

Physical Diagnosis.—Inspection often reveals the outline of the dilated stomach, especially the fundus and greater curvature. After inspecting the patient, cause the stomach to be still more distended with gas, and the outline will be observed to extend out

farther. This is best done by giving Seidlitz powders separately. Or a half-drachm of bicarbonate of soda may be given first, and immediately afterward the same amount of tartaric acid.

On palpation the outline of the stomach may often be felt; and by quickly shaking the patient, while listening at the same time, or in other words on succussion, we are very apt to get a distinct splashing sound. On percussion the area of tympanicity is found to be greatly extended. Penzoldt's test should also be

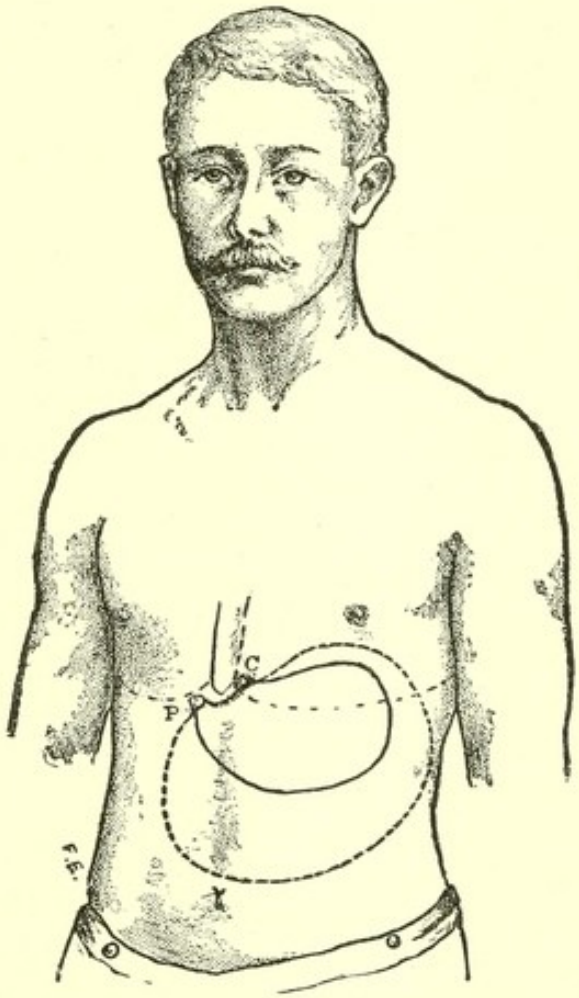


FIG. 28.—OUTLINE OF NORMAL AND DILATED STOMACH, THE LATTER INDICATED BY A DOTTED LINE. *c*, Cardiac orifice at the junction of left seventh rib with the sternum ; *p*, pyloric orifice, at free margin of ribs just inside of a line drawn from the left nipple to umbilicus.

tried. The line of dulness over the empty stomach will not extend to the navel. Now let the patient swallow a quart of water, and dulness will be found along a line below the navel. Lastly, measurement may be tried by means of a somewhat stiff bougie. The average distance in health to which the bougie can penetrate, measured from the mouth, is about twenty-three and a half inches. In dilatation it often measures twenty-six and a half, or fully three inches more.

The bowels are naturally constipated, owing to the small amount of food that enters the intestines.

The urine is scant and often alkaline or neutral.

Prognosis.—This depends on the cause of dilatation. The case is hopeless when there is cancer of the pylorus. In other instances the patient may live long with proper care and treatment, but in course of time nutrition becomes impaired, the general health fails, and the patient finally succumbs to exhaustion or some intercurrent disease

Treatment.—Food should be taken in as small quantity as possible, and that should be not only highly nutritious, but easily digested. Peptonized milk, milk punch, and soft boiled or poached eggs are recommended. Starchy food and sweets are forbidden on account of the gases they are likely to give rise to. Vegetables and bread should also be avoided for the same reason.

Much was expected from washing out the organ by means of the stomach pump and tube, but even in dilatation this does little or no good except in those cases where the patient no longer can vomit. Borax and warm water (℥ ij. : Oi.) is the best stomach wash, and the patient can soon learn how to swallow the tube and wash out his own stomach.

For strengthening the muscular coat of the stomach, electricity can be applied by a very simple apparatus, the patient swallowing one of the poles, the other being applied externally, after Einhorn's method.

An elastic band worn around the region of the stomach helps to support the walls and aids in the peristaltic movements.

Strychnine in small doses is also highly recommended in atony of the stomach. It may be combined with Blaud's pills where anæmia is marked. (℞ Ferri sulphat., potass. carbonat., āā ℥ i.; strychninæ sulphat., gr. i.; pulv. tragacanth., q.s. M. ft. pil. No. xxx. Sig. One ter die after meals.) Instead of strychnine, the tincture of nux vomica may be used. (℞ Tr. nucis vom., ℥ i.; pulv. rhei, sodii bicarb., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ℥ i. ter die after meals.) Arsenic is also highly recommended, but I have never seen any benefit derived from its administration.

Surgical operation for removal of pyloric stricture has been resorted to, but thus far it has been unfavorable except in those cases where stricture was caused by cicatricial contraction due to previous ulceration. In these cases Loreta's operation of dilating the stricture gradually by means of the finger or bougies has been performed with a certain amount of success.

It is easy to understand that only those cases of slight dilatation independent of pyloric stricture promise complete cure by the dietetic and other means described.

Hæmatemesis.

Hæmatemesis is vomiting of blood due to gastric hemorrhage.

It may be the result of cancer of the stomach or ulcer, as has already been described.

In some cases it may be caused by surgical injuries, such as blows, wounds, and the like, or by corrosive poisons.

Sometimes it may be due to passive congestion, as seen in obstruction to the portal circulation in cirrhosis, cancer, hydatids, and other diseases of the liver, giving rise to portal obstruction. The same may be true in mitral lesions causing regurgitation or obstruction. In any of these cases the pulmonary circulation is obstructed, and the right ventricle becomes enlarged from the extra work put upon it. As a result, there is obstruction to the return circulation, with passive congestion of the liver (nutmeg liver) and consequent obstruction to the portal circulation. This also occurs in general emphysema, where there is obstruction to the pulmonary circulation with general venous stasis. Tumors, like aneurism, for instance, pressing upon the portal vein and obstructing it, also give rise to passive congestion and gastric hemorrhage. It sometimes occurs in such diseases as scurvy, typhus fever, and the like, or among those who have what is known as the hemorrhagic diathesis. It also occurs in pernicious anæmia.

Finally, we sometimes find it among women as a vicarious menstruation. Instead of having her period as usual, the patient vomits blood about the time of menstruation. Vicarious menstruation may not only appear as a hæmatemesis, but also as hæmoptysis, epistaxis, or even bleeding from one or both breasts, as is well known.

The diagnosis and symptoms of hæmatemesis have already been mentioned when speaking of ulcer of the stomach. The treatment is also the same as when speaking of that disease.

Neuroses of the Stomach. Atonic Dyspepsia.

Neuroses of the stomach are functional disturbances due to nervous influence. Such disturbances embrace a variety of dyspeptic symptoms that give to the affection the name of atonic dyspepsia in contradistinction to the irritative dyspepsia due to gastric catarrh.

Atonic dyspepsia occurs more frequently in women than men, and chiefly among those of a nervous temperament. The disease is usually chronic. It is indicated by a sense of weight and uneasiness in the epigastric region, with languor, after eating, and there is a general depression of the vital powers. Pain is not always present, but sometimes gastralgia is distressing.

The affection is often inherited. Sometimes it may be associated with debilitating diseases, or brought on by great mental disturbance, such as the sudden loss of money in speculation, the loss of friends, disappointment in love or political aspirations, and other severely depressing moral emotion. Want of wholesome physical or mental occupation, as observed among even wealthy young men and women of temperate habits, but who do not know how to kill time; prolonged fasting, the undue use of condiments, and old age also produce it.

The symptoms somewhat resemble those of gastric catarrh, and in time the latter disease is brought on in some instances. The tongue is usually broad, pale, and flabby, and pitted along the edges by impressions from the teeth. It is very faintly coated unless catarrh supervenes, and the breath is not so noticeably foul as in gastric catarrh.

Constipation is usually a prominent symptom. Fecal matter delayed in the intestines gives rise to gas which causes them to be distended. The so-called phantom tumors are frequently observed in these cases, and the patient often imagines that some tumor is really developing within the abdominal cavity. The passages become scant and chalk-colored, and the pulse is weak. The surface is cool and clammy, the hands and feet are habitually cold, and generally there is sweating of the palms of the hands.

Dyspnœa due to reflex action along the pneumogastric and phrenic nerves is not uncommon, along with palpitation and irregular cardiac action. The pulse, weak, as already stated, not infrequently intermits. The urine is about normal, but is often alkaline. Sometimes it contains albumin, as in gastric catarrh. There is a general feeling of lassitude, with hypochondriasis and depression of all the vital powers.

The prognosis in these cases depends on the possibility of removing the cause. The treatment is entirely a tonic one. The diet should be liberal and highly nutritious. Phosphorus is also recommended in these cases. The dried hypophosphites is the best form for giving phosphorus, much better, I think, than in the form of the syrup of hypophosphites. Stimulants are to be avoided except in combination with bitter tonics to give an appetite. For this purpose the compound tincture of gentian and nux vomica before meals is one of the best. Over-exertion and violent mental emotion should be avoided if possible. Very often a change of scene is of the greatest benefit to the patient.

It may become necessary to give the patient narcotics at some period of the disease in order to allay gastralgia and promote sleep, for insomnia in these conditions sometimes becomes intolerable. In such cases I prefer to give Hewitt's mixture instead

of opium, as the opium habit is very easily formed in these patients. (℞ Spts. æther. comp., spts. ammoniæ aromat., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. every two hours.) If morphine has to be given, it should be done by no one but the physician, and then only at widely separated intervals, so as to reduce the possibility of the formation of the opium habit to a minimum.

Should anæmia become marked, iron in some form is indicated. One of the best preparations is the solution of the albuminate of iron. It may be given with gentian and nux vomica before meals. (℞ Tinct. gentian. comp., ℥ ss.; tinct. nucis vom., ʒ i.; sol. ferri albuminat., q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die before meals.)

The galvanic or faradic current may also be used, but the patient, as a rule, will do better in proportion as unnecessary treatment is avoided.

Intestinal Catarrh.

Etiology and Pathology.—Intestinal catarrh or catarrhal enteritis, is inflammation of the mucous membrane lining the intestines.

As a result of the inflammation, the portion of intestinal mucous membrane attacked becomes red and swollen, and in severe cases superficial ulcers are formed. In chronic cases the submucous connective tissue undergoes proliferation and thickening. Not infrequently gastric catarrh exists at the same time, as already observed.

Intestinal catarrh is often caused by irritating food or impure water, as is well known. Corrosive poisons produce very violent cases. In the same way drastic cathartic medicines may sometimes give rise to it.

Exposure to cold and wet not infrequently causes intestinal catarrh. It also accompanies infectious diseases like typhoid fever, malaria, pyæmia, and the like.

Intestinal catarrh is also secondary to mitral lesions and general vesicular emphysema, owing to the general venous stasis and obstruction to the portal circulation as a result. In the same way cirrhosis of the liver, and any disease of that organ causing portal obstruction, will give rise to intestinal hyperæmia and catarrh.

Among children notably, foul atmosphere and improper food, bad hygienic surroundings, and hot weather greatly predispose to intestinal catarrh, so that it becomes epidemic, and is then known as cholera morbus or cholera infantum. Dentition is also regarded by many as a cause, but this is no doubt much overrated.

Symptoms.—Diarrhœa is the first and most prominent symptom of intestinal catarrh. This diarrhœa is due to increased amount of fluid in the bowel, and also to increased peristaltic action caused by the irritable condition of the intestines. Instead of the fecal matter undergoing more or less consolidation by absorption of the fluid, as usual, it is expelled too quickly. The stools are commonly copious and more or less watery. Their number varies greatly for any given time. Preceding the act of defecation there is generally rumbling of the bowels, which is caused by the increased peristaltic action just mentioned. Great relief is experienced by going to stool, at least for the time being. In these two respects diarrhœa differs very markedly from dysentery; that is to say, in diarrhœa the stools are usually watery and abundant and give much relief for the time being. In dysentery, on the other hand, the stools are scant and slimy, are often tinged with blood, and tenesmus is not relieved.

Along with diarrhœa there are often colicky pains. When the small intestines are chiefly affected, rumblings or borborygmi are often heard, especially on palpating the abdomen. The pressure frequently gives relief to the colicky pains. Tympanites may become quite noticeable, but as a rule does not cause any distress.

There is generally a moderate degree of fever. The temperature rises to 100° F. perhaps, or in some cases even to 102° F., but soon falls again unless there be some complications.

The thirst, that is often so marked, is probably not due so much to the fever as it is to the loss of fluid by defecation.

The tongue is slightly furred and the appetite poor for a few days.

It has been said that when borborygmi, or rumblings, are heard, with or without pressure over the abdomen, the small intestine is chiefly affected. In some cases vomiting occurs. That would show that the stomach was also involved, or that we were dealing with gastro-intestinal catarrh. Should the inflammation extend to the common bile duct and obstruct it, jaundice would be the result.

Cholera morbus, cholera nostras, sporadic cholera, or, when it attacks children, cholera infantum, is an acute form of gastro-intestinal catarrh that requires for its production a certain amount of heat. Not that high temperature alone can give rise to the disease, but it is an essential factor. Other equally important etiological conditions are improper food and bad hygienic surroundings, especially foul air. Given all of these three conditions, and cholera morbus will result either as affecting a single individual or as an endemic or epidemic, as the case may be. In large cities, and especially in the crowded districts, do we

find cholera morbus during the months of July and August, and even during the first half of September or the latter part of June.

Milk is the chief article of diet for children, and, as is well known, it is more often impure among the poor in the crowded districts of a large city, than in the country.

The symptoms of cholera morbus are those of a severe gastro-intestinal catarrh. The disease often begins suddenly with vomiting, and diarrhœa. At first only the food previously taken is vomited, and the passages are fecal in character. Soon, however, the matter vomited is green or slimy, indicating that the vomitus consists of a mixture of bile and mucus, and the stools are more and more watery, resembling the rice-water discharges of cholera. There are tenderness over the epigastric region, especiallly under pressure, and muscular cramps.

The temperature is usually much higher than in ordinary intestinal catarrh. As taken in the rectum it often rises to 103° F., and in severe cases it goes up much higher than that, 105° F. or even 107° F. The surface and especially the extremities usually feel cool. It is impossible to estimate the degree of temperature by the touch alone. The thermometer should be applied in the rectum. That is the only safe guide. The patient, at first very restless, becomes depressed and dull. The eyes are sunken with dark circles around them, the features are pinched and anxious, and the limbs, however plump and well rounded before, now look shrunken. The urine becomes scant, high colored and often albuminous. The pulse becomes very frequent and feeble, and the face is often cyanotic or else deathly pale. The patient may die of heart failure from exhaustion, or else convulsions and coma may supervene. The symptoms so exactly resemble those of true Asiatic cholera that a positive diagnosis between the two diseases might be quite impossible in some instances. In true Asiatic cholera, however, Koch's comma bacillus is always found in the dejecta, but is wanting in cholera morbus. However important such a diagnostic means may be as regards the health and sanitation of a large and populous city, it will probably be of little avail to the average country practitioner.

Cholera morbus usually attacks children, but it may, and does, attack grown people also. During the late war, a private in the company of artillery that I commanded, died in camp near Richmond, of sporadic cholera. It occurred during the early part of July; and from the time he was first attacked until he died was not more than eight hours.

Among children there sometimes occurs a *chronic* intestinal catarrh resulting from impure milk and want of proper clothing. The stools are abundant or scant, according as the small or large intestines are chiefly affected, and they uniformly have a very of-

fensive odor. It occurs chiefly among weakly and bottle-fed children or those whose nurse is probably unhealthy. Bad hygienic surroundings, especially lack of fresh air, also increase the tendency to this condition. There is more or less fever, which exacerbates and remits to a moderate degree, being always higher at night. Some of these cases very much resemble malarial poisoning and are called infantile remittent fever. This form of chronic intestinal catarrh is observed more frequently in southern than northern climates. When the large intestine is chiefly affected, the stools contain more mucus than when the small intestine is the seat of the disease. It may follow one or more attacks of the acute form, but in some cases it appears to be chronic in form from the first. This has been observed among soldiers in various wars, and is known as army diarrhœa. I have reason to believe that impure water in the neighborhood of camps has much to do in producing this form of catarrh. During the stay in camp around Manassas in the winter of 1861–62, many soldiers became affected with the army diarrhœa. Most of them recovered as soon as they broke camp and changed their quarters. In other cases, however, the disease would last in spite of change or medicine, and the patient would finally die of exhaustion or some intercurrent disease.

Finally, there sometimes occurs a diarrhœa attended with the discharge of shreds and patches of exfoliated mucous membrane that resembles, as Loomis truly states, some curious-looking parasite. It is termed membranous or desquamative enteritis. This was perfectly illustrated in the case of a school boy aged nine. The child lost appetite, began to grow thin, had fever at night, and was being treated for malaria. The attending physician requested me to examine his lungs to see if there were any signs of phthisis. The lungs were found to be perfectly normal. I requested a sample of his fecal discharge for examination. To my astonishment, not only was there a distinct ribbon of mucous membrane resembling some terrific-looking worm, but also *grains of sand*. The specimen was carefully examined by Dr. James C. Mackenzie, of this city. I informed the father that his son had the habit of eating sand, and advised him, without scolding, to remove him to another place on a visit. The boy was accustomed to go to a hill back of the house at a certain hour of the day and swallowing sand. He paid a visit to some friends in another locality, where sand could not be had, and made a speedy recovery; what was better still, the bad habit was also broken without flogging or even scolding. In conclusion, it may be said that not only sand but other foreign substances may give rise to this desquamative enteritis, as, the chewing of slate pencils and the like.

Diagnosis.—The difference between diarrhœa and dysentery has already been alluded to. In diarrhœa the stools are abundant and watery, and preceded by rumbling of the bowels or borborygmi. In dysentery the stools are scant and slimy, and often bloody, without being preceded by borborygmi. In diarrhœa, great temporary relief is obtained by evacuating the contents of the bowels; whereas in dysentery the tenesmus is rather aggravated than otherwise by going to stool.

Cholera morbus so closely resembles true Asiatic cholera that it may be impossible to make a positive diagnosis without examining the fecal discharges microscopically for Koch's comma bacillus. This is characteristic of Asiatic cholera, but is absent in the sporadic form.

Finally, in membranous or desquamative diarrhœa, the shreds of membrane discharged may resemble parasites, but their true nature, as well as the real cause of the trouble, may be determined by the microscope.

Prognosis.—The prognosis of intestinal catarrh largely depends upon the cause of the disease, the age of the patient, and the condition when attacked. Cholera morbus is always a severe disease, and the prognosis is generally unfavorable among weakly infants who are ill-fed and have bad hygienic surroundings. Among the well-to-do, however, and in the open country with plenty of fresh air and cleanliness, the prognosis is, in my experience, good. In chronic intestinal catarrh depending on some grave disease as tubercular ulceration, hepatic abscess opening into the duodenum, Bright's disease of the kidney, and the like, or mechanical obstruction to the circulation, as in heart disease, general emphysema, and hepatic diseases that cause portal obstruction, the prognosis is, as a matter of course, unfavorable.

Treatment.—Acute diarrhœa from intestinal catarrh due to ordinary causes, such as exposure and errors in diet, is best treated by keeping the patient perfectly quiet and attention to nutrition. It is a custom with many to give a mild cathartic, as castor oil, to begin with, in order to clear out the intestinal tract and remove all irritating substances that might be present. Inasmuch, however, as usually the patient's bowels have already moved sufficiently by the time a physician is sent for, that course is rarely necessary. A powder of bismuth and morphine may then be given at once. (℞ Bismuth. subnitrat., ʒ i.; morphinæ sulphat., gr. i. M. ft. cht. No. vi. Sig. One every three hours.) If the colicky pains are severe, a large mustard cloth may be laid over the abdomen. The diet should consist of a little weak tea without sugar or milk for the first twenty-four hours. This will also aid in checking vomiting should it be necessary. If the pains are very severe, a hypodermic of morphine may be injected, but this is rarely

called for. Bits of ice in the mouth should be given for the thirst, which sometimes is an urgent symptom. Under no circumstances should the patient be allowed to drink large draughts of fluid of any sort—least of all, ice water. A powder of opium, bismuth, and kino is often very efficacious. (℞ Pulv. kino, bismuth. subnitrat., āā ʒ i.; pulv. opii, gr. vi. M. ft. cht. No. vi. Sig. One ter die, or oftener if required.)

The diet for several days should be guarded, and small quantities given at a time. Three or four ounces of boiled milk, more or less according to the age of the patient, may be taken as nourishment.

In cholera infantum, the child should be removed as quickly as possible from ill-ventilated quarters into the fresh air. Children suffering with this disease have been cured in a surprisingly short time by riding out on the various excursion boats or floating hospitals or spending a few days by the seaside. Meantime the diet is of the utmost importance. If the child be nursing, the health of the mother or wet-nurse should be inquired into at once. Instead of unwholesome milk, a little barley water for a day or two is sufficient. A few drops of brandy may be added to each teaspoonful. West's mixture should also be given without delay. (℞ Olei ricini, ʒ i.; tinct. opii camphorat., ʒ ij.; mucilag. acaciæ, q.s. ad fl. ℥ ij. M. Sig. Shake. ʒ i. every two hours.) The jumping of the child up and down, by way of amusing it, is all wrong. It should be kept at perfect rest. This with the diet and mixture as indicated is usually sufficient. I have never had occasion to give antiseptics and quinine. If fever run high, I should very much prefer a powder of antifebrin and sugar rubbed up together. (℞ Antifebrini, sacch. albæ, āā gr. xij. M. ft. cht. No. vi. Sig. One every two hours.) The abdomen may be enveloped with cloths wrung out of hot water and a slight amount of mustard, just enough to slightly redden the skin. The gums should also be examined, and lanced if necessary to remove any source of irritation. I am well aware of the great prejudice of modern physicians against lancing the gums of children in those cases, but the fact remains that it often does good. In chronic diarrhœa depending not upon some incurable disease but upon simple chronic catarrh of the intestine, the diet should consist largely of fatty food, and ipecac should be added to the powders. Just how fatty food acts beneficially in chronic diarrhœa I do not know, but I learned it in consultation with the late Dr. Alonzo Clark, of this city. The case was that of a banker forty-two years of age. He had suffered with chronic intestinal catarrh, with fluid stools averaging four to six in number each day. Not infrequently the stools would be fluid, and then a lump would pass, always preceded by rumbling. I put him on a restricted diet

and ordered him to sit on a high chair at his desk instead of standing all the time. He was given the bismuth and morphine powders as above described for three days, taking in all twelve powders, each of which contained the sixth of a grain of morphine. After that he took only one powder containing morphine, and that at bed-time. In the mean time he took the same amount of bismuth and ipecac. (℞ Bismuth. subnitrat., ʒ i.; pulv. ipecac., gr. i. M. ft. cht. No. vi. Sig. One every three hours.) He improved rapidly, but did not get entirely well until by advice of Dr. Alonzo Clark he took cod-liver oil. Where cod-liver oil is not well borne by the stomach, cream or fresh butter may be used instead. Dr. Clark informed me that it was his custom to order a fatty diet for such patients. In some cases chronic intestinal catarrh is successfully treated by drinking Virginia Rockbridge Alum water. A sojourn at these springs for a month often effects a cure, or the water can be obtained and drunk at home.

In one case that I treated for this disease, every remedy failed until, by the advice of Dr. J. Gardner Perry, of this city, I gave her drachm doses of subnitrate of bismuth four times daily. In another case, however, where I tried the same remedy, the patient became so salivated in some way by the bismuth that it had to be discontinued.

I have never found that washing out the lower bowel or the giving of antiseptics proved to be of any material benefit in these cases; but as others have found them to be beneficial, they should be tried if necessary. Lastly, in those cases of diarrhœa where the cause is due to some irritant which can be removed, as in the case of the boy eating sand, already mentioned, it should be removed without delay. In all cases of membranous enteritis, such cause should be looked for. In malarial regions quinine is doubtless indicated in some cases.

Diarrhœa.

Diarrhœa is defined as the frequent discharge of loose alvine evacuations without tenesmus.

It can hardly be regarded as a disease itself, but rather as a symptom of some other condition, intestinal catarrh being the chief, as already described. It is named according to the condition giving rise to it.

Irritative diarrhœa, is due to direct irritation of the intestines by improper food and drink, purgative medicines, poisons, intestinal worms, and the like. When brought on by eating and drinking to excess, it is termed crapulous diarrhœa. Instead of simple irritation, there may be inflammation with some fever, and then it is sometimes termed inflammatory diarrhœa.

Mechanical diarrhœa is due to mechanical obstruction to the portal circulation, with consequent gastro-intestinal hyperæmia and catarrh. Such mechanical obstruction is found in mitral lesion, either regurgitation or obstruction. In the former case the blood is regurgitated back on to the lungs; in the second it is prevented from leaving the lungs. In either event the right ventricle becomes enlarged and weakened. General venous stasis follows, with passive engorgement of the liver, causing it to assume the nutmeg appearance, with corresponding obstruction to the portal circulation, and gastro-intestinal hyperæmia. In the same way, general vesicular emphysema will give rise to that condition, with diarrhœa alternating often with constipation. Or else the stools are partly fluid and partly lumpy. Cirrhosis of the liver, and any disease of that organ that will obstruct the portal circulation, will give rise to a diarrhœa in the same way.

Secondary or symptomatic diarrhœa is secondary to, or symptomatic of, some ulcerative condition of the intestines as observed in typhoid fever, for instance, or tuberculosis, and in pyæmia, Bright's disease, malaria, and the exanthemata, as scarlatina, small-pox, and measles. It is also observed sometimes in anæmia and exhaustion during the course of leucocythæmia, over-lactation, Hodgkin's disease, and the like. It is termed critical when it suddenly appears during the crisis of a disease and ends with it. It is termed colliquative when it occurs during the course or toward the end of some wasting disease, as phthisis or Bright's disease. The word itself signifies melting, from the old idea that it was due to the melting of the solid parts to produce such a profuse liquid discharge.

Nervous or lienteric diarrhœa is due to excessive peristaltic action, as observed among children during dentition or women during climacteric changes. Owing to the peripheral nervous hyperæsthetic condition, food, when taken into the mouth, is rushed through the whole alimentary tube and expelled by the rectum so quickly that it has had no time to become digested or indeed appreciably changed in character. Hence the term lienteric or slippery diarrhœa, from the rapidity with which the food slips through the whole intestinal tract. Though the appetite remai ns unimpaired or even becomes much increased, the patient nevertheless emaciates from want of nutrition.

Vicarious diarrhœa is due to suppression or arrest of the functions of the skin, kidneys, or lungs, so that the bowels do the extra or vicarious work. It is also termed compensatory diarrhœa, and is always more salutary than otherwise. Sometimes, as is well known, a vicarious diarrhœa is artificially set up by hydragogue cathartics when there is suppression of urine or scant urine, from failure of the kidneys to perform their function. Vicarious

or compensatory diarrhœa is also sometimes termed eliminative when it is thought to carry off the poison of the disease.

Fatty diarrhœa is of rare occurrence. It is the result of imperfect pancreatic or hepatic function, either from disease of the pancreas or retention of bile in the liver and gall bladder, as observed sometimes among opium eaters. Bile in the intestines, by precipitating the pepsin, prevents the latter from interfering with pancreatic digestion. In the absence of bile, pepsin destroys pancreatin, so that fat, instead of being emulsified and assimilated, simply passes through the intestinal tract partly as fat and partly as soap, giving to the stools the peculiarly white or clay-colored appearance and peculiarly foul odor.

Choleriform diarrhœa requires a certain amount of temperature for its production, and it prevails mostly, as elsewhere described, in hot weather. It is characterized by vomiting, purging, and collapse. For further particulars on this form of diarrhœa the reader is referred to Cholera and Cholera Morbus.

Finally, we have chronic or cachectic diarrhœa, depending on some such disease as syphilis, scurvy, malaria, tuberculosis, cancer, and the like, or else chronic intestinal catarrh.

In order to treat diarrhœa it is evident that it is necessary to know first what the cause is and to try to remove it if possible; if not, then to treat the disease of which the diarrhœa is but a symptom. The treatment of those diseases and conditions are fully considered in their respective places, to which the reader is referred.

Typhlitis. Appendicitis. Perityphlitis.

Typhlitis is inflammation of the cæcum. It usually begins in the mucous membrane lining the cæcum, but it may extend to the submucous and muscular coats and involve the whole cæcal wall, and even the surrounding connective tissues. Impacted fecal matter is the cause of typhlitis in most cases, the peculiar anatomical conditions favoring the lodgement of fecal matter at this point. The lodgement of foreign bodies may so give rise to it, and in some cases it results from acute or chronic intestinal catarrh from any cause.

Appendicitis or inflammation of the vermiform appendix is caused in the same way as typhlitis. If fecal matter enter the vermiform appendix, as it often does, it may remain there. Gerlach's valve, situated at the orifice of the vermiform appendix, while it prevents substances passing into the appendix, also hinders their return into the cæcum. If, therefore, by any chance fecal matter enter the appendix, it may remain there. The longer it remains, the harder it becomes owing to the absorption of the fluid. Finally, it is incrusted with lime-salts and forms what is

known as a fecal calculus. In some instances foreign bodies enter the appendix, as is well known. I once found a gall stone impacted in the vermiform appendix on post-mortem examination. Seeds of various fruits may also lodge in the appendix and give rise to appendicitis by their presence, or else they form the nucleus of the so-called fecal calculus.

These foreign bodies and fecal calculi may remain in the vermiform appendix a long time without causing any disturbance. In some cases they probably become dislodged. In others, again, they excite inflammation, giving rise to appendicitis. Ulceration may follow, with fatal peritonitis.

Perityphlitis is inflammation of pericæcal connective tissue. It may result from external injuries, but most frequently it is caused by extension of inflammation from appendicitis or typhlitis, the etiology of which has already been given.

Symptoms.—The symptoms of these three diseases are so much alike that they can only be distinguished by physical examination. Generally the patient complains of a dull aching pain in the ileo-cæcal region. It increases on attempting to move, and there is some fever. The patient is unable to work, and sends for the physician. Generally there will be the history of constipation or irregular action of the bowels. Sometimes constipation alternates with diarrhœa. The pain, fever, and loss of appetite have all rapidly increased, and sometimes there is vomiting. The temperature is about 102° F. and the pulse 100 or more.

On physical examination, the whole abdomen is more or less distended with gas in the intestines. A tumor is often observed over the cæcum. On palpation, the tumor can be felt, and it will be sausage-shaped or more or less enlarged according as perityphlitis with infiltration of the surrounding connective tissue has occurred or not. It is generally quite tender to the touch and should be handled lightly. Fluctuation may be observed in some cases if pus be present. On percussion, dulness over the tumor will be elicited.

After perityphlitis has occurred, or should abscess form, the symptoms become more grave. The pain is very severe, and often shoots into the right leg. A deep-seated but not well defined tumor is felt.

After a perityphlitic abscess forms, the pus may burrow in various directions, and open externally or else into the cæcum and be discharged by the rectum. As long as the inflammation in typhlitis or appendicitis is confined to the inner membrane, the case is a favorable one. But as soon as perityphlitis occurs, either through extension of the inflammation or by perforating ulcer, then there are two grave sources of danger; that is, peritonitis and pyæmia. In some cases localized peritonitis only re-

sults, and the patient recovers. In others, however, general peritonitis supervenes, to which the patient speedily succumbs.

Perityphlitic abscess may also give rise to purulent phlebitis with general pyæmia and metastatic abscesses, especially in the liver, as described elsewhere. In such a condition there are repeated chills at irregular intervals, with sweats and a variable temperature that sometimes runs very high and again falls below normal, especially toward morning.

Diagnosis.—The diagnosis of these diseases is made by the existing symptoms, but especially by the physical signs. If the tumor from typhlitis and similar affections develops slowly, it might be mistaken for ovarian tumor. But in the latter case, as well as other tumors, the intestine is in front of them, whereas in typhlitis the tumor is superficial. The severity of the symptoms —the pain shooting into the right leg, and fluctuation—would distinguish perityphlitis from typhlitis and appendicitis; but it is often difficult if not impossible to distinguish the two latter diseases from each other. Psoas abscess may be mistaken for perityphlitic abscess, but generally the previous history of the case would lead to a correct diagnosis.

Prognosis.—The prognosis, though doubtful in many cases, is generally now more favorable, especially under improved methods of treatment. The duration varies from a few days to several weeks. Relapses may also occur. The supervention of peritonitis or pyæmia is generally unfavorable, and a fatal result may be expected. In some cases a fecal sinus is formed, a very unfortunate complication.

Treatment.—If the case is seen early and a diagnosis of typhlitis simply is made, a mild cathartic should be given with the expectation of removing the fecal accumulation. Castor oil is perhaps the best, but drastic purgatives are to be avoided. A large enema of tepid water and soap may be given at the same time, and repeated during the day if thought advisable. In many cases this is all the treatment needed. The patient should be kept at perfect rest and the diet should be liquid and highly nutritious. In some cases there is reason to believe that the ice bag applied over the painful spot gives relief. A piece of flannel should first cover the part. If after a free evacuation of the bowels the tumor does not disappear, or if from the first, from the pain and fluctuation, there is reason to suppose that the tumor is due to inflammation, then opium should be given and the question of a surgical operation should be considered early. The aspirating needle should always be used first to establish the presence of pus. As soon as this is known, no time should be lost, but the abscess should be opened and free drainage established with such antiseptic precautions as to reduce the chances

of an unfavorable result to a minimum. For minute directions regarding this operation the reader is referred to works on surgery.

I have never found leeches and poultices to be of any benefit in these diseases. Either the patient gets well, by means of perfect rest, a cathartic and enemas, with a little opium and the ice bag in ordinary cases, or where abscess forms it has to be opened. Leeches and poultices do little or no good, cause a loss of time, and prevent a positive diagnosis by covering up the true condition of affairs. While a patient is convalescent great care should be had regarding diet, and the regulation of the bowels, in order to prevent the possibility of a relapse.

Intestinal Obstruction. Ileus. Intussusception.

Etiology and Pathology.—Intestinal obstruction is the mechanical impediment in the intestine that results from diminution of its calibre in some portion of its course.

Such diminution of calibre may be due to causes that exist outside the bowel, in its walls, or finally they may lie within the intestine itself. We will consider each of these classes of causes separately.

First, causes that exist outside the bowel, or extrinsic causes as they may be termed. These are tumors compressing the bowel from without, constriction of the bowel from bands of connective tissue, and twisting of the bowel on itself. Of tumors that may compress the bowel, aneurism, cancer, ovarian tumor, fibro-cystic tumor of the uterus, mesenteric tumors, and peritoneal cysts may be mentioned. Constriction may be due to herniæ, and bands of false membrane. Adhesive bands left after recovery from peritonitis sometimes constrict the bowels. The intestine also becomes constricted during the occurrence of various herniæ, as already remarked. The bowel may pass into the foramen of Winslow, but this accident is so rare that it need hardly be mentioned. Diaphragmatic hernia is more common. Volvulus or twisting of the bowel is another extrinsic cause of occlusion. It occurs most frequently about the sigmoid flexure, or between it and the ileum. Abnormally relaxed mesentery, especially if it be very narrow as sometimes happens, predisposes to it. This is further increased by the weight of the intestines when they become loaded with fæces and distended with gas. Sometimes a knot is formed by one portion of the intestine coiling about another. Severe vomiting or excessive peristalsis occurring in diarrhœa may lead to this condition. Twisting of the cæcum also occurs, but chiefly in advanced life.

Secondly, the causes of obstruction may exist in the walls

themselves. Among these are to be mentioned especially cicatrices and intussusception. The cicatrices are usually situated in the large intestine, and most frequently result from dysenteric ulceration. Duodenal ulcer leads to stricture of the duodenum, which more resembles stricture of the pyloric orifice of the stomach than stricture of the intestines. Stricture of the rectum is sometimes due to syphilis, and is then seen much more frequently among women than men, on account of the proximity of the vagina to the rectum. Stricture of the intestine from tuberculous and typhoid ulcers is very rare.

Intussusception or invagination signifies that a portion of intestine slips or becomes pushed into the calibre of that lying below it. This occurs chiefly among weakly children, and is due to paralysis of the muscular coat in one part with spasmodic action in the adjacent portion of the intestine. Not infrequently this condition is met with on post-mortem examination, but in the great majority of instances the invagination occurred after death. No less than a dozen or more points of invagination may be observed in some of these examinations, all of which occurred at the time of death, as there were no symptoms of the invagination during life, and no adhesions or signs of inflammation. Sometimes polypi within the intestines cause invagination by their weight, the upper portion being dragged into the lower. Invagination of the ileum into the colon occurs most frequently, although any portion of the intestine may be affected in this manner. In some cases the invaginated ileum may even protrude from the rectum. Inflammation and adhesion usually follow, and sometimes the internal portion may slough off, and a spontaneous cure be thus effected.

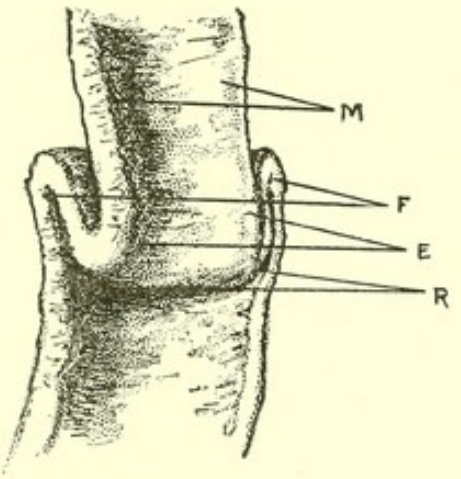


FIG. 29.—INTUSSUSCEPTION. *M*, Mucous surface of intestine; *E*, entering layer; *F*, external fold; *R*, internal fold.

Thirdly, and finally, the causes of obstruction may exist inside the intestinal canal. Among such causes may be mentioned polypi, hydatid cysts, foreign bodies of various kinds, and chiefly fecal accumulation. The neighborhood of the ileo-cæcal valve is most frequently the seat of these obstructions, though they occur also at other points, especially where the intestine bends.

Gall stones, concretions of chalk, and other foreign substances have been found. Fæces become impacted in some cases, even though the bowels have been to all appearances tolerably regular.

Atresia ani is congenital closure of the intestine usually at the anus. Such closure may occur elsewhere, but it is of little clinical significance, as the infant soon dies after birth.

Symptoms.—The symptoms of intestinal obstruction are similar, whatever be the cause. They vary also with the amount of obstruction. In some cases there is complete closure. They differ also somewhat according to the locality of the obstruction, but in all there are usually constipation, pain, and vomiting. Blood and mucus are often mixed with the dejections. In case of intussusception, blood is not infrequently discharged, and this in time is followed by diarrhœa if the patient lives long enough. Gangrenous portions of the intestines mixed with blood and mucus are discharged when sloughing of the invaginated portion occurs. When the lower bowel is invaginated, there is painful tenesmus and the discharges are dysenteric in character. The abdomen is usually tympanitic unless the obstruction is situated high up. In these cases vomiting and hiccough occur early. Should the obstruction be imperfect, and especially if situated low down and in the rectum, the fecal matter passed is often ribbon-shaped or in small pieces like sheeps' dung, as before mentioned when speaking of cancer.

As the case progresses, and complete obstruction occurs, signs of collapse are marked. The pulse becomes feeble and frequent, the surface cool, the eyes sunken with dark circles around them, and the countenance anxious. The vomiting, which before was of an ordinary kind, now becomes stercoraceous. The vomited matter has a distinct fecal odor. The contents of the intestine above the point of obstruction undergo putrid decomposition. As a result, the intestine here becomes greatly distended, so much so as to be often plainly felt. By this means the seat of the difficulty can frequently be made out. Inflammation and even ulceration of the intestine follows, sometimes resulting in perforation and fatal peritonitis.

In some cases the progress of the disease is rapid, while in others, as when there is incomplete constriction, its course is prolonged with varying symptoms.

Diagnosis.—The diagnosis of intestinal obstruction is based upon the physical signs, the symptoms present, and the history of the case. Often it is very uncertain. In the absence of the physical signs of any tumor or other abnormal condition, the vomiting of fecal matter and signs of collapse would suggest the true condition. Among old people, as well as some young women, the obstruction may be found to be accumulated fecal matter in the rectum, as proved by digital exploration.

Prognosis.—This depends upon the nature of the case. As a rule, intestinal obstruction terminates unfavorably. Death either

results from collapse, secondary peritonitis, or pyæmic conditions. In any case it must be regarded as a serious affection, unless limited to ordinary accumulation of fæces in the rectum or elsewhere from simple intestinal catarrh.

Treatment.—By means of physical examination, the seat of the obstruction, and the cause if possible, are to be ascertained. If there be simply an accumulation of fecal matter in the rectum, it can easily be removed by first breaking up the mass gently with the finger, and then washing out the rectum with tepid water and soap-suds. If the accumulation be higher up, a long catheter may be used for injecting fluid. Sometimes a boggy mass of fecal matter can be felt near the cæcum, or at the right or left bend of the colon. A dose of castor oil will frequently remove it, as I once observed in a cocaine *habitué*.

Should invagination be suspected, or evidenced by the appearance of the intestine at the rectum, it should be carefully pushed up with a repositor and further placed in position by large enemata of warm water.

Stricture of the rectum and herniæ are subjects for the surgeon to treat. In doubtful cases, so called, 5 to 10 ounces of pure quicksilver have been given at a dose to work its way through. A much more sensible plan is to perform laparatomy.

Hypodermic injections of morphine should be given early, if necessary to allay pain and quiet peristalsis, thus preventing further mischief in dangerous cases.

Habitual Constipation.

Habitual constipation signifies the habit of prolonging the intervals between the acts of defecation more than twenty-four hours, together with irregularity and incompleteness in the performance of that function. As a natural consequence the stools are usually hard and dry.

Reference is not had to certain chronic diseases that necessarily lead to this condition. But it is here intended to treat of habitual constipation as an apparently functional disease in persons who are otherwise healthy. We therefore omit strictures of the intestine, tumors, paralysis, and the like. Such causes of constipation come rather under the head of Intestinal Obstruction, to which the reader is referred.

In analyzing the subject of functional constipation, however, we find that it can be accounted for either by want of peristalsis of the muscular coat of the intestine from some cause, or else that it is due to intestinal catarrh.

Want of peristalsis may be found in all diseases that lower vitality. Insufficient food and overwork may in this way lead

to this condition. Anything that causes intestinal catarrh may also lead to chronic constipation, sometimes alternating with diarrhœa.

Diseases of the liver by which the function of that organ is perverted or disturbed often lead to habitual constipation. Torpid liver is a fruitful source of this complaint.

In certain nervous diseases we find that constipation is a prominent symptom. This is due to the fact that nervous disturbance is often followed by corresponding irregular action of the bowels, not only as regards peristaltic action, but also as to the function of various glands. In melancholia, hypochondriasis, and hysteria, as well as the various forms of neurasthenia, we find constipation to be often a prominent and obstinate accompaniment.

Among women suffering with uterine and ovarian troubles, constipation is often one of the most difficult problems to deal with. In atonic dyspepsia in both sexes we find the same conditions, as also among masturbators. The constipation among all such patients is probably due to want of proper nervous inhibition, as well as the general anæmia, ill health, and weakness consequent upon such conditions.

In some cases habitual constipation appears to be inherited. Just what this inheritance exactly consists in is not known, but it is probably a predisposition to intestinal catarrh and weakness of the muscular coat, both of which conditions evidently tend to constipation.

In New York, much more than in Europe, want of proper instruction on this all-important subject among parents and in our public schools, together with an excessive amount of false modesty on the part of young people, especially girls, are the most fruitful sources of habitual constipation. Children are hurried off to school before they have had time to go to stool. No one asks them any questions. If they eat, they are supposed to defecate. They put it off until compelled by stress of circumstances to perform imperatively what should be done daily and regularly. They go to school, about the streets, and to bed with cold, damp feet. The result is habitual constipation, either as a functional affection or as a disease dependent on intestinal catarrh, torpid liver, and the like.

Treatment.—The first thing to do in such cases is to see to it that regularity in going to stool is carried out. The patient should have some particular time for going to the water-closet, and go there at that hour every day, whether they *feel* like it or not. There is no use in waiting until one *feels* like it. Some women *never feel* like it. But the thing to do is to go and make a fair and reasonable trial. The best time for such

tentative effort is evidently early in the morning, either before or soon after breakfast. After this, one is then ready for the business of the day. This and warming the feet before going to bed will often suffice without further interference. Should this fail, however, other remedies and measures may be tried.

Certain articles of food often aid greatly in removing this affection. Fruit, such as prunes, oranges, lemons, and the like, prove beneficial. A tumbler of cold water on rising in the morning will frequently suffice. Warm water, on the other hand, is quickly absorbed and has no effect. Cold water, however, may prove injurious to the stomach, and, although recommended by high authority, should be used with caution.

Slapping the abdomen with a wet towel, massage, and the like are well-known measures. Exercise and diet are all-important. Coarse bread such as graham or corn bread is good. Faradization and galvanism may be tried. Change of diet is often beneficial. But with it all, regular meals and hours, and regular going to the water-closet, are absolutely necessary to make the cure permanent. So far as medicines are concerned, a great many are recommended. Squibb's fluid extract of buckthorn is very good. It reddens the urine sometimes and frightens the patient. (℞ Squibb's fld. extr. Rhamni frang., ℥ ij. Sig. ʒ ss. before dinner and supper.) In many cases the mixture or rhubarb and soda with the tincure of nux vomica is excellent. (℞ Pulv. sodii bicarb., pulv. rhei, āā ℈ ij.; tr. nucis vom., ʒ i.; aquæ, q.s. ad ℥ ij. M. Sig. ʒ i. ter die.) In one case of a lady that I treated, the rectum was so full of fæces that I had first to break up the mass with my finger with the free use of sweet oil. Her constipation was due to dryness of the lower bowel from an old catarrh. In some of these cases, especially among the old, rectal injections of molasses, as practised by Dr. Leo and others of this city at the Home for the Aged, answers the purpose better than anything else. The liberal use of unrefined New Orleans molasses as an article of diet, according to Dr. A. H. Smith, of this city, is an excellent remedy in some of these cases. Belladonna has been recommended under the supposition that it dilates the pyloric orifice of the stomach and other parts of the alimentary tract. This action of belladonna is doubtful. It may, however, be given in small quantities in various pills. Strong purgatives, as a rule, do harm. They weaken the intestinal coats in time. In conclusion, it may be said that no two cases of habitual constipation may be treated exactly alike with similar results. But in each case the physician in charge is expected to use a certain amount of patience and professional tact in performing what often turns out to be a thankless task.

Hemorrhoids. Proctitis. Periproctitis.

Hemorrhoids or piles are tumors about the anus caused by a varicose condition of the submucous veins. The mucous membrane becomes swollen and the surrounding connective tissue thickened.

The size of the nodules varies greatly according to the fulness of the vessels and the amount of mucous membrane and connective tissue involved. Situated below or outside of the sphincter ani they are called external; but above the sphincter, internal piles. Hemorrhoids may be due to local causes, as pressure on the vessels in habitual constipation, together with the expulsive force used at stool. Hence they are often found among those who lead a sedentary life. Obstruction to the return of blood from the rectum naturally gives rise to piles. Congestion of the liver during a prolonged debauch not infrequently causes them, sometimes of enormous size. Cirrhosis of the liver or cancer of that organ is usually accompanied by piles due to obstructed portal circulation. Hence the necessity for a careful examination of the liver in these cases, especially occurring among elderly persons and rebellious to treatment. In like manner a pregnant uterus or pelvic tumor of any kind may be a cause, by pressure and obstruction to the return circulation. Heart disease, especially mitral regurgitation or obstruction, and obstructions to the pulmonary circulation as seen in general vesicular emphysema, will often give rise to hemorrhoids, by means of the chronic passive congestion of the liver produced. Diseases about the rectum, such as cancer, proctitis, and the like, may cause them. During labor, hemorrhoids may be rapidly developed and forced down, or else the mass pre-existed as internal piles.

Hemorrhoids occur in those of middle life or past, and more frequently among men, it is said, than women. Hereditary tendency appears to be present in many cases, some families being more subject to the disease than others.

Proctitis or rectitis is inflammation of the mucous membrane of the rectum. It is very rarely primary, but nearly always secondary to other diseases, as diarrhœa, dysentery, and gonorrhœal urethritis, or else injuries, such as the rough passage of sounds into the bladder. New growths, such as cancer of the rectum, as well as syphilitic inflammation, may also give rise to it. From whatever cause it results, the symptoms are chiefly those of tenesmus and the discharge of small quantities of slimy and often bloody mucus, as in dysentery. Frequent desire to micturate, either from coexisting cystitis, or else sympathetic irritation of the muscular coat of the bladder, is often present.

Periproctitis or inflammation of the connective tissue surrounding the rectum may result from the extension of inflammation in proctitis, or be due to some injury, as the lodgement of foreign bodies in the rectum, bowels, and the like.

Periproctitis not infrequently leads to ischio-rectal abscess or *fistula in ano*. Tuberculous subjects are prone to this disease, though it also occurs among those who were previously in good condition. Riding horseback by those unaccustomed to such exercise sometimes gives rise to ischio-rectal abscess. The disease properly belongs to surgery.

The symptoms of hemorrhoids and kindred diseases need not be dwelt upon. A patient may have piles during the whole course of life without being annoyed by their presence. On the other hand, they may become enlarged, ulcerated, and so painful as to confine the patient to the house, or even bed, for a variable length of time. A slight amount of hemorrhage is not of infrequent occurrence, and this often proves beneficial by relieving the congestion and allowing the tumors to be replaced inside the rectum. In some cases hemorrhage may be so severe as to require its being checked. The slight hemorrhage and tenesmus may lead one to suspect dysentery, but a careful examination of the parts and the history of the case will generally lead to a correct diagnosis.

The prognosis in these diseases is usually favorable unless they are associated with malignant disease. The possibilities of contaminating the portal circulation, however, with general sepsis, especially in periproctitis with formation of abscess, should never be lost sight of. The treatment of hemorrhoids consists in removing the cause if possible and making topical applications, and, these failing, to remove them by surgical procedure. In the first place, habitual constipation should be treated by repeated attempts at regulating the diet until a suitable one is found. In the mean time mild laxatives may be used, but often simple enemas of tepid water containing a little borax will accomplish the result if gently given. Where the patient has hepatic congestion due to excessive eating and drinking, such a course of living must be changed. A dose of calomel and soda given at bed-time is an excellent remedy for unloading the portal circulation. (℞ Hydrarg. chlor. mitis, gr. iij.; sodii bicarb., gr. v. M. ft. pulv. Sig. Take at bed-time.) This should be followed by a moderate saline laxative next morning. The patient should remain in the recumbent posture for a few days if necessary, and if there are any ulcers they may be dusted over with a little iodoform and burnt alum in equal parts. If the patient objects to the smell of iodoform, bismuth subnitrate may be used instead. In a few days the tumors diminish in size so as to allow their being gently replaced within

the rectum, having first oiled the fingers with a little vaselin. An insect-powder blower is the best means for blowing the powder on the ulcerated mucous membrane. In this way a surgical operation may be avoided in many cases. Regulating the bowels by means of a suitable diet, aided when necessary by mild saline laxatives, and keeping the parts clean by an occasional and mildly antiseptic injection, will often prevent the return of the hemorrhoids. One of the best laxatives is a glass or two of Hathorn or Carlsbad water taken at bed-time, and the injection may consist of a pint of tepid water containing a teaspoonful of borax and an ounce of glycerin. Astringent injections and suppositories, with and without anodynes and various topical applications, are claimed by some to be curative agents, but disappointment in their use will often be experienced. In some cases, however, nothing short of surgical measures will effect a cure. This consists in extirpating the tumors by knife, thermo-cautery, or ligature, or else they may be injected with some astringent. For the details of such operations the reader is referred to works on surgery, or those specially devoted to diseases of the rectum.

Proctitis when acute requires rest in bed until the tenesmus and pain subside. A suppository containing the fourth of a grain of morphine may be placed in the rectum, or even a hypodermic injection of five to ten minims of Magendie's solution of morphine may be necessary. Leeches to the anus are seldom if ever called for. In chronic proctitis, mild astringents may be injected, and if necessary the rectal mucous membrane, with the aid of the speculum, may be brushed over with a solution of nitrate of silver (℈ i.–℥ i.) every other day until a cure is effected. Although the disease requires local treatment, constipation and hepatic congestion should be avoided.

Periproctitis should be treated with rest and opiates until the acute inflammation subsides or abscess forms. As soon as the latter occurs, as evidenced by the fluctuation, it should be opened. Should *fistula in ano* result, this should be treated by the proper surgical means.

Cancer of the Intestines.

Cancer of the intestines occurs much more rarely than cancer of the stomach. It affects the rectum more frequently than any other part. The colon comes next, especially in the neighborhood of the cæcum and sigmoid flexure, and lastly it affects the small intestine, especially the duodenum. Cancer of the intestine is nearly always a primary affection, though it is sometimes secondary to cancer of the uterus, bladder, and peritoneum. Generally it forms a ring-like swelling around the intestine, but in

some cases it is diffuse. It usually begins in the mucous membrane and extends to the submucous coats, involving from one to four inches of intestine and diminishing its calibre. When the cancer is of the scirrhous form, it is most likely to produce stricture of the affected portion of intestine. The cause of cancer of the bowel is no more known than that of cancer affecting other organs. It occurs in advanced life, and affects men more frequently, perhaps, than women. It develops in the cicatrix of previous ulcer in some cases.

Symptoms.—The symptoms of intestinal cancer depend a good deal on the part affected.

When the rectum is the seat of the disease, there is pain at first only on defecation. As the disease progresses, the pain becomes continuous, though it may be greater sometimes than at others. The pain shoots in different directions, along the thighs and in the back. Constipation and diarrhœa alternate. After a while the symptoms are those of dysentery, the stools being frequent and consisting of bloody slime in small quantities. Frequent desire to micturate is also present. The patient becomes emaciated and the characteristic cachexia is observed. As the sphincter becomes paralyzed, incontinence of fæces results, with constant soiling of the clothing. On examination with the rectal speculum, the cancerous nodules and ulcerations are observed. Perforations may occur into the bladder, vagina, and peritoneal cavity. If the patient be anæsthetized, digital examination will reveal the presence of cancerous nodules and friable masses that bleed easily and have a peculiar, cancerous odor. Portions of affected tissue placed under the microscope place the diagnosis beyond doubt, but this is seldom necessary. Stricture of the rectum exists early in the disease, so that fecal matter passed, even at that period, is ribbon-shaped, rather than cylindrical.

When the cæcum is affected, the signs are more vague. There are usually dull pain over the region, obstinate constipation, and increasing emaciation and debility. The stools consist of little lumps resembling sheeps' dung. This is merely characteristic of the stricture produced by the cancer. On examination, a tumor is felt over the cæcum, but much of this is due to accumulation of fæces above the seat of stricture, caused by the cancer. In such a case it much resembles the tumors of typhlitis, but the age of the patient and coexisting enlargement of the lymphatics, with the cancerous cachexia, distinguish the former from the latter. Cancer of the duodenum resembles cancer of the pyloric orifice of the stomach and cancer of the liver. Not infrequently there is vomiting of a substance resembling coffee grounds, some time after eating. Dilatation of the stomach also results. Should the opening of the common bile duct become closed,

marked jaundice results. In most cases a tumor is present and felt in the upper right portion of the epigastrium.

Diagnosis.—The diagnosis of cancer of the intestines is easily made. There are pain, the cancerous cachexia, progressive emaciation, and the presence usually of a tumor. In case of cancer of the rectum, physical examination soon places the diagnosis beyond doubt. It is sometimes difficult, however, to distinguish cancer of the duodenum from gastric and hepatic cancer, but the distinction is not particularly necessary, since the prognosis and treatment are the same in either case.

Prognosis and Treatment.—The prognosis is uniformly unfavorable, though early extirpation of the rectum has shown good results in a few cases. Scraping out the rectum also prolongs life in some instances. Otherwise the treatment is merely palliative and symptomatic. Milk punch may be given to sustain life, and morphine injected hypodermically to allay pain. Antiseptic injections are useful for preventing the fetor of the discharges in case of cancer of the rectum. A mild solution of liquor sodæ chlorinatæ (℥ ss. : Oi.) makes a good injection. Constipation and the pain it causes during defecation may be prevented by mild laxatives.

Intestinal Worms (Helminthiasis).

The worms most frequently found in the human intestines are the tape-worm and the round worm, each of which presents several varieties.

1. Tape-worms.

There are three principal varieties of tape-worms or tæniæ that are found in the human intestine: (1) Tænia solium, (2) Tænia mediocanellata, and (3) Bothriocephalus latus.

The mode of development of tape-worm is as follows: The last links of the worm contain ripe eggs and are passed with the fæces from time to time. Some of these eggs are swallowed by an animal that is used for food—the pig, for example. The eggs become broken or dissolved in the pig's stomach, and the embryos set free pierce the walls of that organ and, drifting along with the blood current, are lodged somewhere in the tissues. In a few months these embryos are developed into cysts about the size of a pea, from which a tænia-head or scolex is developed. The whole is then termed a cysticercus or bladder worm. If now a cysticercus is swallowed by a human being in a piece of uncooked meat, the cysticercus develops into a tape-worm. Küchenmeister found young tape-worms in the intestines of an executed criminal, to whom he had administered corresponding cysticerci a few days before death.

Tænia solium, the long tape-worm or chain-worm, consists of a head, neck, and body. The latter is composed of links, and varies in length according to the age of the worm and the number of links that have been broken off and evacuated. The neck is small and about an inch long. The head is about the size of the head of a pin, and is provided with four suckers, and a beak with about two dozen hooklets. By means of the suckers and hooklets it fastens itself to the mucous membrane of the intestine. The sexes are combined in one individual. The cysticercus of the Tænia solium is found in the tissues of the hog. It is from eating raw pork, then, that the Tænia solium becomes developed in the human intestines.

Tænia mediocanellata resembles the Tænia solium, but its links are broader and thicker, and its head is not provided with hooklets. There are, however, four suckers.

The cysticercus of this worm is found in the tissues of beef, and not pork.

Bothriocephalus latus is the largest tape-worm. Its head is oblong, with two slit-like suckers on the sides instead of the cup-shaped suckers in the other species. According to Braun, the cysticerci of this worm are found in the muscles and internal organs of fish, especially eels and pike, and the infection of man with this worm comes, therefore, from eating such underdone fish containing the cysticerci.

2. Round Worms.

There are several varieties of these worms, those most commonly found being (1) the Ascaris lumbricoides or round worm proper, (2) Oxyuris vermicularis, and (3) Trichocephalus dispar.

Instead of being developed from cysticerci contained in meat of some kind, it is supposed by Stein and others that their larvæ are found in weevils. Pastry and bread made from cheap and weevilly flour would therefore be the vehicle by which the larvæ of these worms would reach the human intestine.

Ascaris lumbricoides or large round worm is from six to twelve inches long, two to three lines thick, cylindrical, and pointed at both ends. The sexes exist in different individuals. This worm inhabits the small and large intestine, but also finds its way into the stomach, œsophagus, larynx, and common bile duct. It is found even in the abdominal cavity if there be perforation of the intestine.

Oxyuris vermicularis, also called the seat, pin, thread, or maw worm, is a small round worm, about the size of a small pin, the males being shorter than the females. They are found in the rectum chiefly, but also in the cæcum and large intestine, or they may crawl out of the anus into the vulva.

Trichocephalus dispar or whip-worm is about an inch and a half long, the posterior part being thick, the anterior hair-like. The female is thicker than the male, and straight. The posterior part of the male is spiral shaped and has at the end a hook-shaped penis surrounded by a bell. This worm is found chiefly in the cæcum.

The Strongylus duodenalis is also mentioned by some authors, but appears to be rare. It occupies the upper portion of the small intestine, especially the duodenum.

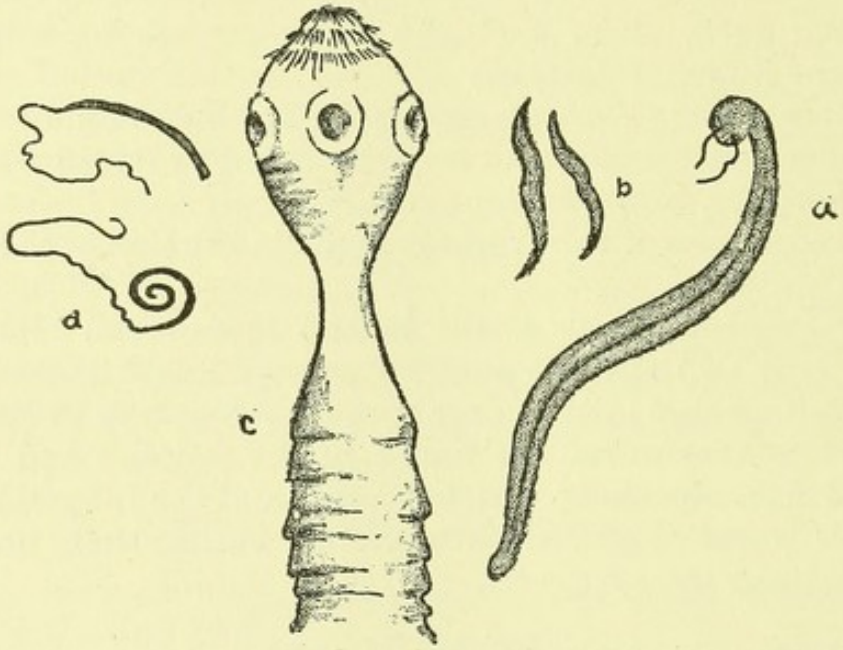


Fig. 30.—*a*, Ascaris lumbricoides; *b*, Oxyuris vermicularis; *c*, Tænia solium; *d*, Trichocephalus dispar.

Symptoms.—The symptoms of worms in the intestinal tract are variously described by authors and thought much of by the laity. In general they may be said, at the outset, to be greatly exaggerated. It is true that in case of great numbers of worms in the alimentary canal the general health may suffer, the tongue become coated, the appetite impaired, and there may even be some fever at times, the so-called worm fever. Among some children even convulsions may occur. Increased flow of saliva, nausea, vomiting, colicky pains, and diarrhœa are sometimes caused by worms in large quantities. Picking at the nose, itching at the anus, and choreic movements are also attributed by the laity to worms in the alimentary canal. There is no doubt that the Oxyuris vermicularis, by its presence in the rectum, does often cause intense itching about the anus.

But frequently there are no symptoms whatever, and worms of any kind are only known to be present in many cases by seeing them wholly or in part vomited or passed with the fæces. Children with catarrh about the vulva should be carefully exam-

ined, since it is not uncommonly due to the presence of the Oxyuris vermicularis that has crawled into it from the anus. Owing to the usual seat of the Trichocephalus dispar in the cæcum, no symptoms whatever may be observed.

Treatment.—Prophylaxis requires that meat and fish be thoroughly cooked so as to destroy the cysticerci. In like manner children should be forbidden the eating of cheap and inferior pastry and the like.

When it is found, however, that a patient has tape-worm, the question arises, What is the best remedy? The oil of filix mas is one of the best and is also safe. (℞ Olei filicis maris, ʒ ij.; mucilag. acaciæ, q.s. ad fl. ℥ i. M. Sig. Shake well, and give a teaspoonful every hour, commencing early in the morning.) There is no necessity for the patient always to undergo preparatory fasting or purgation. Only when the bowels are habitually costive should they be unloaded by a saline cathartic, and the diet be then somewhat restricted the day before administering the remedy. During the day while giving it, the diet should be light, consisting of a little milk. A teaspoonful of the mixture containing the oil of filix mas should be given early in the morning, say six, eight, or nine o'clock. This should be repeated every hour until the ounce mixture is taken. A brisk purgative like castor oil should be given about noon or a little later, so that purgation will follow soon after the last dose of filix mas is taken. The patient should sit over a vessel containing tepid water, so that the parasite allows itself to be wholly expelled. This precaution is especially necessary with the aged and young children, in whom peristalsis is not so strong as during middle life. Sometimes one, sometimes two, or even more tape-worms may be expelled at the same time. The filix mas may also be given in capsule, a very convenient method.

There are other remedies, of which the flowers of kousso make one of the best. This remedy is really a tænicide, and, but for the fact of its being a delicate preparation and consequently inert in many instances, it would be by far the best remedy in case of tape-worm. (℞ Pulv. kousso, ʒ ij.; aquæ bullient., ℥ iv. M. ft. decoct. Sig. Take all at once.) Kousso tablets are also given. Nausea and even vomiting sometimes follow the administration of kousso or its preparations, and for that reason the patient should lie quietly for a short time after taking a dose of it, for fear of vomiting.

The bark of the pomegranate root is about third in the list of remedies for tape-worm. (℞ Granati rad. corticis, ℥ ij.; aquæ, Oij. M. Boil down to Oi. Sig. Wineglassful ter die.) Or it may be boiled down to five ounces, and a drachm of the oil of filix mas be then added. The whole should be divided into four

doses and taken at intervals of about four hours. Instead of this, the active principle may be taken—five grains of pelletierine ter die. (℞ Pelletierinæ, ℈i. Ft. cht. No. iv. Sig. One every three hours.)

The three above-named remedies—oil of filix mas, kousso, and pomegranate—are by far the best, and in the order named, according to the author's experience.

There are various other remedies, however, said to be cures in this affection, and it is well to mention some. Chloroform is undoubtedly a tænicide, and proves effectual in doses sufficiently large. But there is also danger of killing the patient, as has been done. Why run any such risk when other harmless and equally efficacious remedies are at hand?

Kamala is also a good remedy, in Abyssinia, no doubt. But, like kousso, it is a very delicate preparation, and by the time it arrives in New York it is quite inert. Time is lost by administering kamala.

Turpentine is a remedy much advocated by some. But this also is a dangerous drug. Acute tubular nephritis is a not infrequent consequence of the administration of turpentine. For this reason large doses (tablespoonful) are recommended instead of a few drops. At best it is inferior to any of the above-mentioned remedies, and there is no reason why the risk of tubular nephritis should be incurred. The same may be said of pine-needle oil. It is also extremely uncertain in its action. It should be given in a little milk.

Carbolic acid is also recommended by some. It is, to a limited extent, capable of expelling portions of tape-worm, but is altogether inferior to the foregoing. Calomel in large doses is likewise suggested. As a purgative it may be used as a preparatory treatment for the administration of other remedies, but by itself it is practically useless.

Pumpkin-seed has been specially reserved to the last, as being the most inefficient of all the remedies for expulsion of tape-worm. The fresh seed exert a limited influence in expelling tape-worm, but as obtained in the drug-shops it is usually dried up and inert. Practically it is the least desirable remedy for tape-worm known.

Whatever drug is used, we know that a complete cure is effected only when the head is expelled. This can be found by diluting the fæces with water, stirring them up thoroughly and then pouring off the fluid. The worm is found at the bottom of the vessel.

Regarding treatment for round worms, there are also various remedies. In the case of pin or seat worms (Oxyuris vermicularis), the bowels should be unloaded first by a simple ene-

ma of glycerin and water. Then diluted vinegar may be injected, or a five-per-cent solution of carbolic acid, or a weak solution of salt in water. This may be repeated once daily. The vulva, when affected, should also be washed out by a tepid solution of the same kind. A cure by these means will be effected in time. The tinct. ferri chloridi in solution also makes a very good injection in these instances. In the case of Ascaris lumbricoides or large round worms, and the Trichocephalus dispar or whip-worm, the best remedy is the fluid extract of pink and senna. (℞ Extr. spigeliæ et sennæ, fl. ℥ ij. Sig. ʒ i. ter die.) Mucuna, oil of chenopodium, and santonin are also highly recommended. Santonin is untrustworthy, as well as mucuna. The officinal preparation of pink and senna is by far the best.

Cleanliness and attention to the general health are requisite in all cases. Not only nutritious diet and fresh air may be needed, but also preparations of iron in cases of marked anæmia.

Colic.

Colic is intestinal pain of functional origin, and is not due to organic lesion. Strictly speaking it has reference to pain in the colon, but the term is applied also when the pain may be located in the small intestine, or both. A more correct term, perhaps, would be enteralgia.

Colic receives different names according to its mode of origin, as flatulent or crapulous colic, bilious colic, lead colic, and the like. In lead colic the motor cells of the anterior horns of the gray substance of the spinal cord are primarily affected.

Etiology.—Flatulent or crapulous colic is due to eating too much or else indigestible and irritating articles of food, such as green fruit. Bilious colic depends upon derangement of the liver, generally with exposure to cold. Lead colic or, as Flint terms it, lead enteralgia, is due to lead poisoning, whether the lead be introduced into the system through the skin, air passages, or the stomach. Painters, especially those who work indoors, are liable to this disease, and hence the name of painters' colic. Gouty, rheumatic, and hysterical colic are also mentioned by various authors.

Symptoms.—In all cases of colic, paroxysms of abdominal pain chiefly attract the attention both of the patient and physician. In most cases the bowels are constipated. Absence of fever is also noticeable. During the paroxysms the patient rolls about on the bed and sometimes assumes the most grotesque positions in seeking relief from pain. The pulse becomes frequent and feeble, the face often pale, and the surface cool and clammy. In some cases there is profuse perspiration. Pressure over the abdomen

relieves rather than increases pain. In flatulent or wind colic, the abdomen is distended with flatus, the escape of which gives relief. It may last several hours when the paroxysms become milder and there is much rumbling of the bowels with the escape of flatus, discharge of urine, belching, and the like. In some cases this colic in adults is periodical in character, and is then thought to be due to malarial influence.

In bilious colic, nausea and vomiting are of much more frequent occurrence than in flatulent colic. The bowels are constipated and tongue coated, and in some cases there may be slight fever or even jaundice if the attack be prolonged.

Lead colic, so called, is purely an intestinal neuralgia. It usually comes on suddenly, though the patient may have previously been losing somewhat as regards the general health. The pain as a rule begins in the umbilical region and radiates out in every direction. The abdomen is retracted and feels as hard as a board. Along with this pain, there is obstinate constipation. The cause of this constipation is thought to be due to the pain which paralyzes temporarily all peristaltic action of the bowels. It is clear that this temporary condition of obstinate constipation is not due to lead paralysis and atrophy of the muscular coat of the intestines, otherwise it would be more permanent.

That the pain is neuralgic in character, and not due to inflammation or to spasm of the muscular coat of the bowels, is obvious; otherwise, instead of obstinate constipation, there should be diarrhœa or dysentery. Moreover, in the few cases where post-mortem examination has been made, no trace of inflammation was found, and it is hardly possible for muscular spasm to continue without interruption for a week or indefinitely, as lead colic does without proper treatment. Collections of gas cannot account for the pain, since they are not noticeably present, nor is relief usually accompanied by marked escape of flatus, as in wind colic.

The so-called blue line along the gums was first mentioned by Dr. Henry Burton, of London, in 1840. It is said to be due to the action on lead of sulphuretted hydrogen generated about unclean teeth. Niemeyer calls it a dark slate-gray line. Flint truthfully states that the line is wanting where the teeth are missing. The truth is that bad and unclean teeth will often give rise to this line, independently of lead poisoning. Beyond being an occasional clinical curiosity, therefore, it appears to be of little importance.

Diagnosis.—From peritonitis, colic is readily distinguished by the facts that in peritonitis there is fever, and the abdomen is so sensitive to pressure that the patient lies perfectly still on the back with the knees drawn up. In colic, on the contrary, pres-

sure often relieves pain, and the patient becomes extremely restless, assuming first one position and then another, seeking relief.

In gall-stone and renal colic, the pain is situated in particular localities respectively, and there are other distinctive symptoms of those diseases, to which the reader is referred.

Lead colic is distinguished from copper colic by the facts that in copper colic the abdomen is distended instead of retracted, pain is increased by pressure, and there is diarrhœa instead of constipation. The gums are also said to be purple instead of blue!

Prognosis.—This is uniformly favorable, and death rarely happens except from some coexisting disease.

Treatment.—In ordinary attacks of colic among adults, little or no treatment may be required, as the attack soon passes off. In severe cases, however, a teaspoonful of Squibb's cholera mixture (Tinct. opii composita) in a little water is one of the best remedies known. In place of this, a little paregoric or other anodyne may be given, and a large mustard paste be spread over the abdomen. Those cases requiring the administration of emetics and cathartics or enemas are very rare. In very severe cases the hypodermic injection of a few drops of Magendie's solution of morphine often effects a cure. After the pain is over, a suitable cathartic may be given if thought necessary. Among children catnip tea is a favorite household remedy. Emetics also act much better among children than adults, as a rule. A few drops of paregoric may also be given, with great caution, in very severe cases.

Hewitt's mixture is good in hysterical colic as sometimes observed among nervous women. (℞ Spts. æther. comp., spts. ammoniæ aromat., tr. lavandulæ comp., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. every hour or so until relieved.) The treatment of lead colic consists chiefly in allaying the pain. This done, the bowels often move of themselves. To give drastic cathartics, on the other hand, under the supposition that the constipation was the cause of the colic, is unscientific. Perhaps the simplest as well as the best way to treat lead colic is to give a hypodermic injection of morphine sufficient to relieve pain. A cathartic may also be given at the same time for the moral effect a free passage from the bowels would produce, if nothing else. Twenty-five or thirty drops of laudanum, or some paregoric with a half-ounce of Epsom salts dissolved in water, is a very certain remedy in this disease. But the cathartic should not be given without the anodyne, as not only will no stool be produced, but injury will be done by such a course. Instead of Epsom salts, castor oil may be used with the opium. Loomis' plan was to give croton oil, morphine, and belladonna in combination. (℞

Olei tiglii, gtt. iij.; morphinæ sulph., extr. belladonnæ, āā gr. ss. M. ft. pil. No. iij. Sig. One every two hours until relieved.)

After the colic is over, the patient should be placed on iodide of potassium in order to eliminate the lead from the system. Melsens, of Paris, in 1849, first discovered the value of this remedy. It forms the soluble iodide of lead which is eliminated by the kidneys. (℞ Pulv. potass. iodidi, ʒviij.; aquæ, ℥ ij. M. Sig. ʒ i. ter die.) This should be continued as a rule for about six weeks. In some very bad cases, larger doses of iodide of potassium have to be given and continued for a longer period. Should drop-wrist occur due to paralysis of the extensor muscles of the forearm, electricity should be used, while dry rubbing, kneading, and otherwise stimulating the atrophied muscles should be performed meantime. The galvanic current is alone of use, since there is no response to the faradic. In marked cases the interrupted galvanic current may be used, and if necessary the poles changed. The strength of the current should be about fifteen to twenty cells according to circumstances. The negative pole should be placed over the musculo-spiral nerve in the arm or the middle cervical vertebra, and the positive pole over the motor points or bellies of the affected muscles of the forearm, for about two to five minutes for each muscle. As the case improves, the faradic current may be substituted.

There are other remedies used in the treatment of lead poisoning, among which mention may be made of alum. This notion was first started, in 1752, by Grashuis, a Dutch physician. He thought that alum, which is the sulphate of alum and potash or ammonia, would be good on account of the sulphuric acid in it. This would combine with the lead and form the insoluble sulphate of lead, which he concluded would be inert. In the first place, it is very doubtful, certainly not proven, that the sulphuric acid of the alum combines with the lead; and in the second, sulphate of lead is not inert, though it is the least poisonous. Later on, Gendrin, of Paris, conceived the idea that dilute sulphuric acid, the so-called sulphuric-acid lemonade, might be given instead of the alum. Even now the dilute sulphuric acid is given as a prophylactic among workmen. Inquiry on this point, however, has convinced the author that it is not a prophylactic, at least for all. Milk is also claimed as a prophylactic, but beyond its being a valuable article of diet it has no relation to this disease.

Peritonitis.

Peritonitis is inflammation of the peritoneum, the serous membrane that covers the intestines, and is reflected on the walls of the abdominal cavity. Being of great extent, diffuse inflamma-

tion of this membrane is one of the most formidable diseases that the physician is ever called upon to treat.

Etiology and Pathology.—Peritonitis may be acute or chronic and general or local.

Acute diffuse peritonitis is caused by extension of inflammation from the gastro-intestinal tract, as may occur in ulcerative processes in typhoid fever for instance, dysentery, foreign bodies in the vermiform appendix, intestinal obstruction, and the like. Secondly, it may be due to extension of inflammation from the uterus in labors, miscarriages, abortions, and surgical operations on that organ. In other cases peritonitis is caused by absorption of septic material in the uterus which gives rise to peritonitis without there being any inflammation of the uterus. Thirdly, extension of inflammation from other abdominal viscera, as the liver and kidney, and discharge of abscesses and cysts in various localities, may cause peritonitis. Fourthly, like inflammations of other serous membranes, peritonitis may occur in the course of Bright's disease of the kidneys, or it may even occur idiopathically or as a rheumatic disease. Such cases are exceedingly rare, no doubt, but the author believes he has seen two. Finally, peritonitis may be due to penetrating gun-shot and stab wounds of the abdomen, and other surgical injuries. The membrane becomes highly injected, and ecchymotic spots are not infrequently observed. More or less sero-fibrin is usually found in the abdominal cavity, as well as pus. False membranes and adhesions form rapidly, and coils of intestines are not infrequently found glued together.

Chronic general peritonitis is usually of tubercular origin. Rarely it may result from the acute form, and in other cases there appears to be no satisfactory cause. In these instances the peritoneum becomes greatly thickened and the bowels are matted together as if mutton suet had been poured between them. There is very little fluid effusion, and often none. In other cases there is abdominal dropsy.

Local peritonitis, also called circumscribed peritonitis, may be due to cancerous formations or any cause that would give rise to general peritonitis, except that adhesions form around it so quickly that it necessarily becomes limited or encapsulated, as it is sometimes called. It is not known exactly why in some cases peritonitis becomes limited in this way and in others not.

Symptoms.—Acute diffuse peritonitis sometimes begins with a chill. In other cases, where the disease is secondary to some grave affection, the symptoms may at first be masked. When due to extension of inflammation from other organs, it sometimes comes on gradually.

Pain, however, is usually one of the first signs. It begins at

some one point, and rapidly spreads over the whole abdomen. The pain is sometimes darting in character, or there may even be brief remissions, only to return again with more intensity than before. The pain is increased by the least movement or by deep inspiration, and the weight of the bedclothes is unbearable. The position of the patient in bed is therefore characteristic—on the back with the knees drawn up. By this means tension of the abdominal muscles is relaxed and pressure from the bedclothes relieved.

Vomiting is another almost certain symptom to occur. At first the contents of the stomach, then watery mucus, and lastly the spinach-green fluid due to discoloration from bile. The vomiting, when it occurs early, is no doubt caused by reflex action, but later on it is probably due also in part to the pressure from the distended intestines. Constipation is likewise present. This and the tympanites already referred to are undoubtedly due to the paretic condition of the intestinal muscular coat.

The pulse very early becomes frequent and feeble, running up to 120 per minute and often more. The temperature is not so high as might be expected. While the surface feels cool, however, the thermometer in the mouth or rectum may mark a temperature of 103°. It is usually remittent to a noticeable degree, being lowest in the morning. The mind remains clear to the end, as a rule.

Physical Examination.—On inspection, the patient is seen to lie on the back with the knees drawn up, as already remarked. The respirations are about 30 to 40 per minute and chiefly thoracic, even in men. This hurried breathing is doubtless due in part to the pressure upward against the diaphragm and lungs caused by the tympanites. The abdomen is observed to be distended. Palpation is barely tolerated by the patient, on account of the pain it causes. Fluctuation, however, is sometimes felt. On percussion, tympanitic resonance is elicited all over the abdomen and much higher up the chest than normal. The superior border of liver-dulness may be carried up to the fourth rib. The heart is also pressed upward and impeded in its action. Auscultation is of little value, although peritonitic friction sounds are sometimes heard coincident with the respiratory movements.

As the disease progresses, the features become pinched, the countenance anxious, the eyes hollow and sunken, the extremities cool, and the hands often bluish. Collapse, heart failure, and death follow, as a rule.

There are exceptions in the symptoms in some cases. For instance, the author remembers one in which there was neither pain nor tympanites. Vomiting occurred early, and there was the characteristic pulse. In a day or two the patient complained

of pain in her cheek. Soon one parotid gland began to swell, then the other. The inflammation extended to the neck, and she speedily died of œdema glottidis, without peritonitis ever having been once suspected. Dr. Francis Delafield made the post-mortem examination. Judge of the astonishment of all present, when it turned out to be a case of purulent diffuse peritonitis that had been rapidly fatal with metastatic parotitis.

In chronic peritonitis from any cause, symptoms are not so marked as in the acute form, and the pain is more apt to be paroxysmal. The abdomen is never so tympanitic, and sometimes the walls are actually drawn in. More or less fever is usually present, as well as nausea and vomiting. Instead of constipation, however, there is generally diarrhœa. Ascites is frequently observed. Local or circumscribed peritonitis is commonly subacute in character. When due to cancer, the latter, as a rule, is secondary. It can often be felt on palpation. Not infrequently fluid is encapsulated by the adhesions which surround it and limit the inflammation.

Diagnosis.—It would be difficult to mistake peritonitis for any other disease when the symptoms are well marked. The fever and gravity of the symptoms, as well as the increase of pain on palpation and motion, are all in marked contrast to any form of colic or neuralgia, or muscular rheumatism of the abdominal walls. Even in case of suppuration of the abdominal walls, the diagnosis is easily made in a day or two by the absence of the constitutional signs of peritonitis and the superficial character of the swelling.

Prognosis.—The prognosis in acute diffuse peritonitis is to be regarded as generally unfavorable, despite improved methods of treatment. It is probably most favorable when due to extension of inflammation from other organs. But when caused by perforation of the intestine, rupture of organs, and discharge of abscesses and contents of cysts, as well as occurring in the puerperal state, it is almost invariably fatal. The cause of death is usually exhaustion and heart failure, or shock. The average duration of the disease is about five days, but the patient frequently dies in a few hours or a day or two, or in some cases life is prolonged a week or more. Should recovery take place, adhesions and constrictions of the intestines and bile duct, with permanent obstruction and jaundice, are apt to result.

Chronic peritonitis also ends in death from exhaustion after months of ill health. Localized peritonitis frequently ends in recovery unless it be due to cancer or involves some important organ.

Treatment.—The opium plan of treatment of peritonitis as advocated by the late Dr. Alonzo Clark, of this city, is that chiefly

in vogue in America. His plan was to give half-grain of morphine or its equivalent, and repeat the dose every two hours until the respirations were brought down to twelve per minute, the pupils moderately contracted, the pulse about 80, peristalsis quieted, and pain controlled. If this effect was not produced after two doses, then the drug was to be increased by one grain of opium or its equivalent every two hours until the desired effect was observed. Some patients require large quantities of opium to become thus influenced and all who suffer with peritonitis acquire a great tolerance for the drug at the outset. Whatever preparation is begun with, should be continued. Regarding opium pills, however, unless they are fresh and easily digested, they are liable to accumulate in the gastro-intestinal tract and produce poisoning. By the hypodermic method, the dose can be regulated with precision, although it requires many punctures. Perhaps morphine by the mouth is as good as any. The bowels are to be let absolutely alone. For thirst, bits of cracked ice are given.

The nourishment should consist of small quantities of milk or milk punch, say about three ounces every two or three hours.

Applications over the abdomen, such as hot fomentations, cold compresses, and turpentine stupes are recommended by authors, but I have never seen them do the least good. Loomis' plan of pricking the distended intestine with a hypodermic needle for relieving the tympanites I have never tried. A long catheter introduced into the rectum, as in typhoid fever, not infrequently gives much relief by letting off the flatus. Both vomiting and hiccough are better controlled by the opium and cracked ice than any other means. Carbonated water or champagne in small doses may also be tried. If the temperature runs higher than 103° F., five-grain tablets of antifebrin may be given at intervals of three or four hours. Quinine does not appear to have the slightest control over the fever. But the opium treatment should be kept up for about a week on the average. If upon gradually letting up with this treatment it is found that the patient is not yet sufficiently convalescent, it may be resumed again at once.

The bowels usually move spontaneously after about a week has elapsed during convalescence, but if not, then by that time and not before may a laxative be given. Of these, castor oil is about the best, though a small dose of salts would probably answer.

To sum up Clark's treatment of peritonitis, give two or three grains of opium or its equivalent in morphine, and repeat after an interval of two hours, observing the effects carefully. If the required opium symptoms are present, as already described, this dose is continued about every two hours. If not, the dose is increased by one grain of opium or its equivalent

at intervals of two hours until the tolerance of the patient is known.

Chronic peritonitis is to be treated by external applications, such as the compound iodine ointment, rubbed on once daily, or less if it blisters. The internal administration of syr. ferri iodidi and cod-liver oil is also recommended. The food should be highly nutritious. Anodynes have to be used sometimes if pain be so severe as to require it.

For local peritonitis, a modified plan of the treatment of diffuse peritonitis together with counter-irritation may be adopted.

For the treatment of puerperal peritonitis, drainage, and washing out the abdominal cavity with antiseptic fluids, the reader is referred to works on obstetrics and surgery.

So far as pelvic peritonitis following laparatomy is concerned, gynæcologists nowadays do not hesitate to employ what is now termed the saline treatment· that is, they relieve the bowels with small purgative doses of Epsom or other salts as soon as symptoms of peritonitis appear. By this means it is claimed that the disease can often be aborted as well as cured. Only in cases where the patient is suffering markedly from shock do they give opium.

Ascites.

Ascites, hydroperitoneum, or abdominal dropsy is the accumulation of transuded serum in the abdominal cavity, either as a symptom of general dropsy or due to obstruction to the portal circulation.

We therefore find it associated with various affections of the kidney, mitral lesions, and general vesicular emphysema, when they give rise to general dropsy. We also find it in cirrhosis of the liver, thrombosis of the portal vein, tumors pressing on the portal vein, and any disease of the liver that causes obstruction to the portal circulation. The symptoms of ascites are chiefly those of a sense of weight and oppression in the abdomen and, above all, dyspnœa from pressure upward against the diaphragm and lungs. The heart may also be displaced upward and its action impeded or rendered irregular for want of room. Vomiting, due to pressure on the stomach, is sometimes present when the amount of fluid is considerable and the patient's stomach is irritable. Loss of appetite, and diarrhœa, lead to emaciation, chiefly noticeable in the extremities; sometimes there is obstinate constipation. Though the ascites be local at first, yet from pressure due to increased amount of fluid and the anæmic condition of the patient, œdema of the lower extremities is almost certain to follow in time. In case of cirrhosis of the liver, œdema of the lower extremities occurs early if the inferior vena cava passes through

a foramen in the posterior border of the liver instead of a fissure.

Physical Signs.—On inspection, the abdomen is symmetrically prominent and globular while the patient is in the sitting or erect position. The superficial veins are distended. Upon lying down, the abdomen becomes flattened on top and distended at the sides, where the fluid gravitates. The respiration is chiefly thoracic, and somewhat shorter and more rapid than normal. The apex beat of the heart may be noticed to be pushed up higher than usual.

On palpation, we notice fluctuation. If one hand be placed on one side of the abdomen and with the other a sharp tap be given on the other side, a wave-like impulse is imparted that is characteristic of the presence of fluid. Percussion elicits marked dulness or flatness over the most dependent portions where the fluid has gravitated, but tympany on top where the intestines float. These signs change with position of the patient, tympany being always obtained on top, and marked dulness or flatness at the most dependent portions on account of gravitation of the ascitic fluid.

Diagnosis.—Ascites might be mistaken for ovarian cyst. But ovarian cyst always begins on one side and the enlargement is not symmetrical as in the case of ascites. Moreover, the dulness obtained on percussion in ovarian cyst does not change with position of the patient. In abdominal dropsy, also, the fluid obtained by aspiration is usually of a low specific gravity—about 1,012 or under. In ovarian cyst and peritoneal exudation it is more albuminous and the specific gravity is usually 1,020 or higher. In ascites there is associated the history of liver, heart, or renal disease.

Prognosis and Treatment.—The prognosis of ascites is usually unfavorable, since the cause on which it depends is generally incurable. The treatment, therefore, besides being directed to the original cause of the disease, is chiefly symptomatic. This has reference to relieving the distention and the pressure upward against the diaphragm so as to allow respiratory movements, and also the pressure against the stomach and neighboring viscera so as to favor digestion and nutrition. For this purpose the fluid must be diminished in quantity. This may be done by means of hydragogue cathartics, diuretics, and diaphoretics, but they weaken the patient without accomplishing the real object to a desirable extent. For these reasons, tapping the abdomen is to be preferred.

The bladder should be emptied by means of a catheter if necessary. While the patient is in the sitting posture, the trocar and canula, of medium size, should be plunged into the abdomen in the median line about half-way between the umbilicus and

pubes. If the skin is thick and tough, a primary incision through it may be made with a bistoury. The patient should be given a little whiskey and water before the operation, and stimulants should be at hand in case of need. To avoid fainting or rupture of vessels, a many tailed bandage may be placed around the abdomen and gradually tightened as the fluid escapes. I have never found this necessary. A neatly fitting bandage may be applied afterward. The fluid should be allowed to run as long as it will, even with compression of the abdominal parietes, unless some accident happens to prevent, and the wound be closed with a piece of antiseptic cotton and plaster. In some cases the fluid will continue to dribble, but this appears to do no harm.

The operation of tapping does not remove the original cause, and the fluid often rapidly accumulates again. As each operation weakens the patient, it should be reserved until urgent symptoms require its performance.

The diet should be highly nutritious, including a moderate amount of stimulants if necessary. Should the ascites depend on general dropsy connected with renal or heart disease, the infusion of digitalis may be used with great advantage. To this the acetate of potash and sweet spirits of nitre may be added. (℞ Pulv. potass. acetat., spts. ætheris nitrosi, āā ℥ ss.; infusi digitalis, q.s. ad fl. ℥ viij. M. Sig. Tablespoonful ter die and bed-time.)

CHAPTER VI.

ACUTE INFECTIOUS DISEASES.

Typhoid Fever.

Etiology and Pathology.—Typhoid fever is an acute febrile disease that is contagious under certain conditions to be described hereafter. It is invariably associated with lesions of intestinal and mesenteric glands, enlargement of the spleen, and muscular degeneration, and lasts about four weeks altogether. It was first so named by Louis, of Paris, about 1840, on account of the stupor or delirium that is so commonly a symptom; but, since many diseases are in this sense of a typhoid character, authors have at different times endeavored to give it a better name. Of these the best perhaps is enteric fever, on account of the characteristic intestinal lesions, as was first suggested by Dr. George B. Wood, of Philadelphia, Penn., about 1855, and now generally used by the English. Among the Germans it is known as abdominal typhus. Other names are cess-pool fever, gastric fever, autumnal fever, and the like.

It is caused by a specific poison, the germ of which is now known as the bacillus of Eberth. The poison is contained in the aloine discharges of patients suffering with the disease, but not in the fresh fæces. For this reason, typhoid-fever patients may be placed side by side in hospitals or elsewhere, without danger of contagion, if requisite hygienic precautions are observed, such as the immediate removal and destruction or thorough disinfection of the stools. But the dejecta must first undergo outside the body some change, perhaps not yet thoroughly understood, before the specific poison becomes active. This change is specially favored in such localities as sewers, cess-pools, and the like. The chief vehicles of contagion are water, food, and air, particularly water. The spontaneous origin of typhoid fever under certain conditions is yet a subject for dispute. But this mode of its production appears as yet to lack positive proof, however strong the circumstantial evidence may be in certain isolated cases. That a disease very much resembling typhoid fever in some of its symptoms may result from exposure to putrescent animal effluvia and other deleterious influences is well known, but, apart from the specific typhoid-fever poison, the characteristic intesti-

nal lesions of that disease will be absent. In some cases it has been difficult or even impossible to trace the poison, and for that reason a spontaneous origin has been claimed for it. But the same may be said of scarlet fever or any other disease.

The typhoid germ is possessed of great vitality, as is not only well known, but has also been thoroughly proved in a series of very interesting experiments by Dr. T. M. Prudden, of this city, in which it was found that the bacteria of typhoid (enteric) fever lived even in ice for an indefinite period (New York *Medical Record*, March 26th, 1889).

Typhoid fever attacks people usually between fifteen and thirty years of age, and is rarely observed in those over fifty, or during the first year of infancy. One attack may exempt the patient from the disease in future, but it is not the invariable rule by any means. This would appear to be due, in some cases at least, to the fact that not all the intestinal glands had been affected in the first attack, but some escaping became the seat of the disease in a subsequent attack, or relapse. It occurs in all parts of the world and at any season of the year, but more particularly in temperate regions and during the autumn.

Besides parenchymatous degeneration of various organs, hypostatic congestions, emaciation, subcutaneous ulcerations, thrombi, emboli, and resultant infarctions that may or may not occur, there remain for special consideration the intestinal lesions with more or less enlargement of mesenteric glands, the enlargement of the spleen, and the degeneration of muscular tissue, notably the heart.

The essential and invariable lesions of typhoid (enteric) fever are the changes that are produced in Peyer's glands of the small intestines, especially in the neighborhood of the ileo-cæcal valve. These changes vary progressively from hyperæmia through ulceration to cicatrization.

During the first week there is more or less intestinal catarrh, especially about these glands, so that the latter become swollen and elevated, causing the agminated glands to resemble the so-called shaven beard. This condition becomes more marked during the second week; and during the third week, unless resolution shall have taken place, as may happen in some mild cases, ulceration occurs. These ulcers, while they are found near the ileo-cæcal valve, where they sometimes attain a large size, may be scattered throughout the intestinal tract. In some cases perforation results, as is well known, giving rise to rapidly fatal peritonitis. During the fourth week, in favorable cases, cicatrization of these ulcers begins, and the process is continued until they heal, leaving a slightly depressed area, that varies in size and shape, and is often devoid of mucous membrane.

The mesenteric glands become enlarged secondarily to these intestinal lesions by absorption, those near the ileo-cæcal valve being especially affected. At first they are congested, and then inflamed, reaching their maximum size of a walnut or hen's egg, about the third week, when they may be distinctly felt, especially in children who have become markedly emaciated. The inflammation here, as elsewhere, undergoes resolution in favorable cases, and the glands return to their normal size and condition. In other cases they may undergo softening and entirely disappear by absorption, or, rupturing, they may cause perito-

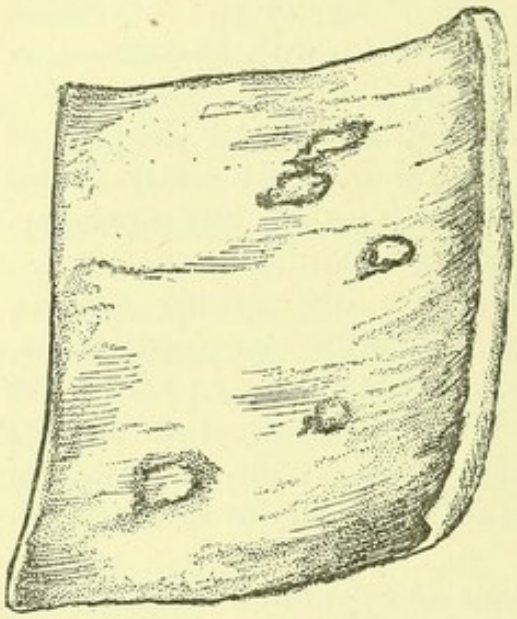


FIG. 31.—ULCERATION OF PEYER'S GLANDS IN THE SMALL INTESTINES IN TYPHOID FEVER.

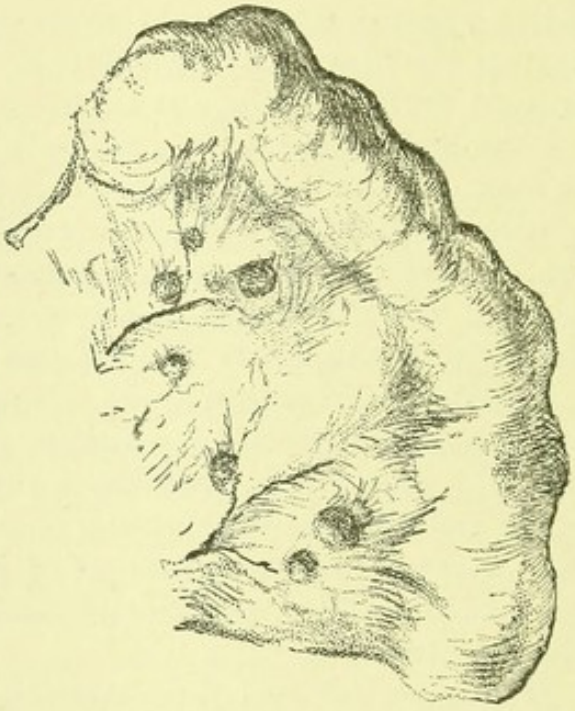


FIG. 32.—ENLARGEMENT OF THE MESENTERIC GLANDS IN TYPHOID FEVER.

nitis. Finally they may undergo caseous or calcareous degeneration.

The spleen is invariably congested and enlarged, sometimes two or three times its normal size or even larger. This is best told by palpation, on account of the tympanites that generally accompanies the disease. It also becomes purplish-black in color, and so soft and friable in consistence that it readily breaks down under pressure, and sometimes ruptures. This swelling of the spleen is not caused by any hepatic disorder or obstruction to the portal circulation, but accompanies typhoid fever, as it does any acute infectious disease, and is probably due to the infection itself. Hence it is termed acute splenic tumor by various authors, in this and other acute infectious diseases. The heart, as well as other striated muscular tissue throughout the body, according to Zenker, undergoes temporary granular or waxy de-

generation. This important fact should always be borne in mind in the treatment of this disease, as it shows that cardiac depressants in general are altogether contra-indicated, or else are to be used with great caution.

Less important are changes occurring in other organs. The liver, for instance, does not appear to undergo marked changes, nor are they regular or invariable. Disturbance of hepatic func-

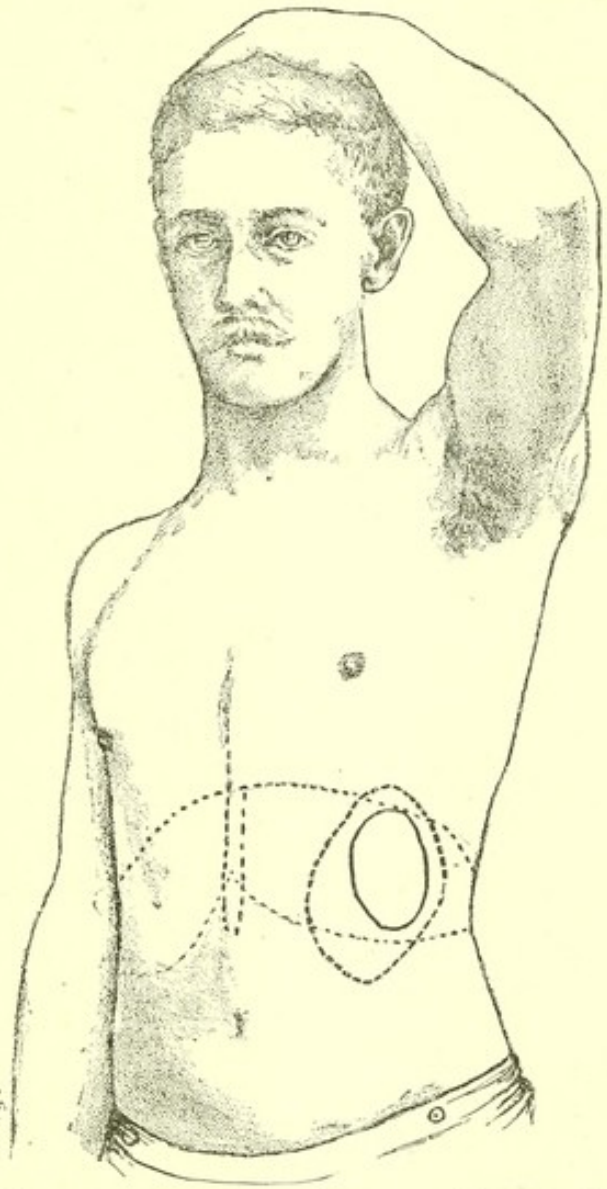


FIG. 33.—ENLARGEMENT OF THE SPLEEN IN TYPHOID FEVER

tion resulting in abnormal and insufficient biliary secretion is no doubt an important factor, but it is the result of a general impairment rather than any action of the typhoid-fever poison on the liver itself. When any lesion of the liver exists, it appears to be limited to granular or fatty degeneration of some of the hepatic cells.

Catarrhal inflammation of the larynx and bronchi is frequently present. There are no special lesions of the brain or nervous system in general.

Symptoms.—After a period of incubation, which is variable and unknown, but averaging some two or three weeks, the patient has a chilly feeling, becomes languid, loses appetite, and complains of headache, pain in the back and limbs. He hangs around the fire and has an aversion, said the late Dr. Alonzo Clark, to putting his hands in water. The symptoms, once begun, vary with, and are often characteristic of, each week of the disease.

Pain and tenderness, especially under pressure in the right iliac fossa, may be noticed early, and continue throughout the attack. It is caused doubtless by the characteristic intestinal lesions, but is never severe and is often absent.

The temperature of a typical case is characteristic. During

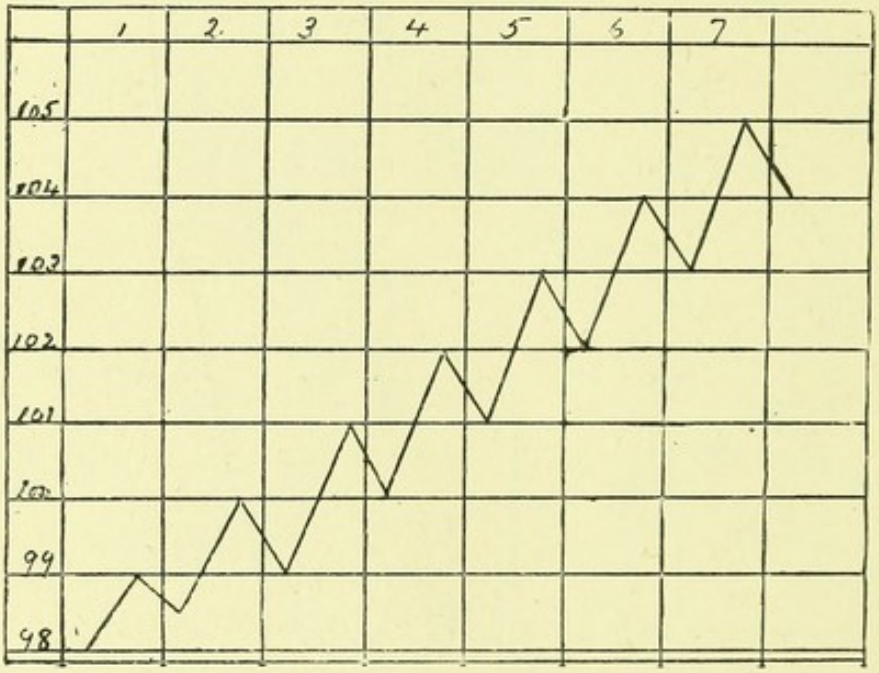


FIG. 34.—TEMPERATURE CURVE IN TYPHOID FEVER, FIRST WEEK.

the first week this gradually rises, the evening temperature being about 2° F. higher than it was in the morning and 1° F. higher than on the evening before, so that it reaches its maximum of 104° F. to 105° F. by the end of the first week, when the fastigium (height) is usually attained. During the second week the temperature remains at about what it was at the end of the first week, but more or less exacerbating and remitting, being about 1° F. higher in the evening than in the morning. During the third week, it remits more noticeably in favorable cases, and in the fourth week it intermits, gradually becoming normal.

The pulse varies with the temperature, being more frequent, feeble, and irregular during the second and third weeks than at any other period of the attack.

The eruption on the abdomen usually appears at the end of the first week or during the second, and it generally remains

throughout the attack. Sometimes, however, it vanishes in a few days, or successive crops occur. Often it requires a very close search to find these spots, in other cases they are abundant, and finally they may be absent altogether, especially in elderly people. They disappear under pressure, and in this respect differ from the maculæ of typhus fever or hemorrhagic spots of purpura. Boils, abscesses, and bed-sores may also occur, but herpes labialis perhaps never, and thus there is a marked difference in this respect between typhoid and malarial fevers. The hair often falls out, but grows again more luxuriantly than ever if the patient lives and is young. The nails may also be affected.

Diarrhœa usually comes on during the first week, and is catarrhal in character, depending on the condition of the intestinal mucous membrane, and characterized by the well-known pea-soup stools. In some cases there may be constipation instead of diarrhœa. The bile being scant and pale, from deficient hepatic function, accounts for the light-colored (ochre) stools. Appearing later on in this disease, diarrhœa may be a very much more serious symptom, depending, as it frequently then does, on ulceration of Peyer's patches.

Hemorrhage may occur early, and then is usually of slight importance, whether it exists as a mild epistaxis or a scarcely perceptible discharge from the bowels. But later on it is more significant and requires prompt attention. When during the third week hemorrhage from the bowels occurs, it is probably due to ulcerative process. It varies in percentage as a complication. According to Liebermeister, it occurs in about seven per cent of the cases, Griesinger about five, Strümpell about ten, and Loomis twenty per cent. The fact is, it varies in different epidemics. Invariably there is a fall of temperature after hemorrhage in this as in other diseases, and sometimes collapse follows. In some cases it is the beginning of recovery. Should perforation occur, the patient usually succumbs to a rapidly developed and fatal peritonitis. This latter complication may result also independently of perforation, from extension of inflammation from intestinal and mesenteric lesions. Perforation occurs in about nine per cent of the cases, and nearly always on the right side and in the lower part of the small intestine. Recovery from this is among the rarest of accidents.

Tympanites, caused by accumulation of gas in the large intestine, from more or less paralysis of the walls of the latter while the sphincter ani remains capable, generally begins the second week and continues usually until convalescence is established. Gurgling (borborygmi) may or may not be heard on pressure, but is of no special consequence. Various causes are assigned by authors for tympanites, but the one given is probably correct,

and the case is similar to retention of urine in a paralyzed bladder. Hence the rational indication of treatment by means of a catheter in both instances.

Delirium is usually first noticed during the second week, and comes on at night. It continues, as a rule, throughout the disease, disappearing, in favorable cases, after a sound and refreshing sleep. Dulness of intellect and twitching of the muscles (subsultus tendinum) are nearly always present. The delirium may be low and muttering, or it may be violent. Not infrequently patients leave the bed and are subject to hallucinations or actual insanity. Among topers, delirium not uncommonly develops.

Insomnia, like delirium, may become a troublesome symptom. It also usually comes on about the second week. Besides these nervous symptoms, there may be atrophic paralysis of single muscles due to neuritis, neuralgia, cutaneous hyperæsthesia, or anæsthesia, general or local, and rarely spastic paralysis and ataxia of the lower extremities. The headache, so severe at first, generally disappears by the middle of the second week.

The causes of these nervous phenomena are not well understood. Bouchard, Lépine, and others would seem to attribute them to certain toxic influences arising from the formation of a certain virus similar to the poisonous alkaloids (ptomaines) that result from the chemical process going on in the presence of infectious agents. More likely it is due to anæmia and muscular degeneration with heart failure; for who has not seen the delirium disappear under the judicious administration of alcoholic stimulants, not only in typhoid fever, but in pneumonia and other diseases? Was the alcohol an antidote to a poison, or did it strengthen the heart and better supply the brain with blood?

The tongue, at first covered with a thin white coat, toward the end of the first week becomes red at its sides and tip. The dorsal papillæ become enlarged. By the second week the tongue has become brown and dry, and, with the lips, is often fissured. Sordes collect about the teeth, but very rarely does herpes occur on the lips toward the end.

Relapses occur sometimes after the patient has been thought to be out of danger and the physician has ceased his visits. These relapses are often difficult to account for. Not infrequently they are due perhaps to imprudence in eating and drinking. But also it may be for the reason that all the Peyer's glands have not been affected during the first attack, but now become the seat of the disease. In this way one or more relapses might occur.

Complications.—Such complications as hemorrhage and perforation with peritonitis have already been referred to. But about the third week in some cases the mouth and throat become sore, and the inflammation extending along Steno's duct causes

suppurative parotitis, which must always be regarded as a not only unpleasant but a grave complication. Besides these, bronchitis is not infrequent, and this is liable to become capillary and result in extensive broncho-pneumonia (catarrhal, lobular, hypostatic). The patient may be in such a state of stupor that there is no cough or expectoration. Hence the necessity of repeatedly shifting the position of the patient and making physical examination. Pleurisy, true lobar pneumonia, and even gangrene of the lungs and pneumothorax are among the possible complications, especially in the case of the intemperate and underfed. Laryngitis is not uncommon, and sometimes œdema glottidis occurs.

Endocarditis and pericarditis follow sometimes. In like manner, nephritis, pyelitis, cystitis, and orchitis may occur, and among pregnant women abortion or miscarriage is probably the rule. The courses are apt to come on during an attack, whether they are due or not. Thrombi and infarction are possibilities, and finally there may be periostitis of the tibia or ribs, or effusion into the joints.

The disease usually lasts about four weeks among adults, but among children its course is shorter.

Diagnosis.—In this the characteristic behavior of the temperature in typhoid fever, the enlargement of the spleen, the stools, and the tympanites are not to be overlooked. Unfortunately, however, genuine typhoid fever in America does not always follow the same fixed course. Sometimes there is constipation throughout the disease, sometimes there is a malarial element to deal with, and often there is no eruption whatever. Moreover, a great many diseases may by neglect or unscientific treatment assume the typhoid type, so that mistake in diagnosis is readily made.

In pneumonia, for instance, the patient not infrequently sinks into a typhoid condition, so that to a stranger the symptoms of true typhoid fever, especially in topers, are at once suggested. Physical examination alone furnishes a sure means of distinguishing the two at once.

Malarial fever in some parts of the United States will so closely resemble typhoid fever after the first week that no one can make a diagnosis except by a careful consideration of the onset of the disease if a history can be obtained, or else by the influence of positive doses of quinine in doubtful cases. The sudden onset of malarial fever, the chill, epigastric pain, vomiting, and rending headache, and above all the marked difference between the morning and evening temperature would generally lead to a correct diagnosis. The microscopic examination of blood obtained from the spleen by means of a hypodermic syringe for the

purpose of discovering the bacillus of Eberth has been recommended, but this is of rather doubtful utility in general practice.

Acute miliary tuberculosis may be mistaken for typhoid fever, but its onset is usually sudden with a very high temperature (105° F. at the outset) with marked dyspnœa, and upon close examination the primary tubercular lesion, on which the general outbreak depends, may be found. Sometimes, however, the diagnosis is very difficult.

A long list of diseases might naturally be included under the head of diagnosis, but strict attention to the early history of the attack, with a careful physical examination, will usually be sufficient.

Prognosis.—Typhoid fever is always to be regarded as a serious disease, especially among fat people. Among children it is milder and of shorter duration. Some cases are so light, on the other hand, that they are called walking cases. Severe symptoms may, however, suddenly set in, especially after imprudence in eating. The more marked the remission, the more favorable is the prognosis. On the other hand, a morning temperature of 104° F. is always unfavorable. Distressing tympanites is not a good sign, and is usually associated with extensive ulceration of the large intestine. Complications render the case unfavorable or hopeless according to their character. When death occurs it is usually about the third week, and is then generally due to exhaustion—failure of the organs, especially the heart, to perform their functions—or to some complication. Under the ordinary expectant plan of treatment in the city of New York, about forty-two per cent of cases die.

At such well-regulated and cleanly institutions as the New York Hospital, about twenty-four per cent of typhoid fever patients die under the same plan Under the cold-bath treatment, however, it is claimed that the death-rate in this disease has, of late years, been markedly diminished.

Treatment.—Although we have to deal with a disease which has for its cause a specific germ, no antidote has yet been discovered for its cure. The object of treatment, therefore, is not the administration of any particular antidote to the virus, but rather to sustain life until the poison has been eliminated; including, of course, the treatment of certain urgent symptoms as they arise, and the use of such remedies as will hasten the elimination or counteract the effect of the poison. For this reason the patient should be allowed an abundance of fresh air and an even temperature of about 65° F. The utmost cleanliness should be observed to avoid bed-sores, for instance, and the stools should be at once removed and thorougly disinfected or destroyed by

fire, or both, in order to avoid the spread of the disease to others, as well as relapses in the same individual. The best disinfectant is the American standard solution No. 1. Dissolve four ounces of the best chloride of lime (twenty-five per cent of chlorine) in a gallon of pure water. One quart of this is to be added to each discharge and mixed well and left in the vessel one hour before emptying it into the water-closet or privy. Vomited material is to be treated in the same way. There are other disinfectants, but that is the best and quickest in its action. Soiled clothing and the like should be at once boiled half an hour, and if the patient dies, the body should be wrappd in a sheet saturated with solution No. 1. About four to six ounces of nutritious and easily assimilable diet, such as milk, peptonized milk, koumyss, matzoon, kephir, or beef tea, should be given about every three hours during the day, and at night when the patient is awake.

The temperature naturally engages our attention, and should it rise above 103° F. it may become necessary to reduce it. There are two ways of doing this: (1) the internal administration of drugs and (2) the application of cold by some means.

Of the drugs usually given for this purpose may be mentioned antifebrin, phenacetin, antipyrine, and quinine; such depressing and dangerous remedies as veratrum, aconite, and kairin being out of the question altogether.

Antifebrin is the safest of all, and equally trustworthy. Being a resinous substance, it is not soluble in water. A very convenient form of giving it is in compressed tablet, or dissolved in a little whiskey and water. Three grains every two hours in the afternoon is usually sufficient to bring the temperature down to 102° F., and that is enough.

Phenacetin may be given, but it requires a dose of ten grains. Though a safe remedy, it appears to be no better than antifebrin. It is also a resinous substance and the dose is large.

Antipyrine, though very soluble and easily administered, has the disadvantage of being somewhat a cardiac depressant. For this reason it should be given, if at all, in combination with digitalis or alcoholic stimulants.

Sulphocarbolate of zinc in two-grain doses may be given in capsules. It acts not only as an internal disinfectant, but also reduces the temperature and is regarded as a very efficient remedy in typhoid fever, and preferable to naphthol.

A word as to quinine. Only a few years ago it was customary with some to give quinine, even in enormous doses, here in New York, to reduce temperature, not only in typhoid fever, but also in pneumonia and other diseases. In 1882, while visiting the General Hospital at Hamburg, in north Germany, it was found that, even at that date, quinine, as an antipyretic in typhoid

fever, had been abandoned there several years previously. The reasons were obvious. It did not appreciably reduce temperature, but it did increase head symptoms, such as delirium, deafness, ringing in the ears, insomnia, and such like nervous phenomena. That was before the discovery of antipyrine; and salicylic acid was regarded as too depressing for the heart; so that finally, for the reduction of the temperature, as well as the general comfort of the sufferer and the avoidance of bed-sores, typhoid-fever patients were placed upon water-beds supplied with two afferent tubes provided with stop-cocks for hot and cold water, and an escape-pipe at the foot of the bed. By these means the patient not only had a delightful couch, but the temperature could be regulated according to the requirements in each case. Since that plan had been adopted, it was the rare exception for a typhoid-fever patient to die, and even then it was usually con-

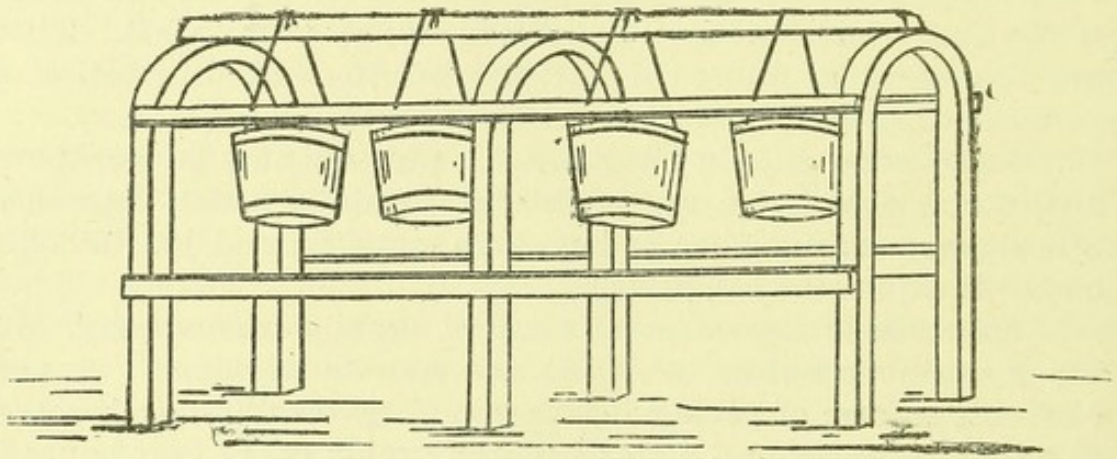


FIG. 35.—FENWICK'S APPARATUS.

fined to those who were brought to the hospital late in the course of the disease, which had been overlooked or badly treated before admission. On the other hand, in malarial regions it may be necessary to use quinine, but it should be given early and in positive doses if at all. (See Typho-Malarial Fever.)

Fenwick's apparatus, as used in the London Hospital, Whitechapel, is a convenient method of reducing temperature by the application of cold. By means of buckets of ice suspended from the top rail of the crib, the temperature can be reduced to any degree required. And if the reduction of temperature alone were necessary, Fenwick's crib would undoubtedly serve the purpose and be a most effectual and convenient way of treating typhoid fever.

The ice-cap might be used, with or without Fenwick's crib, for reducing temperature, but the cap should be large enough to be of service. In the country they use beef bladders. Not only does cold applied to the head often prove very agreeable to the

patient and lessen headache, but it also reduces the temperature of the body. Indeed, Mr. Keith, of London (formerly of Edinburgh), applies cold to the patient's head instead of using the coil and the like over the abdomen, for the reduction of temperature after laparatomies. The Goodyear Rubber Company, of this city, manufactures ice caps of any size or pattern.

Baths, finally, may be used, not only for the reduction of temperature, but for other reasons to be indicated presently. The Germans were the first to adopt this method of treatment. In 1865, Brand, of Prussia, first systematized cold bathing in the treatment of typhoid fever, and it has been claimed that under this method the death-rate has fallen from forty to seven per cent. Indeed, Brand now claims that where patients are treated properly and systematically by means of the cold bath during the first week of the disease, the death rate is only about one per cent. His method is to place the patients (who can generally rise and get into the bath, with assistance if necessary) into a bath of 65° F., and allow them to remain there for from fifteen to twenty minutes, until a sense of chilliness or even chattering of the teeth may be observed. The patient is then taken out, thoroughly dried, and put to bed again. Later, Ziemssen, of Munich, adopted this treatment, but with slight difference in the details. He first places the patient in a bath about 2° F. lower than fever temperature, and then gradually reduces it by adding cold water until it reaches 68° F. The head, neck, and shoulders are meantime showered. After fifteen to twenty-five minutes the patient is dried and removed to bed, as before stated. Others, on the contrary, never use a bath lower than 73° F., and the average time is ten minutes. This is probably a safer plan. During the bath the temperature falls some 2° F., nor is it well to bring it lower. Stimulants should be on hand in case of any signs of collapse. The administration of a tablespoonful of brandy and water just before the bath is a good precaution. Not all patients can be put into the bath, and it should be cut short if any alarming symptom arises. The baths should generally be repeated every three hours.

The action of the bath is not, however, to bring down the temperature simply—that could be more readily accomplished by other means already mentioned; but according to Leichtenstern, Brand, Ziemssen, and others, and as is now well known, the stimulating effect of the water on the nerve peripheries of the whole body is reflected back to the nerve centres, and from them to the various organs of the body. This causes them, especially the heart and lungs, for the time being, to perform their functions in a physiological way. Hence the value of baths generally at the various watering-places. The stimulating effect of a Brand or

Ziemssen bath lasts for about three hours, when it should be repeated. Not only is temperature reduced, but the heart beats stronger and more regularly, digestion is improved, flatulency is lessened, delirium disappears for the time, the respirations are deeper with consequent more perfect aeration of the blood and clearing up of hypostatic congestions, and there is a general amelioration of the patient's condition.

The wet sheet is often convenient and very beneficial, but the principle is the same. Fold a blanket the width and length of the patient, allowing margin sufficient not to wet the bed, and place it alongside the patient. Now wring a sheet out of water at the ordinary temperature of the room, and fold it. Place it on the blanket, and, having stripped the patient, roll him over on the sheet. Now wrap the sheet all around him. In about five minutes another wet sheet may be used. After repeating this operation about three times, wipe the patient dry and put him to bed as when using the bath. Have cardiac stimulants ready, as before mentioned. Repeat the wet pack every three hours, as in case of the bath. Rolling the patient over and shifting him in this procedure is of great benefit in preventing hypostatic pneumonia, so liable to occur in this disease from his remaining in the same position too long.

Diarrhœa in the early stage need not always be interfered with. Indeed, some begin by giving a dose of calomel, but in the opinion of the author no cathartic should be used after a diagnosis of typhoid fever is made or even strongly suspected. Should diarrhœa occur later on or exhaust the patient at any stage, efforts should be made to check it at once. The best remedy is bismuth and morphine. (℞ Morphinæ sulphat., gr. i.; pulv. bismuth. subnitrat., ʒ i. M. ft. cht. No. vi. Sig. One every two or three hours.) Sometimes the twelfth of a grain of morphine may be sufficient. If that fails, the sulphate of copper may be added in doses of one-fourth of a grain. In malarial regions, not infrequently a dose of ten grains of calomel, or five grains of calomel with ten grains of bicarbonate of soda, is an excellent remedy to begin with, as in typho-malarial fever.

Hemorrhage, like diarrhœa, need not be checked unless sufficient to cause alarm. It may become necessary to plug the nares in case of obstinate and profuse epistaxis. Usually plugging the anterior nares is sufficient; but if it fails, the posterior nares may also be plugged by means of Bellocq's canula, as is well known. Hodgen's method of introducing a piece of a condom on a portion of catheter, and then inflating it with cold water or air, is also good, as well as pressure on the outside walls of the nares. For intestinal hemorrhage, whether from ulceration or other cause, opium and ergot are the best remedies. Five to ten min-

ims of Magendie's solution of morphine may be given hypodermically as well as from one to three grains of ergotin. There is no use to give these remedies by the mouth, as their action would be too slow. Ice bags might be placed on the abdomen, but they usually do no good. The so-called astringents are worthless. They probably never reach the point of hemorrhage, and they upset the stomach. Ergotin acts by constricting the capillaries, but opium quiets nervousness and peristalsis, thus allowing a clot to form.

Tympanites, being due to gas confined by a sphincter in a powerless bowel, should be relieved by letting off the gas by means of a catheter gently introduced far up the rectum, just as urine should be drawn from a paralyzed bladder. Turpentine internally is worthless, if not dangerous, and externally in the shape of stupes it is disagreeable if not absolutely useless.

Delirium is often controlled by the judicious use of alcoholic stimulants. This method of treatment should be commenced as soon as delirium occurs, as a rule, and the tongue becomes brown and dry. Among topers, and even habitually moderate drinkers so called (tipplers), alcoholic stimulants may be indicated from the start. About a tablespoonful of brandy or whiskey in a little milk or some of its preparations, or even in plain water, every two or three hours, is usually enough, so that the average patient would get about six ounces in the twenty-four hours. Less than that will do in some cases, but among topers and tipplers a pint or more may be necessary. Alcohol also, by strengthening the heart, lessens the chances of hypostatic pneumonia.

Insomnia is best relieved by small doses of morphine given in the afternoon rather than at bed-time, for the first effect of opium is generally to keep people awake. A twelfth or the sixth of a grain of morphine or an equal amount of Magendie's solution may be given by the mouth at say from four to six P.M., and repeated if necessary. It is hardly requisite to give hypodermic injections, though this may be done if the patient objects to taking it by the mouth. Sulphonal is too difficult of digestion, urethan may depress the heart, and I have had no experience with the rest of the hypnotics. I should be disposed to let them alone.

Finally, the dryness of the mouth and tongue should be attended to. Bits of ice, sucking a clean wet piece of linen, or the application of a few drops of glycerin now and then are of the greatest comfort to the patient.

Complications should be treated as they arise. For this the reader is referred to such conditions mentioned under their respective headings. During convalescence, imprudence in eating, as well as over-fatigue, should be avoided, in order not to bring on a relapse or some complication. However ravenous the appetite

may become, no solid food should be allowed for at least a week or ten days after all fever has disappeared.

Typho-Malarial Fever.

In malarial regions a patient may have typhoid fever, but along with it there will also be symptoms of malarial poisoning, constituting what Woodward, of the U. S. Army, first termed, in 1863, typho-malarial fever. Every one knows that malarial symptoms are likely to develop in such localities during the course of any disease, and why not in typhoid fever? The pathological changes are very similar to those of typhoid fever, such as enlargement of the mesenteric glands due to absorption from intestinal lesions when the latter are present to a marked degree, enlargement of the spleen, and granular or waxy degeneration of muscular tissue, but there is also enlargement and bronzing of the liver, and sometimes jaundice, which we do not find in typhoid fever alone. The symptoms in typho-malarial (typho-remittent, entero-miasmatic, remitto-typhus, continued malarial) fever differ somewhat also from those of unmixed typhoid fever. For instance, the disease in question is more apt to begin with severer and more abrupt symptoms, such as a chill, followed by high fever, headache, and epigastric pain or tenderness, with nausea or even vomiting. These, except the headache, which, by the way, is more rending than the dull ache of typhoid fever, are notably wanting in the latter disease. The remissions and exacerbations are much more marked than in typhoid fever usually, especially during the first week. Not infrequently also during the remissions the patient may become wringing wet with sweat. On the other hand, during the exacerbations all the secretions are diminished, and sometimes there is bloody urine, or it may even be suppressed. These characteristic malarial symptoms are especially observed early in the disease. After a week or two the symptoms will more and more resemble those of pure typhoid fever. Herpes labialis is not infrequently found in this disease; it is very rare in typhoid fever. The duration and various other symptoms and complications, especially regarding the respiratory organs, are similar to those already described under the head of typhoid fever. The prognosis is about the same as it is in the latter disease. It is usually favorable if the case is seen early and prompt measures are adopted, but after a week or two, when typhoid symptoms become well marked, the end is very uncertain, and even in favorable cases the convalescence will then be generally tedious, lasting altogether from four to six weeks or even longer. Recurrence of the malarial symptoms may continue indefinitely, or finally wear the patient out by exhaustion.

Treatment.—From what has been said, the treatment of ty-

pho-malarial fever necessarily differs in some respects from that of unmixed typhoid fever. Early in the disease, the flow of bile should be stimulated by a dose of calomel, which will also help to eliminate the malarial poison. Ten grains may be given at bed-time, to be followed by a Seidlitz powder or a mild saline laxative next morning to insure the patient against ptyalism. Instead of ten, five grains of calomel with ten of bicarbonate of soda make a very efficacious powder to be taken at bed-time. The calomel rarely needs to be repeated. For the intense headache nothing answers the purpose so well as the ice-cap already described. For nausea and vomiting, bits of ice by the mouth and a mustard plaster over the epigastric region often act as a specific.

But the one remedy in this disease, during the first week especially, is quinine. As soon as the calomel has acted, give to an adult fifteen grains of sulphate or muriate of quinine early in the morning and at noon. If it is borne well, this dose repeated at about 6 P.M. is often of great advantage. There is no use in giving small doses strung out and often repeated. They only annoy the patient and keep the stomach in a continuous uproar. The quinine should be given in liquid form if the patient can retain it. Sugar-coated pills are of no use, since they pass through the bowel undigested. Even the gelatin-coated pills do the same thing sometimes. Meantime valuable, precious time is thrown away. Better than pills, and next to the solution, are capsules of quinine or compressed pellets made without any excipient, according to Upjohn's plan. By persistent use of quinine during the first week, the disease is rendered much milder in its course and shorter in duration. After the first week or two, however, and especially when the heart is weak and head symptoms well marked, quinine in doses sufficient to be of any use becomes a dangerous remedy on account of inducing heart-failure, and in small doses it is not only useless, but, as already stated, annoys the patient and upsets digestion. Warburg's tincture in tablespoonful doses ter die is then the remedy, if it be genuine instead of a bogus preparation. The dose may be less if it irritates the bowels. Further than this, the treatment is similar to that of typhoid fever, to which the reader is referred, except that baths and the wet pack do little or no good. Should convalescence be tedious, it may be hastened by the administration of arsenic and iron. (℞ Liq. potass. arsenitis, ʒ i.; sol. ferri albuminat., q.s. ad fl. ℥ iv. M. Sig. ʒ i. ter die before or after meals—usually after.)

Typhus Fever. Hunger Typhus.

Etiology and Pathology.—Typhus fever is an acute contagious as well as infectious disease, depending upon a specific poison the exact nature of which is not yet known. This is one of the

points in which it differs from typhoid fever. Just how the poison enters the body is doubtful, but it is probably through inhaling air infected by the breath and exhalations from the body of the patient. Murchison and others claim for it a spontaneous origin among the over-crowded, ill-fed, and filthy, and there is no doubt that such bad hygienic surroundings greatly tend to increase the death-rate and spread of the affection, but it is questionable if they actually give rise to the particular disease in question. According to Gautier, of Paris, Thomson, of New York, and others, auto-infection from poisonous alkaloids arising from gastro-intestinal fermentation under such conditions might cause the disease (New York *Medical Record*, February 2d, 1889, p. 133).

Typhus fever usually attacks those between twenty and forty years, but it may also be found among children and the aged. It usually occurs as an epidemic, but is confined to no particular season of the year. One attack generally gives the patient immunity against a second.

The disease is not so common in America as in Ireland, certain parts of Germany, and Poland. Old Paris was a breeding-place for typhus until Haussmann rooted it out by his wonderful improvements and sewerage. Owing to the disease being peculiar to overcrowded and filthy ships, jails, prisons, and the like, or because of the eruption or other circumstances, it has been called ship fever, jail fever, spotted fever, and so on. Sometimes it is called typhus gravior in contradistinction to typhoid fever or typhus mitior.

The disease differs chiefly from typhoid fever in that there are no intestinal lesions. The spleen is nearly always markedly enlarged, probably from the action of the poison as in typhoid fever, but it is not so friable as in the latter disease. The liver undergoes no marked changes. The eruption consists of spots which do not disappear under pressure, maculæ or petechiæ, and are due to subcutaneous ecchymoses. The same muscular degenerations and complications that occur in typhoid fever, especially pneumonia, are liable also to take place in this disease.

Symptoms.—The onset is more abrupt than in typhoid fever. The length of incubation is about two weeks, and there may be a few days of prodromic symptoms such as loss of appetite, headache, and the like, but the real attack comes on suddenly and often with a violent chill. Severe headache, pain in the back and limbs, and high fever follow. The temperature rapidly runs up to 104° F. or even higher, and there is but slight difference between that of the morning and evening; lachrymation, sneezing, and bronchitis are usually present. The pulse becomes frequent, and there is nausea and not infrequently vomiting. Great muscular weakness, dizziness, somnolency, and other signs of some

grave affection appear early. The skin becomes hot and pungent, the mouth dry, and the tongue heavily furred. The urine is scant, high-colored, and not infrequently contains some albumin. There is usually constipation throughout the disease, although there are, of course, exceptions.

The eruption appears about the fourth day or by the end of the first week. Though in some rare instances there may be none, yet it is less often absent than the eruption of typhoid fever. Indeed, eruption in the latter disease would seem to be the exception south of the Potomac River in this country. The eruption in typhus fever is chiefly confined to the trunk, especially over the abdomen, and is usually more abundant than in typhoid fever. Sometimes it looks like measles. At first the spots are rose-colored, but after a day or two they become maculated, the so-called mulberry spots, which do not disappear under pressure, in contradistinction to the raspberry eruption of typhoid fever. The countenance assumes a dusky or mahogany appearance.

In unfavorable cases, death usually occurs during the second week from general exhaustion, heart failure, or, later on, it may be from some complication. Death from pneumonia or uræmic convulsions or coma may occur. The delirium in this disease may be of the low, muttering kind, or it may be violent. In some cases the patient appears to be in a state of coma and subject to all sorts of hallucinations, and yet be conscious of what is going on around him. This condition of apparent coma but real insomnia, the so-called coma-vigil, may be prolonged and become a very distressing symptom. In favorable cases, during the second week usually, the fever may begin to abate, and there is a general amelioration of all the symptoms. But commonly it ends by a crisis taking place about the seventeenth day, the temperature suddenly falling. As soon as improvement sets in, recovery is much more rapid than in typhoid fever, and relapses are very rare.

Diagnosis.—The only real difficulty would be to distinguish this disease from typhoid fever. In typhoid fever there are intestinal lesions with diarrhœa as a rule; in typhus there are no intestinal lesions, and the patient is constipated. The eruption in typhus is much more marked, of more frequent occurrence, and is an ecchymosis which does not disappear under pressure, thus differing from typhoid fever. The onset of typhus is much more abrupt, and the symptoms are much more marked, delirium coming on early. The duration of typhus is shorter than typhoid, and recovery is more rapid.

For a consideration of the diagnosis between typhus fever and other diseases, the same remarks apply here as in case of typhoid fever, to which the reader is referred.

Prognosis.—The death-rate varies greatly in different epidemics, from five to twenty per cent. The continuance of high temperature, with little or no morning remission, and the occurrence of such complications as pneumonia, uræmia, and the like are of bad omen for the patient.

Treatment.—Plenty of fresh air and cleanliness are the best general remedies for this disease. The custom of putting typhus-fever patients in open tents, as is done on North Brother Island, New York, is an excellent one. Beyond this, the treatment consists of moderate stimulation and judicious management, as in case of typhoid fever, to which the reader is referred. Baths may be tried, but they act better in typhoid than in typhus fever. The ice-cap to the head is invaluable to relieve the severe headache as well as to aid in bringing down the temperature.

Measles. Rubeola. Morbilli.

Etiology and Pathology.—Measles is a highly contagious eruptive disease, depending upon a specific poison the germ of which is at present not exactly known. It exists in the mucus, blood, tears, and exhalations from the body, and enters the system chiefly through the mouth and nose by inhalation of infected air, so that it is usually first observed to affect the organs of respiration. The disease is never of spontaneous origin.

Although all are subject to the affection, it is most frequently met with in childhood. One attack usualiy gives immunity to the patient against future infection, but in some rare cases a second attack may occur. The disease is usually epidemic, and may appear at any season of the year, but sporadic cases are also not infrequent. It is much more readily contracted than either small-pox or scarlet fever, and may be conveyed by the clothing of those even who are unaffected. Fewer by far attain adult life without having had the measles than scarlet fever, showing how much more universal is the former disease. Physicians who make short visits, and are often out in the open air, are less liable to carry this portable disease about with them than nurses or those who remain with the patient. The papular eruption and the congestion of the mucous membrane of the mouth, pharynx, and respiratory tract are the anatomical characteristics of measles, other lesions being chiefly due to complications.

Symptoms.—After a variable period of incubation, averaging, however, about a week or ten days, the disease usually begins with symptoms of coryza. The eyes become watery and more or less intolerant of light, there is more or less nasal catarrh with sneezing, and these are followed often by pharyngitis of a mild type, laryngitis, and bronchitis, with cough. In some cases laryngismus

stridulus or false croup is caused by the irritation and dryness of the larynx. The disease may begin with chilliness and sometimes even a distinct chill, followed by a moderate rise of temperature (102° F.) and considerable pain in the head and back. In some cases these catarrhal symptoms may be so mild as to escape observation. If the patient be a malarial subject, the symptoms may exacerbate and remit so as to greatly obscure an early diagnosis, especially if the eruption is delayed, as sometimes appears to happen after the administration of large doses of quinine. This stage of invasion, as it is called, usually lasts about three days, or one day longer than that of small-pox, and two days longer than in scarlet fever. But in other cases it may be five or six days or a week or even longer before the eruption appears. Meantime marked exacerbations and remissions may give the idea that the case is one of bilious remittent fever, with the consequent administration of large doses of quinine. In this way on one occasion, though I had eminent consultation, the eruption was delayed nearly two weeks.

The stage of eruption begins usually by a rise of temperature (104° F.) and the appearance of spots, like flea-bites, on the forehead. But even before this, the roof of the mouth and the fauces may be very red, causing the idea among the laity that the measles first breaks out in the mouth. The eruption is papular, of a deep red color, and soon spreads from the face to the rest of the body, lastly appearing on the backs of the hands, and is said to be arranged in crescent-shaped patches, thus differing from the diffused blush of scarlet fever. Such crescent-shaped arrangement, however, is not always apparent. In thirty-six hours or two days the eruption has reached its height and soon begins to fade. In two or three days more the characteristic furfuraceous or bran-like desquamation commences, and the catarrhal symptoms, which have lasted throughout, now begin to disappear.

Finally, the stage of desquamation already mentioned lasts usually about a week, from four to eight days; so that in ordinary favorable cases the whole course of the disease, from the beginning of invasion to the end of desquamation, is about ten days to two weeks. In some instances the eruption becomes confluent and even hemorrhagic, the latter condition giving rise to what is known as black measles.

Capillary bronchitis with broncho-pneumonia is the complication most to be dreaded in children. Hence the necessity for great care in not exposing children affected with measles to draughts of cold air, sudden changes of temperature, and the like. Instead of broncho-pneumonia, sometimes there is lobar pneumonia. Intestinal disturbance may occur, as evidenced by diarrhœa or even dysenteric symptoms due to follicular colitis,

indicating that the disease had passed through the intestines and affected its mucous membrane, as well as that of the respiratory tract and the outside skin. Tubular nephritis may set in, but not so frequently as in scarlet fever. Endocarditis is also one of the possible complications, as I have witnessed, as well as meningitis. Among the sequelæ of measles may be mentioned ophthalmia, otorrhœa, and a favorable condition for the development of phthisis in some form.

Diagnosis.—In small-pox the range of temperature is generally higher than in measles, and there are wanting the catarrhal symptoms of the latter disease. Later on, the umbilicated vesicular eruption of small-pox leaves no room for doubt. In scarlet fever the symptoms of coryza are wanting, but the throat symptoms are more severe. Scarlet fever comes on more suddenly and severely than measles, and the eruption is scarlet and diffused instead of being papular and crescent-shaped or discrete. In roseola or false measles there is absence of severe symptoms of coryza and redness of the fauces, and there is scarcely any fever. Its course is mild and duration short. If the eruption of measles be long deferred, however, it may be impossible to make an immediate diagnosis. If the patient has never had measles, but has been recently exposed to the disease, and complains of coryza, the chances are very much in favor of the measles appearing sooner or later, and precautions against unnecessary exposure should be taken accordingly.

Prognosis.—This is nearly always good unless some grave complication, as pneumonia or meningitis, occurs. Adults suffer more severely than children unless they be infants, especially during dentition, but during the first six months of infancy the disease is rare. Among the pregnant, abortion or miscarriage is apt to occur. Should the woman go to full term, however, and give birth to a child who had measles in the womb, the child will not be liable to a second attack. Occurring in advanced phthisis it is apt to carry the patient off or shorten life, naturally. In black measles, or those cases where there is great disposition to hemorrhage, the prognosis is not so favorable, and sudden disappearance of the eruption by recession, so called, is regarded with dread by the laity. Finally, the prognosis differs with different epidemics, some being very mild, others severe.

Treatment.—While measles is not to be regarded as such a dangerous disease as scarlet fever, it should nevertheless be borne in mind that death may result from complications. Ordinary prudence and common sense would therefore suggest that delicate children be not put in the way of getting the measles by sending them to schools or other places where there is an outbreak. Should one member of a family be affected, it will be too

late to think of sending the others away to escape it. They will only carry it with them. It is a matter of courtesy, however, if not the duty of those who have measles and the like in their houses, to inform their next-door neighbors of the fact, as well as the health authorities, as required by law.

There is little or no treatment of the disease itself. If the eruption is delayed, the laity are accustomed to give a little hot lemonade, ginger tea, or even a glass of brandy and water to adults in order to throw it out and break the spell, but such treatment is of doubtful efficacy. Keeping the eyes, nose, and mouth clean, as recommended by authors, may be very good theoretically or even practically, especially in large cities and bad surroundings, but in ordinary circumstances even such precautions appear unnecessary. In case of choking up from bronchitis, hot poultices in children and dry cupping in adults will be of benefit. The best expectorant is syrup of ipecac. It may be given in doses of a few drops to a teaspoonful, and in some cases vomiting should be induced for the purpose of secondarily getting rid of mucus in the air-tracts if necessary as evidenced by the dyspnœa, chest rattles, and the like. A sudden rise of temperature in addition to these symptoms would indicate the advent of broncho-pneumonia (lobular pneumonia). Pleurisy rarely occurs. For the treatment of complications the reader is referred to those diseases. For diarrhœa or dysentery, opium and bismuth are the best remedies. (℞ Bismuthi subnitrat., ʒ i.; morphinæ sulphat., gr. i. M. ft. cht. No. vi. Sig. One powder every two or three hours as the case may be.) In children, the dose of morphine should be much less, of course. A little paregoric added to the cough mixture is often sufficient. The room should not be so bright as to hurt the eyes, but clean and dry, and of an even temperature of about 65° F. Inhalation of steam impregnated with tr. benzoin. comp. (℥ ss. : Oi.) is not only agreeable, but very useful in cases of troublesome laryngitis and bronchitis. Dover's powder in one to ten grain doses in the evening, according to age of the patient, will often alleviate pain in the back and head and promote sleep. The diet should be nutritious and easily digested. For this reason peptonized milk or some of its preparations is of the first rank. Instead, however, the usual beef tea, broths, and the like might be used or alternated if the patient so desires. Alcoholic stimulants are rarely necessary, but in some cases may be given in moderate quantities. Antifebrin in powder is much better than quinine to bring down temperature should it become necessary. It may be rubbed up with a little sugar for children and is easily taken. The dose would be from half a grain to three grains according to age, and repeated every two or three hours if necessary. The patient should not be allowed out of the

house or be in any way exposed to sudden changes of temperature, such as attending doors, going into cold bathrooms, storerooms, and such places, for at least a week or ten days after desquamation is complete.

German measles or Rötheln has no relation to either measles or scarlet fever, for which it is sometimes mistaken. German measles gives no immunity whatever against either of the other diseases mentioned. It occurs in epidemics, chiefly in schools, however remotely situated. After some two or three weeks' incubation, the stage of invasion sets in, and lasts from a few hours to about two days at most. Then the eruption suddenly appears on the forehead and temples and extends over the trunk and extremities, but it is paler and smaller than in measles, more circular and regular in outline, and not so elevated or papular. It is not apt to become confluent, and the fauces do not show the characteristic redness of measles. Catarrhal symptoms are slight or entirely absent. Temperature rarely reaches higher than 102° F. The eruption lasts two or three days, and disappears without desquamation. The cervical and other lymphatic glands, as the auricular, suboccipital, and maxillary glands, become enlarged sometimes. Constitutional symptoms are slight, and there are no sequelæ. The diagnosis is usually easy, the prognosis invariably good, and the treatment calls for no special mention.

Roseola, false measles, or rose rash, is characterized by a nonpapular eruption occurring on the breast and body that disappears under pressure, and lasts for a day or two. It is usually preceded by constitutional disturbance for one or two days, consisting in headache, perhaps chilly sensations, and a slight rise of temperature, with a disposition to nausea and even vomiting. Catarrhal symptoms, sore throat, and the like are slight or entirely absent. There are no desquamation, complications, or sequelæ. One attack gives no immunity to a second, and although it may affect all, women have it oftener than men. Sulphate of quinine, iodide of potassium, turpentine, copaiba, and cubebs sometimes cause an eruption closely resembling the disease in question, and syphilitic roseola is, as is well known, one of the earliest signs of the constitutional disease. It usually appears on the chest first, and after a warm bath, especially.

Miliary fever or miliaria, so called, is simply the occurrence of sudamina in any disease where there is much sweating, notably in rheumatic fever. Not infrequently we find these sudamina, or miliary white vesicles, appearing at the crisis of typhoid fever, pneumonia, or any disease where sweating begins, and hence of great value among the laity. They may also appear independently of these diseases, so that some authors consider it even worth

while to talk separately about a miliary fever, and even go so far as to say that it is contagious like measles. Sometimes it is called the English sweating sickness, although, as already stated, it not infrequently occurs in America and elsewhere in connection with any disease that causes the patient to sweat much, whether the sweating occur as a crisis or is part of the disease throughout. Anatomical lesions depend on the primary affection, as do complications, the conditions of the urine, and symptoms generally. No particular season of the year is usually required for the production of sudamina, but they are most likely to occur in a warm, moist room and during the course of a disease in which the patient sweats freely at some period. It is due to obstruction of the gland ducts in some cases; in others the sweat is so abundant that it cannot escape fast enough. In either case little miliary sudamina are sometimes formed, especially among the thin-skinned.

Scarlet Fever.

Etiology and Pathology.—Scarlet fever or scarlatina is, like measles and small-pox, one of the acute exanthematous contagious diseases, and is characterized by a bright red or scarlet eruption over the surface of the body. The color varies from pale red to deep red and is more or less diffuse. The affection is never of spontaneous origin, but depends upon a specific virus the germ of which is not yet known. It is usually a disease of childhood, the majority of those attacked being between two and ten years old. As age advances, the predisposition to it becomes markedly diminished, although when grown persons are affected, in the experience of the author, it generally goes hard with them. Very rarely does it attack the fœtus *in utero*. Besides the skin, the mucous membrane of the mouth, fauces, and larynx are nearly always more or less affected, giving rise to dryness of the throat, enlarged tonsils, and sometimes diphtheritic inflammation, with enlargement of the parotids and other glands. The disease may be conveyed from one person to another by actual contact, through articles of clothing, food, especially milk, it is said, and even by domestic animals such as dogs and cats. The same remarks apply to physicians here as in measles. On account of short visits and being out in the fresh air, they do not generally, if ever, carry the disease from one person to another. On the other hand, nurses and those who remain with the patient for a length of time may carry the disease about in their clothing. The serum of the blood of a scarlet-fever patient will reproduce it by inoculation. The disease is not, however, nearly so liable to spread as measles, for one member of a family may be affected and all the rest of the children escape,

which is not the case with measles. The virus of scarlet fever is possessed of much more vitality and lasts longer than that of measles. Thus, patients have been known to contract scarlet fever by sleeping on sofas, or from flannel bands and other articles that had been used by scarlet-fever patients months and even years before, but which from carelessness or being forgotten had not been disinfected or destroyed. Wounds and surgical injuries, as well as the puerperal state, predispose to it. Attacking the fœtus in the womb, abortion or miscarriage may result. There is perhaps no particular season of the year for it to appear as epidemic, but it is nearly always present in large cities to a greater or less extent, where it undoubtedly sometimes spreads about from one house or district to another along the sewer pipes.

Symptoms.—After a period of incubation varying from twenty-four hours to three weeks, averaging about a week or less, the disease usually begins suddenly and without prodromata, although these may be present in some cases. The child is seized sometimes with a chill, or even convulsions may usher in the attack. Sore throat, headache, and vomiting are not infrequent. This period of invasion, as it is called by some, lasts usually about twenty-four hours, sometimes longer, or it may be shorter. The fever even now runs high with very frequent pulse; and in the case of a child about four years old once observed by me, the temperature bounded up to 106° F. after a convulsion, there was paraplegia, and no eruption appeared until just before death two days later. The mother declared that the boy had fallen off a chair and hurt his back, which turned out to be a mistake. At the end of twenty-four hours, or during the beginning of the second day, usually, the characteristic rash appears, first on the neck, breast, and cheeks, and rapidly spreads over the body. It consists of elevated points that run together so as to cause a diffused scarlet blush, especially marked on the back. Being due to congestion of the skin, it generally diappears under pressure. The lips and chin are usually deathly pale.

The period of eruption lasts from three to seven days, averaging about four or five days. During that time the temperature usually runs high (103° F. to 105° F. or even higher), with but little variation, and the head symptoms, such as stupor, delirium, or even convulsions, are often observed. The pulse becomes more frequent (100 to 150) and sometimes irregular. The tongue, at first coated, cleans off, and then becomes reddened and roughened, with elevated papillæ, thus giving rise to the scarlet-fever strawberry tongue, so called. The soreness of the throat is often a distressing and even an alarming symptom. Along with sore throat the parotid and other glands about the neck may become

swollen and painful. Diphtheria of the larynx may occur, but fortunately this is rare. Œdema of the glottis with sudden death sometimes occurs, and should be guarded against. As soon as the eruption fades, toward the end of the first week or commencement of the second, desquamation begins, and all the severe symptoms begin to subside. During desquamation the skin peels off in strips, thus differing from the furfuraceous or bran-like desquamation of measles. The cuticle on the hands and feet is especially liable to peel off. Desquamation lasts usually from ten days to two weeks, so that, although rapidly convalescent, even during the second week in favorable cases, the patient cannot be said to be well until about two or three weeks. It is during desquamation that the greatest dangers to complications and sequelæ arise from exposure, and the disease is then more contagious than at any other period.

When it runs the usual course, as above related, the disease is called scarlatina simplex. But in severe cases, with hemorrhages into the skin, convulsions, high fever, and early death, it is termed scarlatina maligna. Again, when sore throat or diphtheria is a prominent and distressing symptom, it is called scarlatina anginosa and the like. In mild cases the duration of the disease is only a few days, and the eruption and other symptoms may be hardly noticeable. Indeed, in some cases there may be only a little sore throat, but the skin peels off, all the same.

Of the sequelæ, so called, or perhaps, more correctly speaking, the complications, of scarlet fever, acute glomeralo-nephritis stands first. It usually occurs during desquamation, and though, in some cases, exposure to cold during that period would appear to excite it, the kidney trouble is more probably due to the action of the infection of the scarlet fever. There may be an increase of temperature, with hard irregular pulse, restlessness, nausea, and even vomiting for a day or two, showing that the patient is not progressing as favorably as was expected, when suddenly the face and legs are noticed to be swollen. On examination, general dropsy is found to have already set in. The urine is scant, high-colored, contains hyaline and epithelial casts and blood, and is loaded with albumin, or it may even be suppressed. The glomeruli and epithelium of the renal tubules are the seat of the disease. Uræmic symptoms may become marked and even convulsions and coma develop. The patient usually recovers from this form of nephritis, but sometimes it may become chronic and give rise to other complications. Acute articular rheumatism may develop during desquamation, and sometimes even purulent synovitis. Usually, however, it is mild and known as scarlet-fever synovitis.

Lobular pneumonia also occurs in some cases, as well as in-

flammations of serous membranes, notably endocarditis; but pleurisy and pericarditis may also develop.

Otitis from extension of the inflammation of sore throat along the Eustachian tubes not infrequently appears; and on account of this or else closure of the tube due to inflammation, deafness, more or less, often follows scarlet fever, as every one well knows.

Diarrhœa or dysentery may also result as well as enlargement of the spleen and liver.

Finally, chronic enlargement of the tonsil glands may occur, necessitating their removal in some cases.

Diagnosis.—From ordinary cases of erythema, whether the latter occur from eating of certain fish or taking of such drugs as copaiba, or in the course of septic disease including old gonorrhœa, scarlet fever is easily told by the severe symptoms, throat affection and universal spread of the rash, instead of the latter being confined to one or two localities or spots. The diagnosis from measles has already been given, the duration of invasion and character of eruption in the two diseases differing. The vesicular eruption of small-pox soon places that disease out of the question. Due regard to the etiology and symptoms would make it difficult to make a mistake in diagnosis.

Prognosis.—There is no telling how the disease will end. A mild case may be progressing favorably, when suddenly some dangerous complication may arise. The character of the epidemic also must be considered. In some cases this is mild, in others there is tendency to malignancy and complications. The greatest mortality appears to be in children from three to five years of age. Before that it is not quite so high, and rapidly diminishes afterward. Adults are rarely attacked, though I have known grown people to die of it. Among women after delivery, the prognosis is not so unfavorable as might be expected.

Relapses are rare, but they do sometimes occur.

Treatment.—Isolation of the patient in this dangerous disease is nothing more than common sense and humanity would dictate, wherever it is possible. This is happily not so difficult now even in overcrowded New York City, thanks to our Health Department and public officers generally. Twenty-five years ago, however, while district physician for the Fifth District of this city, it was not unusual to be ordered by the late Mr. Kellogg, Superintendent of the Outdoor Poor, to visit darkened cellars in the Bowery, where the negro, Italian, and Chinaman, regardless of age or sex, were huddled together indiscriminately without ventilation or light other than a tallow candle, where measles, small-pox, and scarlatina raged side by side with characteristic odor. And yet some recovered!

The sick-room should be well off the ground and on a southern

exposure if possible, for the obvious reason that sore throat and bronchitis, nephritis, and the like will be less liable to occur than in the northeast spare-room. Without draughts the upper window sash may be lowered for free ventilation, and the stools may be disinfected and removed as in typhoid fever. In fact, the same precautions should be taken for cleanliness and ventilation in all these infectious diseases. All people should be kept out of the sick-room except those who are obliged to be there. There is no antidote to the disease, so we simply try to keep the patient alive on the expectant plan until the poison is eliminated. The skin may be softened with vaselin once daily; it is a pleasant application and helps to prevent infection. This should be kept up until desquamation has ceased.

Should the temperature rise to 105° F. to 106° F., shall we give quinine? It will not bring down the temperature appreciably unless there is malarial complication, in which case quinine or some of its derivatives has to be given, as in other diseases. In scarlet fever uncomplicated with malaria, however, do not give quinine. It will do no good. It does harm, as in typhoid fever. Give antifebrin in half to three grain doses. Tr. digitalis is good to slow the pulse, also. Two or three drops of tr. digitalis with a grain or two of antifebrin may be used every two or three hours to reduce temperature and slow up the pulse. A little alcohol may be added to dissolve the antifebrin, which is a resinous substance. Hot poultices are the best applications to the enlarged glands. From one to four teaspoonfuls of whiskey in about three ounces of milk or some of its preparations should be given as nourishment and stimulation about every three hours. Should death be threatened by œdema glottidis or laryngeal stenosis, the tube may be inserted, or else tracheotomy may be performed. I always prefer tracheotomy, myself. Sprays for sore throat not only do no good, they frighten the child, cause a battle and vomiting or retching, with straining of the throat tissues, and always make matters worse. It is different with grown people, who can stand spraying, or even spray themselves. Instead of this, a mixture of iron and glycerin may be given (℞ Tr. ferri chloridi, glycerini, āā ʒ iss.; aquæ, ℥ iij. M. Sig. ʒ i. every hour or two), or a mucilaginous drink, containing a little borax. Complications should be treated as they arise. For the dropsy of scarlatina the Hughes Bennet mixture was found to be very efficacious in district practice here many years ago. (℞ Potass. acetat., ʒ ij.; spts. æther. nitrosi, ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) That was often sufficient of itself to cure the nephritis. In more acute cases the little patient had a large hot poultice applied to the loins, and the bowels moved by the powder or pill of digitalis, squill, and calomel. (℞ Hydrarg. chlor. mitis,

pulv. scillæ rad., pulv. digitalis, āā gr. vi. M. ft. pil. No. vi. Sig. One every three hours until the bowels move.) Instead of pills, powders of the same strength may be substituted. Care should be taken to give a mild saline next morning to insure the bowels moving and thus guard against ptyalism. Often I have used pipsissewa (℥ i. to Oi. ft. decoct. Sig. Wineglass, sweetened, ter die) with perfect success. Should convulsions occur in scarlet fever, early say, so that uræmia probably has nothing to do with them, what shall we do? Some recommend the rectal injection of five grains of chloral hydrate in solution, but I have had no experience with this treatment and am disposed to be afraid of it. A whiff of chloroform often checks them, but they return. After a while, they cease of themselves or the patient dies.

Should the inflammation extend through the Eustachian tube into the middle ear and threaten perforation of the drum, it had better be punctured than allow its destruction by ulceration.

Regarding food, milk is the best diet.

After desquamation has ceased, the patient should be kept indoors for some time, especially in our changeable northern climate. In the South equal care should be taken, but the patient may be let out earlier. In either case proper clothing should be insisted on.

Vaccinia. Cow-Pox.

In 1789 Jenner introduced vaccination as a preventive against small-pox. It was first practised in America by Dr. Waterhouse, of Boston, in 1799. Since then, vaccination has taken the place of the old practice of inoculation, and is now compulsory in many large cities. Of late years bovine or animal virus has been extensively used in New York in place of the humanized virus. The difference between them is that the bovine or animal virus is obtained directly from the cow, while humanized virus is that obtained from the scab of some patient. Humanized virus is regarded as a more positive safeguard, at the same time that it takes more readily than the bovine virus. The latter is free from the objection, however, of the chance of conveying syphilis from one patient to another. For that reason it is preferred by many. Humanized virus is also comparatively inert if taken from a patient who is suffering with acute or chronic skin disease of any kind.

Vaccination should be performed on the outside of the left arm, near the insertion of the deltoid muscle usually, but in case of girls who expect to wear low-necked dresses the calf of the leg should be selected. Great care should be taken to insure perfect asepsis. If the same instrument is to be used again it should

be immediately dipped in alcohol after the operation and set on fire.

Symptoms.—These differ somewhat according as the operation is primary or secondary. In all secondary vaccinations the symptoms are modified and irregular. But when a child, for instance, is vaccinated for the first time, the symptoms should be as follows, or else there will be no protection:

On the third day after vaccination, a red papule is noticed at the point of introduction of the virus; fourth day, a bluish-white vesicle has formed; fifth day, a yellow margin appears around the base of the vesicle, which continues to grow in size; eighth day, the vesicle is umbilicated (depressed in the centre), with a distinct areola around the base, which goes on increasing in size; eleventh day, the areola has now attained its maximum, being one or two inches broad, of a deep red color, and somewhat elevated (the arm and adjacent lymphatics are more or less swollen and painful); twelfth or thirteenth day, spontaneous rupture of the vesicle occurs, with escape of the contents (the inflamed areola now begins to decline); fifteenth day, a dark brown crust has formed, which is depressed in the centre and becomes more and more desiccated and loosely attached; eighteenth to the twenty-first day, the scab falls off, leaving a cicatrix characterized by pits or minute depressions.

When bovine virus is used, the course is similar, though the symptoms are more pronounced. It should be borne in mind that the occurrence of erysipelatous inflammation during the course of vaccinia will entirely destroy its protective power against small-pox. Cutaneous eruptions interfere also, as has been stated. The best time for vaccinating children is between the second and third months of infancy, unless the child is in bad condition. In such a case it is well to wait until the child's health is improved unless there is cause for some hurry, as in case of an epidemic. Then all should be vaccinated, regardless of the number of previous vaccinations. It is thought that the preventive power of vaccine virus wears off after seven years. The fact is, the duration of this protection varies in different cases. For that reason, to make a sure thing of it, a person may be vaccinated and then revaccinated until it ceases to take. In seven years' time it may be tried again unless meantime an epidemic breaks out, when all should be vaccinated and revaccinated. According to Gast, vaccinating the mother during pregnancy has no effect on the fœtus *in utero*, so that the child is to be vaccinated after it is born. When a person who has never been vaccinated is exposed to small-pox, vaccination should be resorted to at once to anticipate the former disease.

Small-pox or Variola.

Etiology and Pathology.—Small-pox is a highly contagious eruptive, or exanthematous disease, that depends upon a special morbific agent or virus, the germ of which is not at present known. It is transmitted from one person to another, not only by contact through an abrasion of the skin, like syphilis, but it also enters the system through mucous membranes, chiefly by inhalation of infected air. In the open air the danger of infection extends for about one yard from the patient. But in a badly ventilated house, ship, or prison, for instance, the whole atmosphere of such premises may become impregnated with the disease. Undoubtedly the infection is carried about in articles of clothing and the like, especially if they are packed in a trunk and not aired or boiled. The virus may remain effective in clothing for months or even a year. The dead body is also capable of transmitting small-pox poison. The fecal discharges do not appear to be particularly infectious. The disease attacks both sexes, at all ages, unless they have been properly vaccinated, but one attack is almost certain to render the patient proof against a second.

The characteristic pathological lesion of small-pox is the eruption. At first it is composed of red spots that are not elevated. Soon, however, they become papular or elevated, then vesicular and umbilicated or depressed in the centre, and lastly pustular. Desiccation follows in favorable cases, and the crusts fall off, leaving the well-known pits or pock-marks. Enlargement of the spleen does not appear to be constant. The internal organs are not infrequently congested.

Symptoms.—After a period of incubation varying from a few days to a month, averaging, however, about ten days or two weeks, the period of invasion begins suddenly, usually with a chill, and lasts generally two days. Or among children there may be convulsions. The primary fever which soon follows usually runs high during this stage (104° F. to 106° F.). Intense headache and backache, especially the latter, are present, and often with epigastric pain and vomiting. The pulse becomes correspondingly frequent, the tongue dry, and there may be delirium. Bronchitis and soreness about the throat are not infrequent. The bowels are usually constipated, but there may be diarrhœa, especially in children. Retention of urine from paralysis of the bladder, with or without paraplegia, is sometimes noticed. The eruptive stage begins usually on the third day after the onset of invasion. The eruption appears first about the lips, chin, forehead, and neck, and rapidly spreads over the chest, arms, and body, and lastly over the lower extremities. It may, however, begin elsewhere, especially about a sore or some injury. At first there are

small red spots that are maculæ; that is, they are not elevated. Soon these maculæ become elevated in their centres so as to form papulæ. In two days after the eruption began, these papulæ become filled with a clear serum or lymph; and by the fifth day of this stage the vesicles have attained their maximum size of about a quarter of an inch in diameter, and become umbilicated; that is, depressed on top at their centres. This umbilication is pathognomonic of small-pox, and is probably due to bands formed by epithelioid cells that hold it down in the centre and give the interior of the vesicle a reticulated arrangement or, according to others, the central portion, becoming dead, simply falls in. During the eruptive stage the patient in ordinary cases appears better, the primary fever falling greatly below what it was during the stage of invasion.

The suppurative or maturative stage follows that of the eruptive, and usually begins about the sixth day after the eruption first appears, or the eighth from invasion. The fever now rises and is called the secondary fever, and is suppurative or pyæmic in character. The vesicles become purulent and pointed instead of umbilicated, showing that the inside reticulated structure has been broken up. The pulse again becomes more frequent, and the symptoms will be severe in proportion to the extent of the eruption. Diarrhœa, delirium, and coma may occur in this stage. The ulcerations are not confined to the skin alone. Sometimes there are ulcerations of the cornea leading to permanent impairment of vision or even blindness. Ulcerations about the nose, mouth, pharynx, and larynx may also occur. Pneumonia, pleurisy, pericarditis, and endocarditis are among the possible complications, as well as otitis, subcutaneous abscesses, and swelling of the shoulders and knees. Albuminuria is often present in severe cases, but true nephritis is of rare occurrence. The stage of desiccation usually begins on about the twelfth day of the disease. In favorable cases the pustules break, scabs are formed, the characteristic fetid odor is present, the fever and other signs abate, and in about eighteen to twenty-four days, or three weeks on the average, the patient is well. The scabs falling off usually leave the well-known pock-marks. These latter depend on the depth of the ulcerations. Instead of running the ordinary course just described, where the eruption is discrete, the case may be one of confluent variola. In this variety the symptoms are more severe than in the discrete form and the period of invasion shorter. The eruptive and purulent stages are longer, the spots run together or are confluent, the fever runs higher, and all the signs and prognosis are graver. In another variety, called the hemorrhagic or black small-pox, the symptoms are severe and the outlook usually unfavorable.

Diagnosis.—Small-pox begins more suddenly than measles, less so than scarlet fever. But in small-pox there is the primary fever which almost disappears when the eruption occurs; this is absent in measles, which shows instead the characteristic coryza. After the eruption of small-pox comes out and umbilication begins, there can no longer be any doubt. For instance, an eruption resembling small-pox can be produced by tartar emetic ointment by an impostor, but the grave constitutional symptoms will be entirely wanting.

Prognosis.—Among infants, the aged, and intemperate, the prognosis is always bad, as is the case in confluent and hemorrhagic small-pox. Robust young men stand a better chance than women, and pregnancy is an unpleasant complication. Death is usually due to exhaustion, and occurs therefore during the second week, in severe cases much earlier. Sometimes it is due to a complication such as œdema of the glottis, pneumonia, and the like. Inflammation of the spinal cord may result in ataxia or paraplegia.

The character of the epidemic has no little bearing on the rate of mortality, but it usually varies from fifteen to thirty per cent of all cases.

Treatment.—Prevention is always better than cure. Hence there is no excuse in a civilized community for any one to go unvaccinated. Revaccination should be performed at once in cases that are accidentally exposed to small-pox, since vaccinia would anticipate the latter disease.

If, however, a patient has small-pox, and vaccination be too late to be of use, ice may be placed to the head for the severe headache, and opium given for the relief of pain in the back and diarrhœa. The patient should be isolated. Milk, peptonized or otherwise, is the best food. Whiskey may be added if necessary. Tr. iodine or sol. argent. nitrat. (℥ i.–℥ i.) used to be painted on the pocks to prevent pitting. Schwimmer's ointment is said to be better. (℞ Acid. carbolici, gr. xv.; olei olivæ, fl. ℥ i.; pulv. cretæ præparat., ad ℥ ss. M. ft. pasta mollis.) Apply this on pieces of clean soft linen. Greasing the surface and tepid baths give comfort and assist in loosening the scabs. All articles of clothing and the like should be boiled or destroyed by fire to break up the epidemic and prevent its spread. Wearing a mask over the face to exclude light and air from the pustules is said by some to prevent pitting. Fever, when it runs high, may be better controlled by antifebrin or the water-bath, as in typhoid fever, rather than by quinine, which does little or no good unless the disease is complicated with malaria. Bits of ice in the mouth allay thirst and often vomiting.

Varioloid.

Varioloid is a form of small-pox rendered mild by vaccination or a previous attack of variola. The invasion may be abrupt, and there is then no telling what course the disease will take. But soon the eruption is observed to be scant, and perhaps confined to the trunk. Only a few pustules form, the rest disappearing by resolution. The secondary or suppurative fever is correspondingly light. Indeed, the fever is usually only primary, there being no secondary fever at all. Desiccation begins in a week or ten days, and the patient is well in two or three weeks. Complications rarely occur.

Varicella or Chicken-pox.

Varicella is a contagious eruptive disease usually affecting children. It generally occurs in epidemics.

After about two weeks' incubation, the disease is first noticed on account of the characteristic white vesicles that appear on the front and back. Sometimes they are seen on the face, and are even found in the scalp. In two to five days these vesicles have dried up and others appear. In a week or ten days the trouble is over. Although there may be coryza, loss of appetite, pains in the limbs, and even some fever, children usually continue to play about as if nothing had happened, although it may give them a nice little excuse to stay away from school. The diagnosis is easy and the prognosis good unless in some very rare cases fever may run high. It has nothing in common with small-pox and needs no treatment, but children may be kept about the house for a few days.

Diphtheria.

Etiology and Pathology.—Diphtheria is a highly infectious and contagious disease. As to whether it begins locally and then becomes constitutional, or is constitutional primarily with other characteristic lesions as merely local manifestations of a secondary character, authors differ. I have no hesitation in expressing my belief that it is primarily a constitutional disease. The local inflammations and membranes formed in various parts often bear no relation whatever to the constitutional symptoms. While the latter are of a most serious kind, often the local manifestations are scarcely observable, and the contrary may be the case.

It may be transmitted directly through contact with the diphtheritic poison, as may happen in kissing, having shreds of membrane coughed into one's eyes or mouth or nostrils, and sometimes through physicians or others sucking at the tracheotomy

tube to clean it out. In the majority of cases, however, it is transmitted probably through inhalation of infected air. The disease has been carried from New York to Florida in trunks containing clothing of diphtheritic patients, as was proved by the late Dr. Frederick D. Lente, of this city. Deficient sewerage, filth, and bad air, with unfavorable hygienic surroundings in general, favor the development and spread of this disease, but it is not of spontaneous origin and hence depends upon a specific virus, though the germ itself has not yet been found, unless we accept the bacillus of Loeffler.

The disease attacks both sexes, at all ages, but children between two and ten are chiefly affected. It may occur as an epidemic or sporadically, and at any season of the year, but chiefly during fall and spring. The characteristic anatomical lesion is the localized diphtheritic inflammation and membrane, or slough of certain mucous membranes. The tonsils, uvula, and posterior nares are the favorite sites for this inflammation. Sometimes it extends into the anterior nares, invades the fauces, and extends into the larynx or œsophagus. Occasionally it attacks the vagina. Diphtheritic inflammation of the mucous membrane of the rectum is simply epidemic dysentery, and hence will not yield to the usual opium-and-ipecac treatment. In fact, no mucous membrane is entirely exempt. The inflammation may simply involve the epithelial layer in mild cases, and then resembles croup. But usually it goes deeper, so that the membrane has to be separated and slough off by suppuration or gangrene. The deeper the inflammation goes, the more the capillaries become strangulated by pressure, and the more liable is gangrene to occur. Certain lymphatic glands and the spleen often become enlarged, and the kidneys are not infrequently inflamed. The disease has in reality existed probably from time immemorial. But so far as this country is concerned, Dr. Bard, of New York, appears first to have described it in a pamphlet published on the subject in 1812.

Symptoms.—After a stage of incubation which varies widely from a day to a month, but averages perhaps from two to five days, the child, in an ordinary case, begins to complain of soreness of the throat, especially toward night, with more or less headache, soreness of the limbs, loss of appetite, and some fever perhaps. The tongue is more or less furred and there is evident languor and indisposition to play or go to school. Lachrymation and symptoms of coryza are usually wanting, and this fact may aid in the diagnosis of a mild case. If the child's throat be examined now, there will usually be found a gray-white patch on one or both tonsils, generally one, or perhaps the uvula, or it may be concealed by the uvula and arches. These patches or sloughs are surrounded by an angry-looking, dull red base, commonly, and

their tendency is to spread. When detached accidentally or by bad practice, they immediately return. More or less cough may be present. Examination of the lymphatic glands about the neck should always be made. As soon as the gland at the angle of the lower jaw becomes enlarged, we know that the diphtheria has become post-nasal. This is an exceedingly important point in the treatment. Other glands, as the submaxillary and parotid, often become enlarged also, and sometimes render the prognosis very unfavorable by the rise in temperature that they cause as well as the danger of œdema of the glottis that may occur. The temperature of diphtheria itself is not as a rule of a high grade. Usually it is not more than 102° F. or 103° F., and sometimes even lower. When, therefore, a sudden rise of temperature of two or three degrees takes place, it is almost always due to some complication, notably extension of the inflammation to some of the glands. Epistaxis with corresponding temporary fall in the temperature is not uncommon. The pulse will be increased in frequency in proportion to the fever. From 100 or 110 it will go up to 140 or 150, being often irregular. Increased frequency and irregularity of the pulse without such marked rise in the temperature might indicate the occurrence of endocarditis, which may also happen in this disease. The bowels may be constipated, but sometimes there is diarrhœa. The urine should be examined frequently. Nearly always a trace of albumin exists, but in some cases a great amount of albumin with hyaline and other casts will be found, showing that acute tubular nephritis has occurred.

Huskiness of the voice, and the chicken-crow, stridulous, brassy, or barking quality of the latter should be watched for. Happily, it does not always occur, but when it does it shows that the larynx has become affected by actual inflammation or else compressed and more or less stenosed by œdema. In either case it is an alarming symptom, and needs immediate attention, as will presently be seen. Paralysis of the recti and other muscles of the orbit, giving rise to temporary disturbance of vision, also of the muscles of the extremities as well as of the heart itself, is an important matter to bear in mind. It usually is first noticed during convalescence, and is thought to be due to more or less neuritis. Children have been known to drop dead from heart failure, not only during convalescence when all danger appeared to be over, but so long as eleven weeks, according to Reynolds, after the physician had ceased to pay his visits and had pronounced the case cured. Instead of beginning insidiously, I have known cases to have been ushered in with repeated convulsions. Such cases appear to be unusually severe and generally die early. Or, again, they may begin with a distinct chill, and the symptoms

may be very severe from the first, the sloughs becoming gangrenous and the odor exhaled extremely fetid. On the other hand, some cases are so mild that they terminate without difficulty in a week or ten days. There is no regular course for the disease to follow, and it depends a good deal on the character of the epidemic, the hygienic surroundings, and the age and condition of the patient, to say nothing of treatment.

Diagnosis.— Follicular tonsillitis often resembles diphtheria for the first few days. But in the former case the disease comes on suddenly, often with catarrhal symptoms, so that the child is sicker the first day or two than afterward. Examination shows both tonsils to be the seat of catarrhal inflammation with little white, separate, or discrete ulcers corresponding to the tonsillar crypts. In diphtheria often one tonsil only is affected, and then there is a patch or continuous slough of rather a dirty gray appearance. The symptoms in diphtheria steadily increase in severity, so that in two or three days, when follicular tonsillitis has disappeared, diphtheria has just commenced to really show its hand. The urine often contains albumin in diphtheria, perhaps never in follicular tonsillitis. The latter disease of a somewhat severe grade is often observed during an epidemic of diphtheria, and then certain physicians, for reasons best known to themselves, call it diphtherite. From croup it should easily be distinguished, although some high authorities erroneously regard croup as nothing but diphtheria affecting the epithelial layer. How curious it is, then, that we find croup in certain damp, low-ground places, exposed to northeast winds, never contagious or infectious, and invariably affecting the mucous membrane of the larynx! The truth is that membranous croup is one disease, and diphtheria is entirely another. The one is a croupous inflammation affecting the surface of the mucous membrane and is non-contagious; the other is a diphtheritic affection, involving the substance of the mucous membrane, and highly contagious. The constitutional symptoms of diphtheria are always more severe than those of croup and accompanied by swelling of lymphatic glands. But for the accidental stoppage of the larynx in croup, the child would hardly complain of being sick, and there is not the same enlargement of lymphatic glands. The high temperature, strawberry tongue, and scarlet rash over the body, in scarlet fever will usually distinguish that disease from diphtheria, although the two diseases may coexist.

Should diphtheria be nasal, and before the fauces or tonsils are affected, the diagnosis rests on the purulent, ill-smelling discharge, swelling of the glands at the angle of the lower jaw, albumin in the urine, severe constitutional symptoms perhaps, and nose-bleed, together with a probable source of infection.

Prognosis.—Diphtheria, as is well known, is a grave disease. In some epidemics the affection is malignant, in others mild; and the character of the epidemic will not be lost sight of. The younger the child, the less able is it to resist the poison, and the more liable is it to become strangled should the disease extend into the larynx. The occurrence of great swelling about the neck is not favorable. Vomiting of a persistent character and convulsions are bad signs. Complications of any sort add just so much to the gravity of the situation. French authors regard the occurrence of laryngitis as fatal. Loomis states that ninety-five per cent of such cases die. The prognosis should always be guarded, for although the duration of the disease is only about two or three weeks, yet the patient may die of exhaustion within that period, or suddenly of laryngeal stenosis or some complication, notably paralysis of the heart.

Treatment.—The infectious and contagious nature of the disease being admitted, prophylaxis requires isolation of the patient at the earliest possible moment. Children with diphtheria should be kept away from schools and such places, their clothing boiled, and the house in which they have been sick thoroughly disinfected by burning sulphur, and ventilation. Plumbing, sewerage, drainage, and such like matters, whether in the country or city, should be attended to without delay.

When once a case of diphtheria is diagnosticated, the patient should be placed in a room well ventilated by means of the window opened at the top and bottom, the temperature being uniformly kept at about 70° F., as indicated by the thermometer. At the outset the treatment must be both local and constitutional. For local treatment the best application is the bichloride of mercury, iron, and glycerin. (℞ Hydrarg. bichloridi, gr. ¼; tr. ferri chloridi, glycerini, āā ʒ iss.; aquæ, q. s. ad fl. ℥ vi. M. Sig. ʒ i. every half-hour.) There is no use to talk about spraying, and still less of gargling a child's throat. Children do not know how to gargle, and the spray frightens them. A battle with the child is the result, with vomiting or retching, which does more harm by wrenching and straining the inflamed throat tissues than any good that could possibly result from such so-called treatment. Instead of the spray or gargling, therefore, the child swallows the medicine, thus bringing it absolutely in contact with the tonsils and fauces. The corrosive sublimate is antiseptic, the glycerin is cleansing and moistens the dry throat, and the tr. ferri chloridi acts as astringent besides enriching the blood. No chlorate of potash is put in it. It never did any good, but it may and does do harm by irritating kidneys that are already sorely tried. As soon as the disease becomes post-nasal or nasal, as evidenced by the swelling of the glands at the angle of the lower jaw, and the

purulent membranous discharge from the nostrils, especially noticed if the child be coaxed to blow its nose on a clean white cloth, local application must be made through the nares. Again, do not use the spray, an instrument that is fitted only for grown people, or certainly those over ten years of age. But instead of the spray, now use the Peerless syringe, a cheap glass affair with rubber over the nozzle so as to not irritate and injure the anterior nares by its repeated use. Or any syringe may be used by attaching a piece of rubber tubing to it. The injection should be made up as follows: ℞ Hydrarg. bichloridi, gr. iij.; sodii chloridi, ʒ i.; sodii biborat., ʒ ij.; glycerini, ℥ ij.; aquæ, q. s. ad Oij. M. Shake well. Sig. Inject warm every hour, in bad cases night as well as day. This mixture should be injected warm, not cold. It is best kept at the requisite temperature by placing it near the stove so as to have it always ready. The injection should not be left to the timid, frightened, and careworn mother, or perhaps to the child, as I have found out in some cases! A faithful, gentle, and experienced nurse is indispensable, for the physician has no time to stay with one patient all the hours of the day and night. But whoever injects, should see to it that the fluid comes out through the mouth or out of the other nostril; otherwise the whole process is a delusion. The injection of this fluid, by a little practice, can be done in a second for both nostrils—so quickly and gently, in fact, that the child is barely awakened or disturbed in case of sleep. Should the anterior nares become excoriated, the application of a little vaselin or mutton suet is good, and the injection for the time may be weakened, or a mild tepid solution of borax answers. Another very important point: the air of the room should be kept impregnated with terebene, terpina, and other derivatives of turpentine which do not irritate the kidneys but act very favorably on mucous membranes as well as render the air pure and aseptic. For the same reason we send consumptives and others into the pines. The above object is best attained by keeping in the room some open vessel with boiling water with a little turpentine or tr. benzoin co. in it. A half-ounce of turpentine to a half-gallon or so of boiling water, or a somewhat larger proportion of the tr. benzoin co., is usually sufficient to produce the rather agreeable odor. The water may be kept boiling on a stove or, better still, on a tripod fastened on a gas burner. This should be continued throughout the disease until all throat signs disappear. The bed should be changed from one corner of the room to another, or, better yet, it should be well out into the room and away from the walls. The bedclothes and night garments and the like should be changed every day or two. When practicable, the patient should be taken up and carried, but not allowed to walk, into another room, without going through draughty and

cold passageways, so as to allow the sick-room to be thoroughly swept and aired and the bed made over.

The food should consist on the average, more or less according to age, of about three ounces of nutritious fluid every three hours. Milk, peptonized or not, or some of its preparations, is the best. Beef tea, chicken tea, mutton broths, and the like may also be used instead of milk or alternately if liked.

The painful swollen glands are best treated by means of hot flaxseed poultices. Should the temperature rise to 104° F. or more, it may be reduced by means of two or three grains of antifebrin rubbed up with a little sugar and given every two or three hours in the afternoon. By this means the patient may obtain a good night's rest instead of tossing with pain and fever or even convulsions during the night. I have given as much as ten grains of antipyrine with two drops of tr. digitalis every three hours for three times in the afternoon beginning at two, in a child of eight years of age, with the happiest result, although Dr. A. Jacobi, of this city, the consulting physician, thought that the dose was rather large. But the case was a desperate one. Recovery was complete.

As soon as the pulse becomes feeble and frequent and there are signs of exhaustion, alcoholic stimulants must be resorted to. From one to four teaspoonfuls of whiskey or brandy in some fluid may be given every hour, and kept up more or less until convalescence is established.

The urine should be examined from time to time. A slight amount of albumin is nearly always found, but in case of marked albuminuria and casts, tubular or glomerulo-nephritis has occurred and should be treated as in scarlet fever. Should the bowels become very much constipated, the powder of calomel and bicarbonate of soda may be given at bed-time. (℞ Hydrarg. chlor. mitis, gr. ij.; sodii bicarb., gr. v. M. ft. pulv. Sig. To be taken at bed-time.) A Seidlitz powder or other mild saline cathartic may be given next morning to insure movement of the bowels.

Husky voice should be watched for. The inhalation of the steam from lime water is a good remedy to soften the diphtheritic sloughs and thus help to separate them as well as to prevent the extension of the inflammation into the larynx. After this has occurred, however, no time should be lost in resorting to intubation or performing tracheotomy. I prefer the latter, because I can do it very easily, it being a simple operation, and I have had no experience with intubation. The operation decided on, however, should be done quickly, since it is through delay that bad results chiefly occur.

Patients should not be allowed to sit up too early, play vigor-

ously, or run up the steps, and the like for a month or so after convalescence is pronounced, on account of the risk of paralyzing the heart. As already stated, Reynolds mentions a case where the child dropped dead eleven weeks after all danger was thought to be over.

For the temporary paralysis of some of the muscles that commonly follows diphtheria, depending as it does on acute neuritis, electricity should not be used at first. Rubbing and kneading the muscles early is also unnecessary. But if the paralytic symptoms are not inclined to disappear after a few days or a week, give as follows: ℞ Strychninæ sulphat., gr. ss.; tr. ferri chloridi, glycerini, āā ℥ ss.; aquæ, q.s. ad fl. ℥ v. M. Sig. ℥ i. ter die. Electricity, kneading, dry rubbing, and the like may also then be gradually tried. Generally, they are not necessary. In the foregoing remarks on treatment I have said nothing about the forcible tearing off the diphtheritic membranes, and the application of nitrate of silver or perchloride of iron by means of a stick, swab, or other means. Experience has proved such procedures to be very bad practice. Nor has any particular specific for the cure of diphtheria been yet found.

Should vomiting become a marked and distressing symptom, which it rarely does, fortunately, it interferes with the treatment very much. Stimulants and food may then have to be administered by the rectum and disinfecting vapor inhalations be relied upon for the time being. Lime water is the best. Should diarrhœa become obstinate or need checking, a small powder of bismuth and morphine is usually sufficient. (℞ Bismuth. subnitrat., ℈ i.; morphinæ sulphat., gr. ¼. M. ft. chart. No. iij. Sig. One at once, and repeat if necessary.) In very young children, however, the dose of morphine must be smaller.

Erysipelas (St. Anthony's Fire).

Etiology and Pathology.—Erysipelas is an acute, contagious, eruptive disease depending upon a specific poison, the germ of which appears to be the chain micrococcus of Fehleisen.

There are two chief varieties of erysipelas, idiopathic and traumatic. But the poison is the same in both forms, and even in the so-called idiopathic variety the absorption of the virus is probably due to some overlooked abrasion of the skin or mucous membrane. The disease is not only transmitted by actual contact, but also, perhaps, through air, as in certain infected hospital wards, badly-ventilated houses, stables, and the like. In the surgical variety, the outbreak of the disease occurs at the wounded surface, and, among puerperal women and the newly born, injuries about the uterus and vagina or navel are the start-

ing-points, so that they naturally come under the head of surgical erysipelas.

The inflammation of the skin may be only superficial and end in resolution, or it may extend to the subcutaneous connective tissue and become phlegmonous, ending in suppuration or even gangrene. The lymphatics in the neighborhood are usually enlarged, and the spleen also in some cases. Such complications as pneumonia, pleurisy, pericarditis or endocarditis, and meningitis may occur, but they are due to a pyæmic condition rather than the direct extension of the inflammation. Tubular nephritis is a rare complication, although a slight amount of albumin in the urine is not infrequent. Swelling of the joints sometimes occurs.

Idiopathic erysipelas attacks the face usually, and is found among the young chiefly, particularly women. Endemic influences have some bearing, and the disease appears rather in the spring than at any other season. Exposure to cold probably has nothing to do with it. One attack gives no immunity to a second; on the contrary, those who have had it once appear more liable to a recurrence.

Symptoms.—In idiopathic facial erysipelas there are usually at first for a few days some headache, soreness in the limbs, loss of appetite, and perhaps some fever. The bowels are generally constipated and tongue somewhat furred. These symptoms may be much more marked in some cases; the disease beginning with a severe chill, or even convulsions in children. After a day or two, a painful spot on the nose, or cheek, or the ear is felt. It soon becomes red, tense, swollen, and shining. From this point it spreads by a well-marked, elevated border to adjacent parts. Sometimes the side of the face is involved, the lobe of the ear, and it may even implicate the scalp. The eyelids become so swollen that the eye of the affected side is closed. Sometimes little blisters appear on the surface—erysipelas bullosum. After four or five days it disappears from the point first affected, while other parts become involved. In this way it may extend all over the head and even to other parts of the body—erysipelas migrans. In some cases, parts that have recovered are attacked a second time. After the inflammation subsides, there is marked desquamation of the cuticle, which peels off in flakes. The fever during the attack varies greatly. At times it may run up to 105° F. or more, with marked remissions and even sweating. The disease usually lasts about ten days, the fever suddenly disappearing by crisis. In other cases it may linger for a long time, and in still others the disease is of shorter duration and the symptoms not well marked. In some instances a little redness of the nose and side of the face for a day or two is all that is to be observed.

In severe cases, however, pyæmic and typhoid symptoms ap-

pear. There are dry, brown tongue, muttering delirium, sordes about the teeth, frequent and feeble pulse, and death by exhaustion or some complication. This is notably the case among the previously broken down, the intemperate, and the aged.

Besides the headache, fever, coated tongue, and constipation usually present, there is sometimes vomiting which may prove to be a very distressing symptom, the cause of which is not exactly known. Diarrhœa also may be present instead of constipation.

Diagnosis.—Until the reddened and swollen condition of the skin has occurred, a diagnosis may be impossible. After the characteristic cutaneous lesion has taken place, however, it would be difficult, if not impossible, to mistake it for anything else.

Prognosis.—Occurring among topers, the broken down, and aged, or as a surgical complication, erysipelas is a grave disease. Erysipelas migrans may exhaust the patient in time. Suppurative or phlegmonous erysipelas, unless energetically treated, may prove a very serious disease by complications likely to arise. But idiopathic facial erysipelas occurring among previously healthy people generally terminates favorably.

Treatment.—Prophylaxis and ordinary prudence require isolation and good hygienic surroundings for surgical and phlegmonous erysipelas. The same remarks apply to ordinary cases of idiopathic facial erysipelas, although in mild cases and good ventilation there is less tendency of the disease to spread.

Constipation is best relieved at the outset by a mild dose of calomel (℞ Hydrarg. chlor. mitis, gr. ij.; sodii bicarb., gr. v. M. ft. pulv. Sig. Take at bed-time), to be followed by a moderate amount of saline purgation in the morning. Mild applications, such as the lotio plumbi et opii, by means of linen are good; but as this stains articles of clothing, a little morphine may be added to the wash instead of opium, in order to relieve the itching, burning, and pain. A weak solution of vinegar and water is also good. Covering the part with a coat of ordinary white-lead paint often gives great relief. Such strong applications as iodine and nitrate of silver are to be avoided, except in some cases where the disease becomes subacute or chronic, as on the arm, for instance. Then a few applications of tr. iodine will often cause it to disappear. The time-honored custom of drawing a ring round it by iodine or a stick of caustic so as to prevent its spreading is useless. The ice-cap to the head when headache is severe is agreeable. Good nutritious food, notably milk or some of its preparations, is indispensable. Should the tongue become dry and brown, and pulse weak, milk punch should be given. For bringing down the fever if the ice-cap fails, three-grain doses of antifebrin every two hours is usually sufficient. Quinine does no good whatever at any stage of the disease, in any dose, unless

malarial complications exist. But the one specific treatment for erysipelas in any form, besides what has already been stated, is the tinct. ferri chloridi given in twenty-drop doses every two hours. It should be well diluted; that is, about twenty drops to a wineglassful of water.

In case of phlegmonous erysipelas, especially of the extremities and penis, in addition to what has been said, the skin should be opened up in parallel incisions about an inch or two long, and all pus drained and washed out. Mild antiseptic washes and dressings with bandaging generally produce a favorable result.

Injections of carbolic acid after Hueter's method, or Piragoff's idea of giving camphor, appear to be of little or no use.

Sepsis and Pyæmia.

Etiology and Pathology.—Septicæmia and pyæmia are so nearly alike that it may be said that there is a difference without a distinction between them. The former signifies putrefying blood, the latter pus in the blood. They both occur as surgical complications, of which little will be said here. Both diseases exist more or less together and are dependent upon an infection the germs of which are the bacteria of putrefaction. Pure pus without these bacteria is harmless.

The spontaneous origin of septico-pyæmia is therefore more than doubtful. The poison enters the system, in all likelihood, through some abrasion of the skin that has been overlooked, or by the mucous membrane of the mouth and air-passages, uterus, vagina, rectum, and the like. Hence we find it following dissecting wounds, operations about the vagina and uterus with dirty instruments, and after abortions and confinements. Retained and decomposing pieces of placenta are fruitful sources of these diseases—puerperal fever, so called. The common and careless use of unclean curettes in the uterus is not infrequently followed by these diseases.

Septic embolism gives rise to metastatic abscesses in various organs. Such theories as the absorption of pus into the blood-vessels, the purulent diathesis, the retrograde metamorphosis of fibrin into pus, and the influence of nervous action have all been discarded by scientific men as causes of these secondary complications. Veins, however, surrounded by tissues that are undergoing inflammatory processes have formed in them, under certain predisposing conditions, coagula that are septic in their character—septic phlebitis. These clots or thrombi become disintegrated into emboli, which are carried along in the general circulation until they lodge somewhere, in the liver, lungs, kidneys, spleen, muscles, parotid glands, heart, brain, and thyroid gland.

As a result, local irritation followed by septic inflammation results. The latter will usually terminate in suppuration if the patient lives long enough, for the same bacteria are present. Sometimes the emboli are so small that they pass through the liver and lungs and lodge in more remote organs, as the parotid gland. The valves of the heart are favorite places for them to adhere, and not infrequently ulcerative endocarditis results. The spleen is usually enlarged not only from metastatic abscess, but from the general condition as seen in typhoid fever and all acute infectious diseases as a rule.

Symptoms.—The disease is usually sudden in its appearance. There may be a feeling of indisposition for a day or two, but a chill is generally the first thing that causes the patient or physician to think that there is anything serious. This is followed by headache, nausea or vomiting, fever and pains, which are sometimes severe so as to give the idea that the case may be one of rheumatism. Grave symptoms of a typhoid character soon set in, however. The tongue becomes dry and brown, there are muttering delirium, recurring chills at irregular intervals, and fever that may widely exacerbate and remit. Often there is profuse sweating. Ecchymoses in the skin may occur as well as into the retina and serous membranes. Sudden pain in the side and dyspnœa would indicate the occurrence of septic infarction in the lungs, soon to become an abscess and a new focus of infection. Endocarditis, as evidenced by the palpitation of the heart and the presence of a murmur, may occur at any time. Albuminuria, blood in the urine, and jaundice, usually hæmatogenous, are not uncommon. The pulse becomes feeble and frequent, sordes collect about the teeth, and profuse diarrhœa may close the scene. Death usually occurs by exhaustion, but it may be greatly accelerated by complications.

Diagnosis.—Malarial fever in some form is not infrequently mistaken for pyo-septicæmia (septico-pyæmia). But in malarial poisoning in any form there is nearly always well-marked periodicity of the symptoms. Intermittent fever, for example, is characterized by chills which recur at regular periods. In pyo-septicæmia the chills are notably irregular, often coming on in the night or at some time least expected. In remittent fever there is only the initial chill with exacerbation and remission of the fever, it is true, but not so marked as in the disease in question. Often the temperature in pyo-septicæmia will fall below normal with an exceedingly slow pulse, especially in the morning and forenoon, thus resembling somewhat the hectic of tuberculosis. Finally, in spite of large doses of quinine, the temperature of septico-pyæmia continues to rise in the afternoon, not being in the least controlled or influenced by the quinine. I have known two cases

of pyæmic fever due to badly managed gonorrhœa, in which fifteen grains of muriate of quinine were given in liquid form ter die, for days and weeks, until the patients were stone-deaf, without the least benefit. In one of these cases the opening and draining of a pelvic abscess that had formed gave relief with final recovery; and the application of nitrate of silver, twenty and forty grains to the ounce, to the deep urethral lesion in the other resulted in the stoppage of the purulent discharge and final recovery of the patient.

From typhoid fever the diagnosis may sometimes be difficult. But in pyo-septicæmia the differences in temperature are much more marked, and the eruption, if any, is usually ecchymotic rather than the typhoid raspberry eruption. The origin of the former may often also be traced to some poisonous wound or other injury. The pre-existence of tuberculous lesion and the discovery of bacilli would distinguish the disease in question from acute miliary tuberculosis. Endocarditis from septic poisoning is attended with symptoms of a grave typhoid character, and thus differs from the endocarditis of acute rheumatism.

Prognosis.—In some few cases undoubtedly the form of the disease is mild; that is, the patients recover. In most cases, however, they die, so that the disease is always to be regarded as of very grave import. Sometimes they are overwhelmed with the pioson in less than a week, but on the average they live about ten days. In other cases the disease becomes subacute or even chronic, the patient finally dying of exhaustion or some intercurrent affection.

As in some instances the disease appears to be contagious, the patient should be isolated as in scarlet fever, erysipelas, and the like. Fresh air, good ventilation, and proper hygiene in general are necessary. In case of abscess, as may occur in parametritis and the like, the original focus of the disease may be removed by evacuating the abscess if possible. The same is true for purulent discharges elsewhere. Removal of the original cause, therefore, is of prime necessity if it can be done. Putrefying shreds of placenta should be carefully removed from the uterine cavity by well-known gynæcological methods, and the uterus gently and carefully disinfected and cleansed by means of a mild tepid solution of borax, which can be done with a double flexible catheter. The same is true in purulent cystitis. Nutritious and easily digested diet, as milk or some of its preparations, beef tea, mutton broth, and so on, are to be given. The main reliance is alcohol. This may be given in the form of milk punch. Morphine suppositories often act well by giving the patient rest, and do not usually upset the already sensitive stomach. One-eighth of a grain of morphinæ sulphat. or even more may be thus adminis-

tered as the case requires. For the high temperature, antifebrin in three-grain doses every two or three hours promises the best results, together with the ice-cap to the head. Quinine is not only useless in controlling the fever, but helps to upset an already nauseated and weak stomach. Under no circumstances is it to be given except the patient be a malarial subject, and then a few doses early are sufficient to accomplish all that can be expected of quinine in this disease.

Glanders.

Glanders, or farcy, is a contagious disease depending upon a specific virus, the germs of which are the bacilli discovered by Löffler and Schutz, and which very much resemble the tubercle

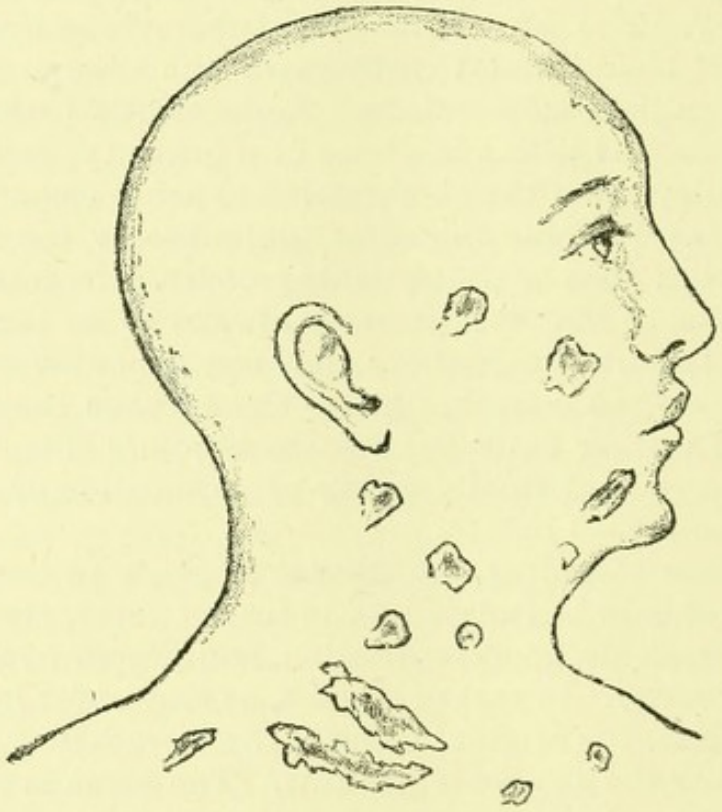


Fig. 36.—Glanders, after Holmes.

bacilli. It affects horses, mules, and asses, and from them is transmitted to men. Hence it is found among wagoners, coachmen, and such like. It is characterized by ulcerations beginning in the mucous membrane of the mouth and nose, and by extension and infection the skin also becomes ulcerated. If the animal or patient live long enough, there are multiple abscesses formed in various organs as in pyæmia. The course of the disease very closely resembles that of pyæmia, and before the researches of Löffler and Schutz the two diseases were confounded even on post-mortem examination. The discovery of the glanders bacilli, however, sets the matter at rest.

As is well known, glanders, or farcy, is a fatal disease usually. Instances of cure are very rare. Prophylaxis requires the immediate slaughtering of diseased animals and the destruction of their stables by fire. Under the old canal-boat system, with their filthy stables and the abuse of animals, glanders was a more frequent disease than nowadays. The immediate treatment consists in alcoholic stimulation and otherwise supporting the vital powers. Special symptoms may be treated as they occur.

Malignant Pustule.

Malignant pustule, anthrax, charbon, contagious carbuncle, intestinal mycosis, or splenic fever, as it is variously termed, is a contagious disease depeneding upon a specific virus, the germ of which is the well-known cylindrical or thread-like anthrax bacillus. The poison of anthrax was first discovered in 1849 by Pollender, but since that time Pasteur, Koch, and others have shown that the spores of the bacilli as well as the bacilli themselves are capable of reproducing the disease by inoculation. Moreover, Pasteur found that by cultivating those bacilli he could obtain a harmless virus for vaccination, so called, by which the disease could be prevented. The disease attacks herbivora chiefly, and hence is found among cattle, sheep, and horses. The spores are thought to exist in marshes, and, being transported to pasture lands, are taken into the mouths of these animals and then become developed into bacilli in the body.

Men who mind cattle, butchers, hide scrapers, and the like are most likely to contract this disease from infected animals. It enters the system through some abrasion. In the same way flies are said to carry the poison about and inoculate people in the act of biting. Hence the great dread of a Southern negro of a fly-bite about the face or neck.

Malignant pustule begins externally as a local disease, the constitutional symptoms appearing secondarily. The pustule appears naturally on the hands, arms, or face, and neck—parts most exposed. At first a vesicle forms which soon turns dark, the tissues around becoming swollen and red. Other vesicles soon form near the original one, and the swelling and blackened spots become larger. Headache, fever, dry brown tongue, and delirium follow as in septic poisoning. The lymphatics absorb the poison, so that neighboring glands become enlarged. The spleen, though not markedly enlarged, becomes dark and congested. In mild cases the disease soon takes a favorable turn and the scabs fall off. But in many cases death speedily follows from exhaustion. Should the disease first begin in the intestines, it is called intestinal anthrax or intestinal mycosis.

The constitutional symptoms are the same when cutaneous hemorrhages and pustules appear externally. Diarrhœa, vomiting, and collapse soon produce death. Very little is known of intestinal anthrax at present, since only within a few years past has this affection been observed to be due to anthrax.

The diagnosis of intestinal anthrax would necessarily be obscure. Discovery of the characteristic pustules and, above all, the bacilli sets the matter beyond doubt.

The treatment, besides being surgical, such as excision, cauterization, and the like, should be directed toward sustaining the life of the patients by well-known methods of stimulation and such food as milk or some of its preparations.

Trichinosis.

Trichinosis, or trichinatous disease, was first brought before the profession in 1860, by Zenker of Leipsic. It depends upon a round worm, the Trichina spiralis, that varies somewhat according as it inhabits the intestines or the muscles; the former, a small, white worm barely visible to the naked eye, and found encapsulated with connective tissue among the muscular fibres, being the larger. The male and female are separate individuals. Just how they reach the muscular tissue is a matter of dispute. According to some, they do so by directly penetrating tissues; according to others, they are absorbed by lymphatics and blood-vessels. From the fact that the diaphragm is the chief seat of these parasites, one would think that they arrived there directly by penetration from the stomach after being swallowed. The intercostal muscles, the biceps, and muscles about the pharynx and larynx are also often affected. The muscular fibres undergo granular degeneration, and their sheath or sarcolemma becomes much thickened by proliferation of the connective-tissue cells.

The disease is thought to arise from the eating of raw or smoked pork or pork sausage—a favorite custom in Germany. Why hogs should be infected with trichinæ more than other animals is not exactly known; but, as they are naturally filthy creatures, that act as scavengers about villages and towns, where they devour human fecal matter, offal from slaughter-houses, and such like refuse, it is thought that in this way they may become infected; but how or where the embryo of the trichinæ originate is not yet known. At any rate, hogs that are fattened on a farm where they have plenty of room for ranging and are fed on corn, oats, and such like are usually unaffected by the disease, which is not infrequent among the pig-sty and swill-fed, especially in towns.

Symptoms.—Not infrequently the disease begins with diar-

rhœa, nausea, and even vomiting, with pain in the epigastric region. By the beginning of the third week after the initial symptoms, the parasites will have found their way to the muscles, which now become painful and swollen, owing to the inflammation produced in them. Accordingly, we find dyspnœa on account of the diaphragm being affected. This symptom sometimes becomes very distressing, the more so when the intercostal muscles also are involved. Chewing and swallowing become painful and the voice hoarse, indicating that the muscles about the throat are affected. Pain about the eyes shows the same for the muscles about the eyeball. Eruptions on the skin, bronchitis, and lobular pneumonia may occur.

Fever usually is a symptom in this disease, but it is irregular and inconstant, depending no doubt upon fresh spots of invasion by the parasite. In this way it often intermits. The temperature rarely goes high, but in severe cases it may rise to 104° F. or even higher, and the pulse varies accordingly. As the disease progresses, typhoid symptoms appear, and the patient dies of exhaustion or some complication. The first case of this disease ever recognized had, before autopsy, been supposed by Zenker to be typhoid fever. There is no enlargement of the spleen, but the liver is often fatty.

Œdema occurs about the eyelids and sometimes the extremities also, but the cause of it is unknown. Localized œdema or swelling due to inflammation might be expected, but that affecting the extremities is unexplained.

The patient usually dies or recovers in from four to six weeks on the average. Hardly sufficient statistics have as yet been collected to say exactly what is the rate of mortality. Some cases recover, but the disease is to be regarded as a serious one.

Treatment.—Prophylaxis requires that the meat of hogs should be thoroughly inspected before being allowed to be offered for sale. Thorough cooking for a long time is the only means of destroying the parasite. After infection takes place, treatment is only symptomatic. Cathartics may be given early to rid the intestinal tract of any of the trichinæ that may be present. Picric acid (gr. ½ to i. ter die) and glycerin (℥ ss. ter die) have been recommended.

Hydrophobia.

Etiology and Pathology.—Hydrophobia is a contagious disease depending upon a specific virus, the germ of which is not yet known. It is probably never of spontaneous origin, but exists among dogs, cats, wolves, foxes, skunks, and horses. Of these the dog is by far the most subject to this disease. Cattle are probably not exempt. The poison exists chiefly in the saliva, but

according to Pasteur it is also present in the spinal cord. Among men the disease is acquired directly by inoculation. About seventy-five per cent of those bitten by dogs become infected. The reason some escape is because the dog's teeth have become cleansed in passing through clothing. Hence, bites about such uncovered parts as the face or hands are much more dangerous and liable to be followed by infection than where the teeth have to pass through thick clothing or several layers of it.

On post-mortem examination, no characteristic pathological lesion is found, and by many authors the disease is classified among the neuroses. As the symptoms are generally due to morbid irritability of nerve centres, it is thought that these, especially in the upper part of the spinal cord, are congested, but even that condition is not constant.

Symptoms.—The stage of incubation varies greatly in different patients. From three weeks to six months, however, includes the extremes. If after six months from the time of biting no symptoms appear, the patient may be considered safe, though some state that incubation may last one or more years. The stage of invasion lasts about two days. During that time there are usually headache, loss of appetite, and restlessness, with an indisposition to drinking fluids. Of course such symptoms may mean nothing, but, coming on after dog-bite in a nervous person, fright has much to do with the case, and should not be lost sight of. In all cases the patient becomes very melancholy. Meantime the character of the wound has very little bearing on it. The wound may have healed rapidly or it may have been delayed and remained red and painful. The lymphatics may or may not be swollen.

If the case is really one of hydrophobia, then after about two days the second stage characteristic of the disease begins. Tonic convulsions occur. They chiefly affect the muscles about the throat, causing deglutition to be painful if not impossible. Hence the impossibility of swallowing water or any fluid though the thirst is tormenting, and hence the name of this terrible disease. After a little, not only the attempt to swallow water will bring on a convulsion, but even the very sight of it. Paroxysmal dyspnœa due to affections of the muscles of respiration becomes distressing, and the convulsions may also extend to the muscles of the lower extremities. The convulsions throughout are probably reflex in character, and at first are brought on by some definite cause, especially the act of swallowing. But soon they begin to recur more and more frequently and from less and less marked exciting causes. Their duration varies from a few minutes at first to half an hour or more toward the end. The temperature is usually normal or slightly raised, but sometimes it may run high.

The pulse, which may be slow during the interval, becomes small and frequent during a convulsion. So terror-stricken is the patient that acute mania may be developed. The eye becomes wild with excitement, the pupils dilated. The cruel thirst nearly always present is often accompanied by an abundance of sticky, ropy mucus. The crawling about on all fours and barking and snapping like a dog, so called, is not a part of real hydrophobia. If death does not occur during one of these convulsions, the so-called third or paralytic stage begins after about three days, and the patient dies from exhaustion in a day or two. The whole duration, therefore, from invasion to death may be, if all the stages are present, about one week. Often the patient dies earlier than this.

Diagnosis.—From tetanus or lock-jaw this disease is easily told. In tetanus there is trismus or lock-jaw, a characteristic symptom that is wanting in hydrophobia. In tetanus, also, there is the characteristic opisthotonus or arching of the body backward, which is not found in hydrophobia. In the latter disease, also, there is usually delirium in the second or hydrophobic stage; in tetanus the mind is clear throughout.

In some cases hysteria or imposture may simulate hydrophobia, but careful attention to details, and, in suspected cases, the applications of strong ammonia to the nostrils, firing the buttocks with a few cups, or the application of moxas usually cause the secret to be disclosed.

Among drinking people the crawling about on all fours, pretending to bark and snap at objects, real or imaginary, may attract the attention of children and the idle, so that for the time being the idiot is regarded as an object of curiosity or pity, which soon, however, dwindles to contempt upon the application of the strait-jacket, confinement to a cell, and other well-known means of correction.

Prognosis.—The disease is uniformly fatal so far as mankind is concerned. Reported cases of recovery only show lack of diagnosis in the first instance.

Treatment.—Prophylaxis is the only hope. This may be accomplished in various ways. The best is to kill off all ill-fed and stray dogs. Dog laws should be stringent and enforced. A heavy tax should be imposed on dog-owners, and heavy fines for not muzzling the animals according to law. Should the dog scrape off the muzzle in some way and then go out of his way to bite a child in the public highway, as one of mine once did, there is no use to kill the dog under the supposition that killing the dog prevents the development of the disease afterward. So firmly rooted is this idea among the New England and American laity generally, that it was with great difficulty, and good tact, that I

persuaded the father of the child not to kill the dog, which, by the way, was a Spitz, the worst kind. Neither the dog nor the child had hydrophobia afterward, as was proved by the lapse of years. After a bite, however, especially on uncovered parts, during the dog-days, July, August, and September, the wound should be excised or cauterized at once, after being sucked and allowed to bleed. The best caustic is the strong nitric acid. It should be applied freely. It is equal to, or even better than, excision or the actual cautery, and anybody can apply it. No time should then be lost in going to Paris if the patient can do so, and have Pasteur's prophylactic injection made, as well as the wound treated antiseptically. Recently Dr. Gibier, of New York, claims success in this direction. Remedies for treatment of the disease are of little avail. Curare is the best. It may be given in one-third-grain doses hypodermically every twenty minutes or so until the convulsions are under control.

Epidemic Cerebro-Spinal Meningitis (Cerebro-Spinal Fever: Spotted Fever).

Etiology and Pathology.—This is an acute infectious disease characterized by inflammation of the meninges or coverings of the brain and spinal cord, especially the arachnoid and pia mater. Though it may occur sporadically, yet such cases must be very rare. In some cases the brain or cord themselves may be softened by extension of the inflammation and mechanical pressure of the exudation. The base of the brain and posterior portion of the spinal cord are chiefly involved, and in the latter case the exudation is observed more particularly in the lower cervical, dorsal, and lumbar regions. Should the patient die early in the disease, only congestion and punctate hemorrhagic spots may be observed. But usually the disease goes on until the effusion, at first sero-fibrinous, becomes purulent. Pus is found chiefly at the base of the brain, but it may also be present on the convex surface. As a matter of consequence, the convolutions would be flattened and the sulci deepened. In cases of longer duration the ventricles of the brain become filled with serum. Although an infectious disease, the germ is not yet known. Indeed, little if anything was known of this disease before the present century, though in all probability it existed before, but unrecognized. The French appear to have been the first to call attention to it, from observation among their soldiers. Not infrequently there is herpes labialis, as well as petechiæ over the body, so that, as Flint says, it was known in New England between 1807 and 1816 as spotted fever. It occurs epidemically in winter and spring, and its outbreak appears to be favored by bad hygienic surroundings.

Men are more frequently affected than women, although it occurs among children also. The spleen is not constantly enlarged, but is usually softened. Enlargement of Peyer's patches is common. Granular degeneration of muscles, including the heart, is not rare. Bronchitis, hypostatic congestion of the lungs, with lobular pneumonia, endocarditis, and congestion of the kidneys are often present.

Symptoms.—The disease usually begins rather suddenly, sometimes with a chill, though a few days of prodromic indication may occur, such as slight headache, loss of appetite, and a feeling of general debility. Should the onset of the disease occur without a chill, there are intense headache, vertigo, pain in the back of the neck and loins, and fever. Vomiting is also an early and a frequent symptom and is referable to the cerebral inflammation rather than to any particular gastric disturbance. Stupor or delirium occur early in severe cases, and among children convulsions are not infrequent. Twitching of the muscles, opisthotonos, and even trismus or lock-jaw may occur. Among children the thumbs are often pressed into the palms of the hands. Ringing in the ears and even deafness may occur, sometimes due to the general condition of the patient, and sometimes due to actual extension of the inflammation to the auditory nerves and adjacent tissues in the internal or middle ear. Owing to diminished sensitiveness, the conjunctiva may become inflamed from imperfect closure of the eyelids. The pupils often are unequal in size and respond slowly to light. Sometimes there is photophobia. Hyperæsthesia of the skin, particularly of the lower extremities, is not infrequent, as also herpes labialis and petechiæ over the body, giving rise to the name of spotted fever.

The tongue, at first moist and coated white, becomes dry and brown.

The fever in this disease irregularly remits, or it sometimes completely intermits. The temperature rarely goes higher than 104° F. except in unfavorable cases. The pulse varies and is often irregular and seems to bear no particular relation to the temperature. In case of such complications as endocarditis and pneumonia occurring, the pulse is usually increased in frequency and the temperature rises. Constipation is the rule, but sometimes there is diarrhœa. Permanent deafness may result from extension of the inflammation to the internal and middle ear, and among very young children dumbness follows, of course. The eyesight may become permanently injured by retinitis, opacity of the cornea, and the like.

In other cases hydrocephalus or paralysis may result. The joints are not infrequently tender and inflamed.

Diagnosis.—In a sporadic case it may be difficult or even im-

possible the first few days. After that, a careful consideration of all the symptoms will usually lead to a correct decision. From tubercular meningitis it is often difficult. Here the previous history of the case must be considered, such as heredity, the fact that the patient has already some pre-existing tubercular lesion, such as caries of bone, scrofulous glands, and the like. The eruption in cerebro-spinal meningitis is often of great assistance in diagnosis, especially the herpes labialis. This, with the sudden onset, renders it distinct from typhoid fever. The cerebral symptoms distinguish it from lock-jaw, though opisthotonos and trismus may occur in both.

Prognosis.—In mild cases the patient may recover in from one to six weeks. In very severe attacks death may occur within a few days from the onset. The average duration is from two to four weeks. Where it is prolonged more than four weeks, it may be due to relapses. Among those under fifteen the rate of mortality is greater than between fifteen and forty, and after that it again increases. The death-rate ranges from thirty to eighty per cent according to the character of the epidemic, averaging say about fifty per cent.

Treatment.—Prophylaxis requires that the patient be isolated if possible, and placed in a clean and well-ventilated room, with not too bright a light if it be painful to the eyes. The bowels should be opened with calomel. (℞ Hydrarg. chlor. mitis, gr. iij.; sodii bicarb., gr. v. M. ft. pulv. Sig. To be taken at bed-time.) This should be followed next morning with a moderate amount of saline cathartic to insure the bowels moving. The diet should be nutritious and easily digested, consisting of milk or some of its preparations, beef tea, mutton broth, or the like. Bits of ice may be taken to allay thirst, or an orange be sucked. A bag of ice to the head may be of great service in relieving headache, as well as bringing down the temperature. The urine should be carefully drawn off if retention occur, and this should be watched for. Quinine is of no value unless there is malarial complication; then it may be used in large doses at first, but after that it only increases delirium, but does not reduce the temperature. Antifebrin or antipyrine, the former in three, the latter in ten, grain doses, may be given instead. Opium in small doses to relieve pain and restlessness is better than any other remedy, but it is by no means a specific cure in this disease. Iodide of potassium does no good except occasionally, perhaps, during a slow recovery. It may then be given in ten-grain doses ter die after meals. In such a case the various tonics may also be employed. Bleeding in any form is useless. Alcoholics may be indicated in order to sustain life, and then should be given in the same way as in typhoid fever.

Relapsing Fever.

Etiology and Pathology.—Relapsing fever is a contagious disease that depends upon a specific poison the germ of which is the spirillus (or spirillum) of Obermeier. It was discovered by Obermeier, of Berlin, in 1873, and since that time this threadlike micro-bacterium has always been found in the blood of patients suffering with the disease in question, and capable of reproducing it by inoculation. They are about three to six times longer than the diameter of the red blood-corpuscles, and play about in freshly drawn blood like spermatozoa. During the first few days, the stages of intermission, and convalescence they are not found. The spleen and liver are both enlarged, and sometimes there is a gastro-duodenitis, giving rise to jaundice. The white corpuscles of the blood are somewhat increased in numbers.

Bad hygienic surroundings favor the outbreak of the disease, which occurs epidemically in Europe, but in the United States it has always been traced to emigrants landing with it. The first case occurred in Philadelphia, Pa., in 1844. And in the winter of 1869-70 I remember distinctly that it appeared among the house staff of Bellevue Hospital, and afterward there were a great number of cases in New York. Dr. John T. Metcalfe was the first to make the diagnosis of relapsing fever, in 1869-70. For a very interesting report of 103 cases prepared for the late Dr. Austin Flint by Dr. Thomas J. Moore, house physician of Bellevue Hospital, now of Richmond, Va., the reader is referred to the New York *Medical Journal* for March, 1870.

Symptoms.—After an incubation varying from five to eight days or about a week, the invasion begins suddenly. There may be in some cases slight prodromata as in any disease, but generally without notice the patient is seized with a severe chill. Rending headache and pains in the loins and extremities, with high fever and loss of appetite, soon follow. During the first day the temperature will run up to 104° F. or even higher. The pains in the muscles are intense, causing great suffering on attempting to move. Vomiting frequently occurs—at first the contents of the stomach, then bile, and afterward dark, resembling somewhat the black vomit of yellow fever. Indeed, the disease is by some called mild yellow fever. The skin becomes hot and dry and somewhat jaundiced, thus still further resembling yellow fever. The pulse rapidly becomes frequent, beating perhaps one hundred and forty times to the minute. The tongue is dry and thickly coated. Delirium is not of infrequent occurrence and is sometimes violent. Pains in the muscles, especially cramps in the calves of the legs, are often noticeable. Profuse sweating usu-

ally begins about the third day, but without any abatement of the symptoms.

The spleen and liver both are found to be enlarged, on physical examination.

After about a week, suddenly there occurs a remission, and hence the name of seven-day fever by which it is also known.

While the patient is sweating profusely, the temperature suddenly falls, the pulse becomes slower, the liver and spleen rapidly lessen in size, the pains cease, and all the symptoms of the disease quickly disappear. In a day or two the patient feels well except very feeble and much pulled down. At the end of about a week, however, a relapse occurs, coming on most frequently in the night. There are the chill, high fever, pains in the muscles, and other characteristic symptoms. After three or four days, convalescence again begins, and the patient now goes on usually to complete recovery with no more relapses, although, of course, a second or even a third relapse may occur. Instead of the first attack lasting a week, in some mild cases it may end in three or four days. And instead of the first relapse occurring after about a week, as it usually does, it may come on after a few days, or may not occur for ten days or two weeks. Such cases are, however, not usual.

Diagnosis.—In relapsing fever, the high temperature, frequent pulse, and enlarged spleen usually distinguish it from yellow fever where the spleen is not enlarged, and where there is remission instead of intermission.

In remittent fever there is the characteristic remission instead of the intermission of relapsing fever, and this point should be well noted or a mistake in diagnosis is likely to arise.

In typhoid fever the disease begins slowly, the sudden onset of relapsing fever being entirely absent.

In typhus fever there are the peculiar odor of the disease, absence of pains, but stupor, and the characteristic eruption occurring just when relapsing fever intermits. A careful study of the case and attention to details will usually enable one to distinguish between relapsing fever and such diseases as small-pox, scarlet fever, measles, dengue, and the like. There is no eruption characteristic of relapsing fever.

Prognosis.— This is usually favorable, barring complications, and they are not likely to arise. Sometimes, however, the patient may die suddenly from collapse or pneumonia. Splenic abscess, dysentery, and pyæmic conditions may greatly change the whole aspect of the case. Sometimes parotitis may occur. Epistaxis is not uncommon, and may prove inconvenient. The kidney is sometimes affected, congestion or nephritis occurring with bloody urine, albuminuria, or even suppression. The death

rate is from two to four per cent. Incomptent nursing and such complications as pneumonia and nephritis account for some of the fatal cases. According to Dr. Thomas J. Moore's report already referred to, the rate of mortality was only two per cent.

Treatment.—The patient should have good hygienic surroundings, nutritious and easily digested food, and a trustworthy nurse to administer it. Stimulants may be given if necessary in order to prevent heart failure. The bowels may be moved with a small dose of calomel, to be followed by a moderate amount of some saline cathartic, if there be marked constipation. The ice-bag applied to the head may to a certain extent relieve headache and lower the temperature. Bits of ice in the mouth may also relieve thirst and nausea. But there is no specific remedy or particular treatment. Quinine is worse than useless. Baths are impracticable, as the pain on motion causes too much suffering. Opium in small doses may be given for this reason, as well as to allow the patient to sleep.

Cholera.

Etiology and Pathology.—Cholera, epidemic cholera, or Asiatic cholera, as it is variously called, is an acute infectious disease affecting primarily the intestinal canal, and attended usually by profuse diarrhœa with other symptoms to be described. It depends upon a specific poison or virus, the germ of which is Koch's comma bacillus, discovered in 1883. These bacilli are found only in the intestines, where they have arrived by means of swallowing them in some vehicle, such as water, fruit, milk, or other articles of food. Cholera bacilli are contained in the patients' fecal discharges, which, according to Pettenkofer and others, must first undergo some change not yet thoroughly understood, but which is greatly influenced by the soil, before they become virulent, and in this respect they resemble the dejections in typhoid fever. A certain amount of heat seems to be necessary also for the production of the disease, for it occurs in summer and warm weather, as is well known. The comma bacilli appear to thrive best at a temperature of from 86° F. to 104° F.

Cholera does not extend by currents of air, but spreads by being carried about by patients' clothing and the like, and hence is found along the various lines of travel, water courses, and in crowded cities, or thickly populated countries. Defective drainage, over-fatigue, imprudence in diet, and intemperance all predispose to it. Mountainous regions are less subject to the affection than low, flat lands. The disease occurs epidemically, or it may be endemic in certain localities. Rarely does it occur sporadically. The disease originated in India, from which the first authenticated epidemic spread in 1817. It attacks both sexes,

at all ages; but adults are more subject to it than children. The aged are also very liable. Whatever is apt to excite gastro-intestinal catarrh, acts powerfully as a predisposing cause. The mucous membrane of the small intestine is swollen and red, as in catarrhal inflammation. The solitary follicles and Peyer's patches become swollen. Owing to transudation into the intestines and profuse secretion of the glands, rice-water discharges are produced, which are free from bile, owing to suspended hepatic function. Desquamation of the epithelium follows, and sometimes there are diphtheritic sloughs and ulcerations. The spleen is not enlarged. The tissues of the body generally are desiccated and pale. Congestion of the kidneys and even tubular nephritis may be present.

Symptoms.—After an incubation of one to three days the first stage or invasion begins. This may last a few hours or extend over a whole week. Usually it averages about two days. Mean-

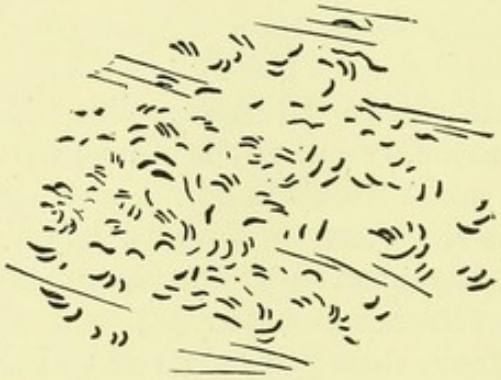


FIG. 37.—KOCH'S COMMA BACILLUS OF CHOLERA.

time there are some headache, more or less loss of appetite, and perhaps a little diarrhœa. In many cases during a violent epidemic this stage is altogether wanting.

The second stage is marked by painless diarrhœa and vomiting. It often begins in the night or early morning. The discharges from the bowels have the appearance of rice water, and are without fecal odor. These watery discharges amount to about four pints in twenty-four hours. They are neutral or alkaline in reaction, and contain, besides albumin and chloride of sodium, the comma bacilli of Koch. Soon the same material is regurgitated, rather than vomited from the stomach. The voice becomes weak and husky, the pulse is small and frequent, the surface cool, and there are great apathy and mental depression. Cramps in the calves of the legs become more and more frequent and painful. The urine is scant or even suppressed. Not infrequently it contains albumin. The tongue is dry and coated white, and the features become shrunken. Hiccough is often present and may be a distressing symptom.

The second stage may last a week and then recovery begin. Or after one to three days, or even longer, the third stage sets in.

The third or algid stage, or the stage of collapse, may speedily cause death in a few hours; or after forty-eight hours the fourth stage or that of reaction may begin. During the third or algid stage the temperature falls. Even in the mouth the thermometer may only register 80° F.; and after death, for a few hours, it rises. In the rectum it will probably be 100° F. The surface becomes livid and cool, the eyes sunken with dark circles around them, and there is great apathy on the part of the patient, though the mind remains clear to the end. The cramps in the calves of the legs become very severe. The pulse cannot be felt, and the voice is so feeble that the patient speaks in a whisper—the cholera voice. Vomiting and diarrhœa diminish, and the stools from being odorless are now fetid, and are passed involuntarily. The urine and all the secretions become markedly diminished. The patient may die in this stage, which toward the end is termed the asphyxial portion of the algid stage; or else the last stage, that of reaction, may set in.

The reactive stage is the fourth and last. The temperature rises, the pulse returns, the diarrhœa diminishes, and the stools begin to have the usual fecal odor. The cramps cease and the urine returns. In a few days or a week recovery is complete, so that an ordinary attack with all stages complete from invasion to recovery, lasts about ten days to two weeks. In mild cases, so-called cholerine, the patient recovers without any algid stage. In others, again, the algid stage may set in soon after invasion begins. And in some of these very severe cases, the patient dies early without any diarrhœa—cholera sicca. The explanation of this is, that the intestinal muscles become paralyzed early, so that no discharges take place, but the bowels are found to be full of the characteristic rice-water fluid after death.

Cholera typhoid, so called, may occur during the reactive stage following the algid stage. The patient becomes feverish, the tongue dry and brown, muttering delirium occurs, and exhaustion follows. Death usually results, but even some of these patients recover in time. Instead of cholera typhoid, relapses may occur during the reactive stage. Uræmic symptoms, even convulsions, may occur early in this stage owing to the scantiness or suppression of urine.

Diagnosis.—A case of sporadic cholera might be mistaken for poisoning with corrosive sublimate, arsenic, and the like. But in the latter there is violent burning pain produced by the poison with discharge of bloody stools, all of which are wanting in cholera. In fact, the painless diarrhœa and vomiting in cholera distinguish it from any other disease. During an epidemic, a

mistake would hardly be made. Chemical and microscopic analysis of the stools and vomit should be made in case of doubt.

Prognosis.—In fatal cases the cause of death is exhaustion, as a rule. The occurrence of complications, such as capillary bronchitis, lobular pneumonia, and congestion of the lungs or uræmia would add greatly to the danger. Patients over fifty or infants under one year of age are less likely to recover than others.

The death rate on the whole is about fifty per cent. Proper hygienic surroundings, and prompt attention to treatment in the early stage, are of the utmost importance. After collapse has occurred, the prognosis is unfavorable, but even then many recover. In the United States of America each epidemic seems to be milder than the preceding one, showing the effect of improved sanitation.

Treatment.—Prophylaxis requires the immediate isolation of patients if it be possible, and proper sanitation in general. During an epidemic people should be careful to avoid all causes of diarrhœa. The diet should be simple and moderate. The stools of patients and the vomited matters are to be at once disinfected and destroyed by fire, or buried as in typhoid fever. A five-per-cent solution of carbolic acid is highly recommended. The bed-clothing and all fabrics that become soiled should be disinfected by exposure to dry heat, say of 250° F., for an hour. All vessels and the like should be thoroughly cleansed and disinfected.

As soon as an individual is taken with a diarrhœa, however mild and insignificant it may be, the case should be at once treated as if it were cholera—for that is just the way in which the most hopeless cases often begin. For this purpose, immediate arrest of the diarrhœa is imperative, and this is best done by rest, opium, very simple diet, and bits of ice in the mouth to allay thirst. Rest in bed is the best. If there be nausea so that the opium would be vomited, no time must be lost, but morphine must be given hypodermically, say five to ten minims of Magendie's solution twice or three times daily, according to the age and condition of the patient. No such large dose as that, of course, could be given to a child, but a few drops of paregoric may be administered and repeated. Where opium is given to adults by the mouth, it may be combined with bismuth subnitrat. (℞ Pulv. bismuth. subnitrat., ʒ i.; morphinæ sulphat., gr. i. M. ft. chart. No. vi. Sig. One every two or three hours.) The diet should be nothing more than a little barley water or peptonized milk, until further developments show the true nature of the case. There appear to be no good reasons for beginning with giving calomel, although at the onset of the disease one dose may do no particular harm. The early management of diarrhœa as already indicated is the key to success in treating cholera. If it

fails, or if the patient be seen for the first time when violent symptoms are already present, opium has still to be used to control the cramps and diarrhœa, but now it must be given hypodermically, to adults at least, as the stomach and intestines absorb but little. Whiskey, brandy, or, better yet perhaps, ether may be injected hypodermically to support the heart. Hot dry flannels may be wrapped about the extremities and body, re-enforced by bottles of hot water, just as in collapse from any other cause. Rubbing the limbs, and the administration of hot tea, coffee, and champagne, have all been recommended. Bits of ice allay the intolerable thirst somewhat, but under no circumstances is a patient to be allowed to drink a whole tumbler or gourd full of ice water, since death may be caused just in that way, in patients on the road to recovery. Careful watch about this, therefore, is necessary, so that patients be not tempted to do what their thirst almost compels them to. Ice caps to the head prove agreeable in some cases. The diet should be very simple during reaction, and no solid food allowed until recovery is complete.

La Grippe.

Etiology and Pathology.—La grippe or influenza is an infectious disease characterized by catarrh of the respiratory and gastro-intestinal mucous membranes. It depends upon a peculiar morbific agent, the germ of which is as yet unknown, but it spreads chiefly through inhalation of infected air. It was first called influenza by the Italians in the seventeenth century, who supposed that the stars had some influence upon its outbreak. In 1743 it was called la grippe by the French, from the Polish word grypka, which means about the same thing as influenza. During the pandemic outbreak of 1889–90, it was called the grip here in America.

The origin of the disease is unknown. The French think that it begins in Germany or Italy, and hence they call it the German pest or Italian fever when they do not call it la grippe. The Germans, on the other hand, call it the Russian disease, and the Russians call it the Chinese catarrh. The disease travels very rapidly, as is well known. It was not many weeks in getting here to New York from Paris. The pathological lesions are confined to congestion of the bronchial and gastro-intestinal mucous membranes, sometimes one, sometimes both. One attack does not afford immunity against subsequent attacks.

Symptoms.—The disease usually comes on suddenly, sometimes with a chill. Headache is often a marked early symptom, with pain in the back and limbs. Very soon there is fever, which exacerbates and remits. The temperature rarely goes

higher than 103° F. The pulse also becomes frequent, 80 to 112. In a day or two the patient begins to have watery eyes, nasal catarrh, and sneezing, and is troubled with cough and dyspnœa. Upon physical examination of the chest, abundant râles are heard. Very fine sibilant and subcrepitant râles are not infrequent, showing the presence of capillary bronchitis, which accounts for the dyspnœa, and the liability to the occurrence of broncho- (catarrhal, lobular) pneumonia as a complication. In some cases vomiting is not only present, but becomes a distressing symptom. Great mental depression, and occasionally delirium, with general muscular weakness, may be present, and even heart failure sometimes appears imminent. The tongue is usually dry and coated white, more rarely it becomes brown, and there is muttering delirium. In a few cases a roseolous eruption is seen. After a few days the fever and other symptoms subside, the cough decreases, and the patient soon recovers. Now and then the lungs become intensely congested and the face livid. Pneumonia and pleurisy may be complications. The duration of the disease is about eight days, though it may last two weeks.

Diagnosis.—During the first part of an epidemic, when only a few cases have been met with, the disease may not be recognized; but soon the same symptoms, particularly the nervous depression and muscular pains occurring in so many patients, distingush it at once from all other diseases.

Prognosis.—This is usually favorable. Infants and the aged, however, may succumb. When influenza occurs in the course of any other disease, it lessens the chances of recovery. Many phthisical patients die during an epidemic of influenza. In some cases it no doubt predisposes to the development of phthisis. The most frequent complication is lobular pneumonia, which has a tendency to spread; otitis, pleurisy, and even nephritis sometimes occur as complications or sequelæ. So rapidly does the disease travel and so short is its course, that the duration of an epidemic for any given locality is often not more than a few weeks or two months. Even in New York City, with its great population, the disease began in December, 1889, and practically ended in February, 1890. Cholera is said to follow in the wake of la grippe, but this is doubtful. Last summer, it is true, they had cholera in Spain, but that was only one locality out of many where la grippe occurred.

Treatment.—The disease runs a certain course; and if care be taken to prevent exposure of the patient to cold, thereby avoiding broncho-pneumonia and intense congestion of the lungs, as well as heart failure, patients in previously good condition are almost certain to recover in about a week or ten days. The pains in the back, and headache, sometimes require attention.

For these, antipyrine in five-grain doses ter die commonly affords relief and controls the fever. In some cases antipyrine is not well borne, as it may depress the heart. Then three grains of antifebrin may be given in place of the antipyrine. The heart should be watched and sustained with alcoholics: a tablespoonful of whiskey or brandy in milk, every two or three hours, if necessary. Should the pains be severe, morphine may be hypodermically given in doses of from five to ten drops of Magendie's solution. But it should be injected early in the afternoon, otherwise it may keep the patient awake all night, as opium given at bed-time sometimes does. Where the bronchitis becomes capillary, the chest should be well rubbed with turpentine liniment. The atmosphere of the room should be subjected to steam impregnated with tr. benzoin comp. One ounce put in an open vessel of boiling water will usually suffice. It diffuses a very pleasant odor, and has a beneficial action on the respiratory mucous membrane. For the bronchitis, Stokes' expectorant is good. (℞ Pulv. ammoniæ carb., gr. xvi.; fld. extr. senegæ et scillæ, āā ʒ ss.; tr. opii camphoratæ, ʒ iij.; syr. tolu., q.s. ad ℥ ij. M. Sig. ʒ i. p. r. n.) Should lobular pneumonia occur, as evidenced by rise of temperature and pneumonic sputa, or should the bronchitis be severe, dry cups may be applied over each lung posteriorly, to be followed by hot poultices contained in oil silk or other material to prevent dampening the sheets and night clothing. Milk punch, judiciously administered, is often beneficial in hastening recovery, and should be insisted on in spite of the patient's dislike to it. Even after recovery is complete, the patient, especially if elderly, during the following winter will be subject to colds, capillary bronchitis, and pneumonia. Cod-liver oil and even temporary change of climate have to be ordered in some cases where there is a tendency to phthisis. Nothing has been said of quinine, for it has no effect whatever on the disease, except in malarious districts.

Whooping-Cough. Pertussis.

Etiology and Pathology.—Whooping-cough or pertussis is an acute infectious disease that chiefly affects the bronchial mucous membrane and depends upon a specific poison, the germ of which is at present unknown. The infectious agent exists chiefly in the expired air and the sputa of those suffering with the disease, and spreads especially through inhalation. The pathological changes, not including complications or accidents, consist mainly in congestion of the mucous membrane of the bronchial tubes as in ordinary catarrhal bronchitis. It affects children mostly, and up to six years of age. After that, liability to the disease rapidly diminishes; and although adults may have it, the form is

so mild that it is scarcely noticeable. One attack generally gives immunity from a second, although there are exceptions. The disease not infrequently follows measles, and occurs generally in epidemics.

Symptoms.—After a period of incubation varying from one to two weeks, the first or catarrhal stage begins, which lasts usually about a week or ten days. During that time there are symptoms of coryza with sneezing, a moderate amount of conjunctivitis perhaps, and some bronchitis. In fact, during this catarrhal stage there is nothing to distinguish the disease from an ordinary cold, except, perhaps, a little fever, noticeable especially at night, when the temperature may go as high as 103° F. Usually, however, nothing is noticed except cough and restlessness.

Gradually the second or paroxysmal (convulsive, spasmodic) stage is developed. During this the cough occurs in paroxysms and is characteristic. After a number of expiratory coughs following each other in rapidly increasing succession, a long inspiration follows, causing a peculiar whooping sound, from which the disease receives its name. These paroxysms increase in frequency and severity, so that as many as fifty or more may occur in a day. The child on waking out of sleep, crying, or being startled in any way may be seized with a paroxysm. During the expiratory action the child may become exhausted, the face livid, and the urine and fæces sometimes involuntarily discharged. Hemorrhages into the retina or brain, and even hernia, may be produced. Vomiting is not infrequent. Injuries to the tongue from biting it during a paroxysm may occur. Between the paroxysms the child may be apparently well, but finally becomes more or less feeble, emaciated, and exhausted in prolonged and severe cases. The fever during this stage is slight, the thermometer only going to 100°–101° F. toward evening. This stage lasts usually about three weeks or one month, though it may be protracted for several months, especially if relapses occur, as sometimes happens.

Lastly, the declining stage begins. Gradually the paroxysms become less and less frequent, are shorter in duration, the child sleeps well through the night, and finally recovers.

Diagnosis.—The diagnosis during the catarrhal stage may be impossible, but the case should be judged by the presence or absence of an epidemic or other cases in the neighborhood. After the characteristic paroxysms of cough set in, there is no mistaking this disease for any other.

Prognosis.—This is generally favorable unless complications arise. Of these, lobular pneumonia is the most serious perhaps, unless it be cerebral hemorrhage. The physical signs during whooping-cough are usually those of bronchitis; but if the tem-

perature suddenly rises and the case drags along, it is fair to presume that lobular pneumonia has occurred. Acute vesicular emphysema, or over-distention of the air-vesicles, is not infrequent, but the patient usually makes a complete recovery from this condition as well as interstitial emphysema, which may also happen, due to rupture of some of the air-cells in a violent paroxysm. Finally, phthisis may develop in those predisposed to it, and it is not unusual to find the bronchial glands enlarged from tubercular disease on post-mortem examination of children who have died during or shortly after whooping-cough.

Treatment.—Prophylaxis requires removal of children from schools and the like when whooping-cough breaks out. A child in a family should be isolated if possible as soon as it is known to have the disease.

So far as actual treatment is concerned, there is no specific remedy. Quinine probably has no effect whatever in controlling the disease, unless the patient lives in a malarious district; besides, it causes ringing in the ears and other unpleasant head symptoms, with often nausea and even vomiting. Cathartics are not indicated in any stage of the disease. During the catarrhal stage, some simple cough mixture may be given, such as Stokes', care being taken regarding small amounts of paregoric or other preparations of opium to young children. During the paroxysmal stage, belladonna has been highly recommended. It may be given in doses of two or three drops of the tincture with fl. extr. lactucarium. (℞ Tr. belladonnæ, ʒ ss., fl. extr. lactucarii, ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. every two or three hours.) Lobelia inflata is also highly recommended. It may be given in the form of tincture instead of belladonna, in doses of two to five drops. Infusion of chestnut leaves is said by some to be the best remedy. (℞ Pulv. fol. castaneæ, ℥ i.; aquæ bullient., Oi. M. ft. decoct. Sig. Tablespoonful every two or three hours.) Instead of the infusion, the fluid extract may be given in ten to twenty drop doses in some syrup. The inhalation of chloroform has been also highly recommended for controlling the paroxysms, but this is a dangerous remedy for children. Turpentine or tinct. benzoin. comp. in boiling water in an open vessel, as in diphtheria or la grippe, is undoubtedly beneficial. I have had no experience with inhalations of carbolic acid. Small doses of opium in some form, and cautiously repeated if necessary, are less dangerous, I think, than chloral; but fl. extr. lactucarium is usually to be preferred, as it does not constipate and is soothing. The bromides are generally useless. In fact, fresh air, a moderate amount of liquid and nutritious diet, with a little cough mixture consisting of fl. extr. lactucarium or paregoric, and tr. belladonnæ, with steam in the room impregnated with tr. benzoin

co. or turpentine, is about all that is necessary in most cases. Should lobular pneumonia arise, it should be treated as already indicated.

MALARIAL FEVERS.

Intermittent Fever. Ague and Fever. Chills and Fever. Chronic Malaria.

Etiology and Pathology.—Intermittent fever, chills and fever, or fever and ague, as it is variously termed, is one form of malarial poisoning. Three factors appear to be necessary in any of these forms: (1) the condition of the soil, (2) exposure to air, and (3) the temperature. Moisture of a soil containing more or less vegetable matter is necessary; so that the disease is found in tide-water regions, especially along the line of junction of fresh and salt water, or low and marshy grounds. Where the soil is continually covered with water and is not exposed to air, it does not give rise to the disease, except near the edges as about stationary ponds and lakes. Salt-water marshes, however, like the peat bogs of Ireland, do not give rise to the disease. Finally, a certain amount of heat appears to be necessary, so that in this country we find it chiefly in the Southern States, although in later years malarial fevers have been observed in almost all parts of the country. Digging up streets for the purpose of laying sewer and other pipes, ploughing virgin lands, and draining swamps sometimes cause these diseases to appear. The poison seems to be near the ground, so that those inhabiting the upper rooms of houses may escape, while those in the lower rooms and basements of the same house may be affected. In large cities the carbonic oxide arising from various causes is said to prevent the disease to a certain extent. All forms of malarial fever are more prevalent in spring and autumn, especially the latter. A person once affected is more liable to a second attack. It affects all, regardless of age or sex.

The only characteristic lesions are enlargement of the liver and spleen. After repeated attacks of intermittent fever, the spleen becomes much enlarged, and the white corpuscles of the blood are increased, giving rise to the disease known as leucocythæmia. In such cases the spleen may undergo enormous hypertrophy weighing fifteen to twenty pounds instead of seven ounces, which is its normal weight.

The disease is acquired probably by inhalation of infected air, but the germ of the poison has not yet been satisfactorily determined. Over-fatigue, previous illness, and bad hygienic surroundings predispose to it.

Symptoms.—The stage of incubation varies from a few days

to six weeks, so that a person while travelling may have become infected at a certain locality, and not be attacked with this disease until arriving at some distant point where malaria is hardly known. Sometimes there are prodromata for a day or two, such as impairment of appetite and a feeling of apathy, but often the attack begins without any warning. The patient is suddenly seized with a chill which lasts usually an hour, more or less. The teeth chatter, the nails become blue around the edges, the skin has the goose-flesh appearance, and, in spite of blankets and bedclothes in general, the chill continues. This generally begins in the forenoon, thus differing in this respect from the chills of

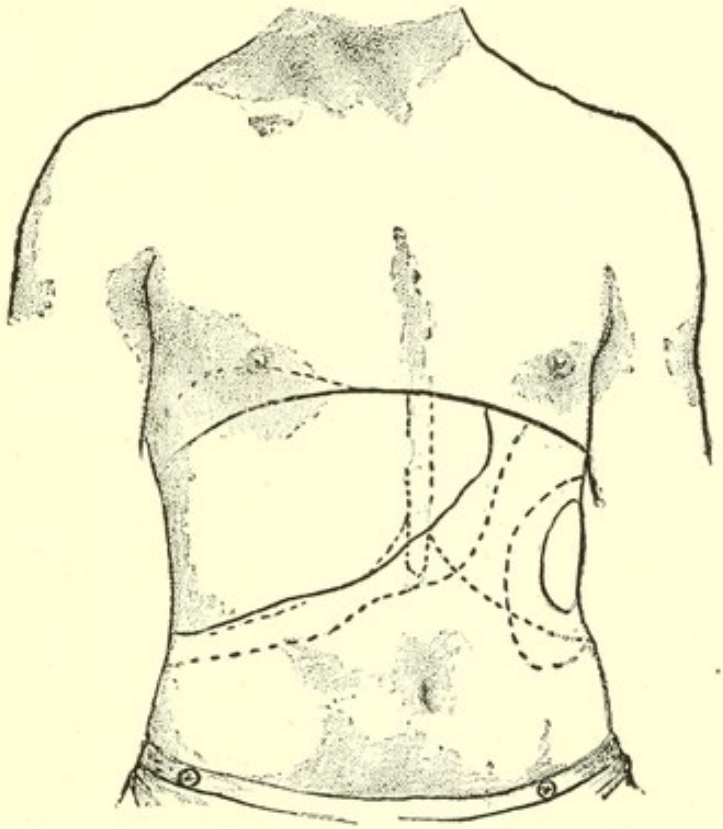


FIG. 38.—ENLARGEMENT OF LIVER AND SPLEEN IN MALARIAL FEVERS.

hectic fever, pyæmia, and the like, which come on as a rule in the afternoon or are irregular. Immediately following the chill the fever begins. The temperature rises rapidly to 103° F. or even 106° F. There is intense headache, and the pulse becomes frequent. Often there is vomiting. The urine becomes scant and high colored, or even suppressed. This second or hot stage lasts usually from three to five hours, when the temperature gradually falls. Perspiration now begins, and the third or sweating stage sets in. At first there is moisture about the forehead only, but soon the patient becomes bathed in a profuse perspiration. In general, it is about ten hours from the beginning of the first or chilly stage to the end of the third or sweating stage.

The period following the sweating stage up to the time of another attack is called the intermission. During the intermission there is no fever, and the patient may feel well. The three stages of chill, fever, and sweating make up what is termed a paroxysm. The interval embraces both paroxysm and intermission. If the interval be only twenty-four hours, the type is called quotidian. But if the interval is forty-eight hours, as is more commonly the case, the type is called tertian, and quartan when the chill occurs every third day, with an interval of seventy-two hours. Sometimes it occurs as a double tertian and so on. These different types depend on the amount of poison in the system. The quotidian is the most severe type of intermittent fever, the tertian the most common. In some cases there appears to be no regularity, and then it is termed irregular or erratic intermittent fever. In others the paroxysms come on earlier than expected, and it is then said to be anticipating; or if it come on later, it is said to be retarding or postponing.

Diagnosis.—In hectic fever, as in phthisis for example, the chill comes on invariably in the afternoon instead of the forenoon, and there are the signs of the disease on which the fever depends. In pyæmia, at the beginning, the chill may come on in the forenoon and a diagnosis be impossible at first. But even then, the presence of the cause of pyæmia and the recurrence of chills at irregular intervals in spite of quinine very soon settle the question. A severe chill after a surgical operation should always be regarded with suspicion as being the first manifestation of pyæmia, although intermittent fever might also be a coincidence.

From remittent fever the disease is easily distinguished, as in remittent fever there is only one chill at the beginning, and the fever never entirely intermits, but only remits. The diagnosis of enlarged liver and spleen in this disease has already been considered see (pp. 195, 231).

Prognosis.—This is invariably good in ordinary cases. Quotidian fever, however, is sometimes difficult to break, even after change of climate. Repeated attacks may lead to chronic enlargement of the spleen, with increasing anæmia and even chronic tubular nephritis. The prognosis is then unfavorable.

Treatment.—During the cold and hot stages little can be done except to attempt to make the patient as comfortable as possible. The ice-cap to the head is a valuable means to allay headache and modify the temperature in the hot stage. During the sweating stage the patient should avoid unnecessary exposure, for fear of taking cold. But as soon as the paroxysm is over, or even as soon as the sweating begins, quinine should be given.

There are various substitutes for quinine, as every one knows; and in cases where it acts unpleasantly on the ears, chinoidine with or without a grain or two of powdered red pepper may be used instead. To avoid the bitter taste, which is very nauseating to some patients, the quinine may be put up in capsules or made into gelatin-coated pills. Ten or fifteen grains given to an adult twice during the intermission is usually sufficient to prevent the next paroxysm. But the quinine should be continued for several days or more, in order to prevent the return of the paroxysms. The food should be nutritious, and the bowels regular. Night air, especially in the neighborhood of lakes and ponds, should be strictly avoided. In many cases tr. ferri chloridi in ten-drop doses ter die is indicated where the patient is anæmic.

In obstinate cases it may be necessary to give an initial dose of gr. xxx. of quinine, followed by smaller doses at regular intervals, to break up the fever. Where quinine fails, a mixture of the four cinchona alkaloids (quinine, quinidine, cinchonine, and cinchonidine), equal parts, given in the same doses as quinine, will often prove effectual. Tincture of iodine, alone or in combination, as recommended by some, has been found perfectly worthless in the author's experience. No mention need be made of oil of eucalyptus, dog-wood, bone-set, and other housewife remedies.

In cases where the stomach is weak and quinine cannot be given by the mouth, it may be administered hypodermically. For this purpose the hydrobromate of quinine is recommended by some. In Italy the following is the mixture used: ℞ Quininæ hydrochlorat., gr. xv.; sodii chloridi, gr. iiiss.; aquæ destil., ʒ iiss. M. Sig. Inject all hypodermically. As the quantity of fluid is somewhat large, it may require two or more injections.

In cases of Chagres fever, so called, arsenic is highly recommended along with quinine, strychnine, and mercury. (℞ Quininæ sulph., ʒ iss.; strychninæ sulph., acid. arseniosi, hydrarg. bichloridi, āā gr. i. M. ft. pil. No. xxx. Sig. One pill ter die.)

Sometimes an impending chill may be aborted by taking half a teaspoonful of Squibb's tr. opii comp. in a little water. This preparation, also called Squibb's diarrhœa mixture, contains camphor, pepper, chloroform, and opium. In fact, a few drops of laudanum and tinct. of capsicum in a little milk may cut it short, or the hypodermic injection of a moderate amount of Magendie's solution of morphine (five to ten drops for an adult). Finally, in obstinate cases of chronic malarial poisoning, nothing short of change of climate will be of permanent service.

Neuralgia affecting different parts, diarrhœa, and even dysentery may result from chronic malarial poisoning. They always assume more or less periodicity in their course, and quinine is indicated. Dumb ague, so called, with ill-defined feelings of impaired

health, muscular pains, and the like, are sometimes attributed to chronic malaria. In many such cases dyspepsia and alcoholism or some similar bad habit is behind it all instead of malaria. There is no use, therefore, in attributing all such ills to malaria when correcting abuses in eating and drinking will often cure the patient, while quinine has no other effect than to make the ears ring. Periodicity in these various complaints is the all-important diagnostic point when they are due to malaria.

Remittent Fever.

Etiology and Pathology.—The etiology in all forms of malarial fever is the same, and has already been stated. In remittent, or bilious remittent fever as it is called, the poison is either of greater intensity or else there is increased susceptibility on the part of the patient, or both. It is the severest type of malarial fevers, unless it be the pernicious form, to be mentioned. The pathological changes are also chiefly confined to moderate enlargement, from congestion, of the spleen and liver, and the latter has often a bronzed appearance due to pigmentation of the hepatic substance throughout. This pigmentation is probably caused by the change of hæmoglobin into melanin, brought about by the germ of the disease, whatever it may be, but it is characteristic of this affection.

Symptoms.—The period of incubation varies greatly, as it does in fever and ague, but is perhaps shorter. Not infrequently there are prodromal symptoms of more or less headache, loss of appetite, and oppression about the epigastrium. In a day or two, or without any premonitory symptoms whatever, the patient is seized with a chill. This is not so severe and long continued as in intermittent fever, nor is there any particular time when it occurs. Soon after the chill the temperature rapidly rises, so that in half a day it may go up to 105° F. The pulse is increased in frequency to 100 or 120. There is rending headache, and oppression with tenderness in the epigastrium, sometimes amounting to pain. Vomiting often occurs. About midnight the fever gradually abates, the headache diminishes, and the patient begins to perspire. The remission has now commenced. During that time the temperature may go down to 100° F., and the patient sleeps. By noon the next day, however, the temperature again begins to rise, and the same symptoms are repeated. During the height of the fever, the patient may be delirious or even comatose. The urine becomes scant and high colored or even bloody, and is sometimes suppressed. Again, the remission begins about midnight. The occurrence of herpes labialis in this and all malarial fevers is common. In favorable cases and under proper treat-

ment, the remissions become longer, so that the disease assumes the intermittent type, and recovery is complete in about two weeks on the average. But when the disease takes an unfavorable course, the remission becomes shorter and shorter, so that the disease may resemble typhoid fever. The tongue, at first coated white and moist, becomes dry and brown. Muttering delirium and sometimes jaundice occur, and the patient dies of exhaustion or some intercurrent affection. Throughout the disease the bowels are usually constipated, though in protracted cases diarrhœa is not infrequent, so that it may still more resemble typhoid fever. In some instances double exacerbations and remissions occur. The exacerbation may be anticipating and retarding also, like the paroxysms of intermittent fever.

Diagnosis.—The disease with which remittent fever is most likely to be confounded is typhoid fever, especially if the patient be seen for the first time during the second week. Here the history of the case is of the utmost importance. The onset of remittent fever is sudden, with a rapid rise of temperature, and the remissions are marked. The rending headache and epigastric oppression also aid in distinguishing it from typhoid fever.

In yellow fever the temperature does not rise so high with such marked remissions, and the disease runs a much more rapid course.

Prognosis.—The prognosis of an ordinary case of remittent fever under proper treatment is always good. Usually in two weeks the patient has recovered, and often in a much shorter time. When the temperature runs up to 106° F., however, with marked cerebral and uræmic symptoms, the case is a very serious one. The occurrence of hemorrhagic or black jaundice is an unfavorable sign. In other instances, where from neglect or improper management the case has been allowed to drag on to the third week with diarrhœa, muttering delirium, and the like, the prognosis is unfavorable, and quinine seems then to have little control over the disease.

Treatment.—Early in this disease a moderate dose of calomel is of advantage. (℞ Hydrarg. chlor. mitis, gr. iij.; sodii bicarb., gr. v. M. ft. pulv. Sig. Take at bed-time.) It should generally be followed by a moderate amount of saline cathartic next morning. During the exacerbation the ice-cap to the head is of the greatest service. It lessens headache, helps to reduce temperature, and is of great comfort to the patient. As to vomiting, bits of cracked ice taken by the mouth and a mustard paste over the epigastrium are often capable of arresting it. Care should be taken not to allow the mustard to remain so long as to blister the patient. A few minutes at a time is enough. As soon as the first remission begins, quinine is indicated. Fifteen grains should be given

at once, and repeated before the exacerbation commences, say at 5 A.M. and 10 A.M. In many cases the dose may be repeated at 6 P.M., thus giving forty-five grains of quinine per day. In case it is vomited or not absorbed by the stomach, as occasionally happens, no time should be lost, but it should be given hypodermically. In severe cases or where the patient has already been sick for several days, the remission need not be waited for, but quinine may be given at once, as already stated. In a few days the worst cases generally yield to this treatment; but if in spite of quinine the patient gets no better after several days or a week, and you still are convinced that the case is one of remittent fever, the hypodermic injection of an eighth of a grain of pilocarpine muriate during the rise of the fever will often cause a profuse perspiration to break out. The quinine before was doing no good, but now takes hold. The remissions are more decided and last longer, and the patient recovers rapidly. Though I have not had an extended experience with pilocarpine in this disease, yet in the few cases used it simply acted like magic in turning the whole aspect in a few hours. Large doses of this drug, however, are to be avoided, as it depresses the heart and causes great salivation and choking.

After the case has dragged along for two or three weeks, genuine Warburg's tincture in tablespoonful doses ter die seems to act better than the continued administration of quinine. After an interval of several days, quinine may be tried, and repeated if necessary. Alcoholic stimulants, a tablespoonful of whiskey or brandy in a little milk every two or three hours, then become necessary. In ordinary attacks of remittent fever, stimulants are not usually indicated until convalescence, as the course of the disease is generally short.

Instead of pilocarpine, or with it, the patient may be put in a tub of hot water (112° F.), with a blanket around the neck and extending over the edges of the tub, so that the patient gets a steam bath. These two measures rarely fail, and are often necessary to prevent congestion of the kidneys and even nephritis. In place of pilocarpine, some use a drop of tr. aconiti rad. in a little water every three hours, to induce sweating. It is not so certain as pilocarpine, however, and equally dangerous, perhaps. During convalescence, great care should be taken by the patient not to undergo over-fatigue or exposure to night air, as a relapse may be brought on.

Infantile remittent fever, so called, is nothing more than a mild form of typhoid fever of short duration found among children, and has nothing to do with malarial poisoning.

Pernicious Fever.

Etiology and Pathology.—Little need be said under this head. The cause is the same as for all malarial diseases, but this particular form is rarely seen except in localities where malaria abounds and especially in warm countries. Sometimes a patient may bring the disease with him, so that cases may be observed, at schools and colleges situated even in the mountains for instance, especially in early autumn.

The anatomical changes in this form are what might be expected—congestion of internal organs, especially the spleen and liver, with their consequent enlargement.

Symptoms.—At first the patient may appear to have only an ordinary attack of intermittent or remittent fever, though even the onset is usually severe. Each paroxysm is more marked than the preceding, and in the worst cases the patient will die as early as the third chill. In some instances the patient becomes cold and collapsed, as in the algid stage of cholera. In others, violent delirium sets in. Black jaundice, persistent vomiting, and uncontrollable diarrhœa are observed occasionally.

Diagnosis.—This may be difficult unless strict attention is paid to the character of fevers prevailing in the neighborhood, and as to where the patient has just come from. Given marsh grounds in our Southern and Southwestern States during the months, say, of August and September, what appears to be a severe attack of intermittent or remittent fever should be regarded with suspicion from the first. Delay or hesitancy in treatment will soon disclose the real nature of this disease. The physician who is properly on guard will therefore see to it that energetic measures are used from the start.

Prognosis.—This depends much on the character of the epidemic and the type of the disease. The tertian type is the most favorable, for it gives time for treatment. Quotidian pernicious fever is very unfavorable in the prognosis. If the patient can be carried through the third chill successfully, there is hope. Even then, some fatal complication, such as dysentery, pneumonia, or exhaustive fever, may follow.

Treatment.—No time is to be lost in waiting for the effects of cathartics that act on the liver, or until the symptoms are such as to admit of the giving of quinine. Quinine must be given at once and in large doses. The best plan is to give it hypodermically (p. 405); for, in some cases at least, pills, capsules, and even solutions of quinine are either not digested or else are vomited. It should therefore be given hypodermically in fifteen-grain doses every two hours, say, whether abscess form or not. It is easy enough to cure the abscess afterward. But there is no ne-

cessity for abscess if the instrument be perfectly clean and the solution be prepared properly.

Energetic administration of quinine is the sheet-anchor of treatment in this disease. But at the same time, while the temperature runs high, the early hypodermic injection of an eighth of a grain of pilocarpine muriate greatly enhances the chances of profuse sweating and elimination of the poison. In some cases also the hot tub bath and blanket around the body, the head protruding through a hole cut out in the middle, undoubtedly helps to make the patient sweat, relieving the congested internal organs, especially the kidneys, and eliminating the poison. Aconite, as already remarked, may be given in place of pilocarpine, but the latter, given in small doses hypodermically, is, in my opinion, infinitely to be preferred.

The Magendie's solution of morphinæ sulphat. may be given with the pilocarpine muriate. An eighth of a grain of pilocarpine muriate in five drops of Magendie's solution of morphine, and enough water to make up the injection, may be given together. The morphine holds the heart up to its work, aids in the diaphoresis, and allays nervousness. (℞ Sol. morphinæ Magendie, ♏xx.; pilocarpin. muriat., gr. ss.; aquæ, q.s. ad ʒ i. M. Sig. Shake and inject hypodermically ♏xx.) The two together induce profuse perspiration. Since using these remedies at the right time, and judiciously, malarial fevers of all forms have lost many of their terrors, chief among which are congestion of the kidneys and brain.

This disease is so short in its course usually that there is little or no time to give Warburg's tincture. The latter remedy is excellent in chronic malaria resulting from neglect or any cause, or in the sequelæ following acute attacks. But it cannot take the place of quinine and calomel in acute malarial fevers, nor can anything else do so, as yet found out. Opium in some form, as well as red pepper and even chloroform, in minute doses, often help to break up the disease, as already indicated.

After any form of malarial disease, the patient is apt to be anæmic and pulled down. Nutritious diet, iron in some form (chiefly tr. ferri chloridi, ten drops ter die in water), and avoiding over-fatigue and exposure to night air, are all important in preventing a relapse. Change of climate also may become absolutely necessary, especially in those forms attended with chronic diarrhœa.

Dengue.

Etiology and Pathology.—Dengue, or dandy, from the stiff way it compels one to walk, break-bone, or African fever is an acute infectious disease that occurs epidemically in hot climates,

and is characterized by remittent fever, pains in the back and joints, an eruption resembling measles, and glandular swellings. One attack does not prevent a second; and all are subject to the disease, regardless of age or sex. The exact character of the poison is unknown, but it is communicable by means of clothing and the like, and is usually found in malarious districts. The pathological conditions, so far as known, are limited chiefly to the eruption, swelling of lymphatic glands, and more or less catarrh of the nares and throat, causing the latter in some cases to be painfully sore.

Symptoms.—After an incubation of three to five days, the disease begins suddenly with chilliness, headache, much sensitiveness to light, and intense pain in the back and limbs. The small joints are sometimes swollen. In children, convulsions are not infrequent. The temperature soon begins to rise, and rapidly goes up to 105° F. or even higher, and the pulse is frequent accordingly (100 to 130). Epigastric pain with nausea and vomiting are not infrequent. The testicles, inguinal glands, and those of the axillæ and elsewhere swell and become painful. After a few days the fever remits, the pains and swellings subside, and the patient feels better. Often there is profuse sweating, or even diarrhœa. After about two to four days, the fever again rises, the pains increase in severity, and the same symptoms are repeated. But at the end of about the third day from the first attack, or later in some cases, the eruption appears, first usually in the palms of the hands, and then rapidly spreads over the surface of the body. This eruption is generally papular, resembling measles, but it may be merely an evanescent flushing of the surface here and there in spots, and in some rare instances it may be wanting altogether. The fever and all the symptoms now subside and recovery is rapid, so that in a favorable case the patient is usually well in a week or ten days.

In some instances the fever recurs again and again, with successive crops of the eruption. In others, especially in children, the fever and pains are scarcely noticeable, but the rash occurs. In some cases the patient sinks into a typhoid condition with dry, brown tongue, muttering delirium, and the like, and dies of exhaustion.

Diagnosis.—The eruption and long remission and the fact that it occurs epidemically usually, sporadic cases being rare, would enable one to distinguish it from ordinary remittent fever, rheumatism, or relapsing fever.

Prognosis.—This is uniformly favorable unless the attack be very severe and affects an infant or aged and debilitated person or one that is suffering with some pre-existing serious disease.

Treatment.—Opium in moderation to relieve pain, nutritious

diet, and, during convalescence, tonics constitute the treatment. Quinine has no control over the malady, but may be given at the outset as in any other disease occurring in a malarial neighborhood.

Scurvy. Purpura.

Etiology and Pathology.—Scurvy or scorbutus is an infectious disease characterized by spontaneous hemorrhages into the skin and deeper tissues, as muscles and joints, and also by bleeding from the gums. These hemorrhages are due, no doubt, partly to the increased permeability of the walls of the blood-vessels from capillary vaso-motor disturbance and impaired nutrition, and partly to the deterioration of the blood. Both conditions favor the transudation of sanguinolent fluid into the surrounding tissues. It belongs to a group of hemorrhagic diseases, but differs from the others by the peculiar affection of the gums and hemorrhages into the deeper tissues. In all these there is a tendency to the swelling of joints. Lack of variety of diet, rather than of any one particular class of food, is the chief dietetic cause of scurvy. According to Garrod, food lacking in potassium salts is particularly injurious, and hence the necessity for eating vegetable substances containing those salts, the so-called anti-scorbutics. Of these the principal are lemon or lime juice, onions, sugar, vinegar, and the like. On the other hand, the continuous eating of salt pork without such vegetables, together with over-crowding and lack of exercise, as on board ship and in barracks, prisons, and such places, strongly favors the production of the disease. Dampness, foul air, heat, and over-work also act in this way. It attacks both sexes, at all ages, though men are more frequently affected than women, from greater exposure to the cause. Those suffering debility in any way are more liable to it than the strong.

From the fact that scurvy may occur independently of all the above-mentioned conditions it has come to be regarded by some as the result of an infectious poison the nature of which is unknown, but which is more apt to show itself under certain predisposing circumstances. For that reason it has been placed among the infectious diseases. It occurs sporadically, but also as an endemic and epidemic affection.

Symptoms.—The disease usually begins insidiously. Rheumatic pains in the lower extremities, debility, and dyspnœa are among the earliest signs. In about a week, not only do spontaneous hemorrhages into the skin occur, especially in the legs, but also into the deeper tissues, giving rise to hard and painful swellings. In some cases there are spots resembling bruises from injury. Ulcerations may occur. The gums also become affected

in a way peculiar to scurvy. They are swollen and painful, bleed easily, and have a bluish color. In children and old people the gums are but little affected, and no change is observed when there are no teeth. In this latter respect it resembles the affection of the gums in lead-poisoning. In some cases ulceration of the gums occurs.

Anæmia is usually observed. It is due partly to the bad hygienic condition, but chiefly to the disease itself, which is certain to give rise to anæmia from impaired nutrition, loss of appetite, and bleedings. Dyspnœa is marked, but is unattended by any of the physical signs of diseases that would be likely to cause it, but is probably due to the anæmia, as we have seen. Systolic functional heart murmurs and venous hum may be present, with palpitation. The skin becomes dry and assumes a peculiarly dull leaden pallor, characteristic of the disease.

The pulse is generally compressible, as might be expected. It is also small and sometimes more frequent, and at others slower than in health. The temperature is generally normal, except after the disease is far advanced or else some complication arises. In course of time, swelling of joints occurs usually, due to intra-articular effusion. Acute tubular nephritis with albuminuria sometimes occurs, as well as endocarditis. Enlargement of the spleen is not constant, though in severe cases it is not infrequent, especially when the disease is far advanced and the scorbutic anæmia well pronounced. The duration is about six weeks in ordinary cases, with proper care and surroundings. In others it may last much longer, unless the patient dies meantime of some intercurrent disease, as pneumonia, nephritis, or cardiac complications.

Purpura.—This is one of the hemorrhagic diseases, and is also of an infectious character like scurvy, the true nature of the poison being unknown. The two affections are closely allied to each other and may truly be considered as different degrees of the same type of disease. Purpura appears to affect women more frequently than men, and often occurs without any apparent cause. Purpura receives different names according as it is mild or severe or of rheumatic origin. It is therefore termed purpura simplex, purpura hæmorrhagica, or peliosis rheumatica, as the case may be. In none of these forms do we have the peculiar affection of the gums characteristic of scurvy.

Purpura simplex occurs without any constitutional symptoms or apparent exciting cause. The chief sign is hemorrhage into the skin of the lower extremities. The deeper tissues and gums escape. The disease usually terminates in recovery in about ten days or two weeks.

Purpura hæmorrhagica is a graver form. It is also known as

morbus Werlhofii or Werlhof's disease. Here we observe constitutional symptoms often of a typhoid character and hemorrhages not only into the skin, but also into the deeper tissues, and from mucous membranes. The gums, however, do not present the characteristic changes observed in scurvy, but on the contrary, remain intact. Nephritis and endocarditis may occur, and there is usually more or less swelling of joints, as in other varieties of hemorrhagic diseases. Apoplexy, pleuritis, and even peritonitis from perforation due to intestinal ulceration may occur. Hemorrhages into serous cavities are not infrequent, giving rise to hæmothorax, hæmopericardium, and the like. The spleen is not infrequently enlarged. Anæmia and debility with depression of spirits are more or less prominent symptoms. The disease is of much longer duration than purpura simplex, and may extend over several months. The prognosis is unfavorable on the average. This disease is more closely allied to scurvy than any other form of purpura.

Purpura rheumatica or rheumatic peliosis (dark spots) is usually attended with some constitutional disturbances, as loss of appetite, slight fever, and general indisposition. The joints of the lower extremities, especially the knee joint, are more or less swollen, and sometimes there is actual inflammation of those structures. The gums and mucous membranes are usually free from hemorrhage. The cases generally recover after about two weeks, but may be prolonged by recurrence of the symptoms already described.

Diagnosis.—Scurvy is not likely to be mistaken for any other disease than purpura. Scurvy, however, is characterized by the peculiar gingivitis (inflammation of the gums) and hemorrhages into the deeper tissues, both of which are peculiar to it, and absent in purpura of any form. But inasmuch as these diseases are closely related to each other, being simply different degrees of one and the same cause, which is an unknown infectious poison, the differentiation between them is not of such vital importance as if they were separate and distinct affections.

Prognosis.—As already stated, scurvy is usually curable under proper management. But in severe cases the patient may die of complications, as nephritis, endocarditis, and the like. In purpura hæmorrhagica the prognosis is more unfavorable, since intercurrent affections are more frequent and exhaustion is more likely to occur. The prognosis in purpura simplex and peliosis rheumatica, on the other hand, is nearly always favorable; the latter, however, sometimes proving to be tedious.

Treatment.—In scurvy, prophylaxis requires the free use of various kinds of fresh vegetables, with proper hygiene. Even after the disease has appeared, these two elements, fresh vegeta-

bles and fresh air, with cleanliness, are to be insisted on. Lemons and onions are specially regarded as anti-scorbutics. Radishes, spinach, lettuce, and fresh fruits are recommended, as also vinegar and the chemically pure salts of potash, especially the bitartrate.

Of medicines, the mineral acids are of little value. The dilute sulphuric acid, or sulphuric-acid lemonade so called, has been much used, but without benefit.

Keeping the mouth clean by means of astringent lotions is a valuable element in the management of a case of scurvy. Rinsing the mouth with a mixture of tr. myrrh and water is one of the best mouth washes. A weak solution of alum and water (℥ i. : Oi.) is also good. When the gums are much inflamed and painful, tepid water with borax (℥ i. : Oi.) is very cleansing and soothing. Bitter tonics should be given to stimulate the appetite. The compound tr. of gentian is about the best. A few drops or a teaspoonful may be given ter die in a wineglass of water just before meals. Stimulants in the form of whiskey and milk (milk punch) should be given (℥ ss.–℥ iv.) in cases of necessity. As the patient begins to improve, iron in some form is indicated. Quinine may be added if the patient is a malarious subject or if the fever is sufficient to require it and is controlled by its use. Applications over the painful parts are sometimes required. Of these, the lotio plumbi acetat. is one of the best, but it stains the linen. For this reason, morphine may be used instead of the opium in preparing the wash. Later on, frictions by means of the camphorated soap or other liniment may be of use.

The remarks on the treatment of scurvy apply also to that of purpura. But if hemorrhage is persistent and alarming, effort should be made to arrest it. Epistaxis may be controlled by plugging. But it is difficult and often impossible to control hemorrhages elsewhere, especially in purpura hæmorrhagica, or Werlhof's disease. Injection of one to three grains of ergotin hypodermically is probably the most efficacious, but even this often fails. Applications of ice by means of rubber bags, or otherwise, may be tried. Preparations of iron and mineral acids are generally worthless for this purpose. Absolute rest, a cool room, the use of ergotin as already described, and morphine to allay nervousness and peristalsis in case of intestinal hemorrhage, promise the best results.

Yellow Fever.

Etiology and Pathology.—Yellow fever is an acute infectious disease depending upon a specific virus the germ of which is not at present known. It is not directly contagious, but the poison

first undergoes some unknown change after leaving the body of a yellow-fever patient and infects another individual, chiefly, it is thought, through inhalation. It is, however, a portable disease; that is, it is transmissible from one point to another by means of clothes packed in trunks and the like. It occurs epidemically, chiefly in tropical and semi-tropical regions, and preferably during the summer months and early fall. One or two good frosts put an end to it. It attacks both sexes, at all ages, but colored people are less liable to it than white, and in the former it also runs a milder course than in the latter. One attack usually exempts the patient from future attacks. As is well known, bad hygienic surroundings, as well as the low parts of towns situated on the water, favor its outbreak. Sporadic cases are very rare.

With the remarkable exception of the spleen, which is not enlarged in this disease, most of the internal organs show signs of more or less congestion. The liver, moreover, has become mustard or boxwood colored from acute fatty degeneration of the hepatic cells. The kidneys are frequently affected with acute tubular nephritis. The mucous membrane of the stomach is reddened and thickened, and the lungs are often the seat of apoplexies and infarctions. The skin and tissues generally are jaundiced from coloring matter derived from disintegration of the red blood-corpuscles—hæmatogenous jaundice—and not from hepatogenous jaundice due to resorption of obstructed bile. Finally, the heart and other muscles undergo more or less granular degeneration, as in typhoid fever, and in rapidly fatal cases congestion and hemorrhages are often found in the brain.

Symptoms.—The stage of incubation varies usually from a day to several weeks. Premonitory symptoms may occur as in any disease, but they are not the rule. Generally the onset is sudden and characteristic, and is termed the stage of invasion, which in ordinary cases lasts about two or three days.

The patient is seized with a chill—hardly as severe as the chill of intermittent fever, and sometimes chilly sensations—and this is soon followed by fever, the thermometer not going higher than 102½° F. to 104° F., except in few cases. The pulse rarely beats more than 115 per minute, and in mild cases there may be little change noticed. Not only is the pulse much slower than might be expected, but it is gaseous in quality. There is violent headache, together with pains in the back and limbs. Even now there is nausea with epigastric tenderness, and perhaps some vomiting, but usually this characteristic symptom appears later. The bowels are costive and the tongue more or less furred. The face is flushed, the eyes injected and watery. The urine is scant and early contains some albumin. By the third

day this period of invasion has reached its height, when the second stage, of remission or calm, rapidly sets in. The temperature falls to 100° F., the pains are less, the urine increases in flow, and the patient appears to be rapidly convalescent. In mild cases it does happen that the patient may now go on to complete recovery. But usually after a few hours, or it may be a day or two, the third stage begins with the second exacerbation. The third stage is not ushered in anew by chills as a rule; but after the remission the temperature simply rises again to 104° F. or thereabouts, and the pulse becomes remarkably compressible, as already stated. The skin is hot and dry, but often bathed in sweat. In most cases it turns yellow by about the third or fourth day, the discoloration being due, as already stated, to hæmatogenous jaundice. In severe cases the surface becomes cool, and the characteristic black vomit appears. This is caused by capillary hemorrhage into the stomach, the changes it undergoes there causing it to resemble coffee-grounds, as may also occur in cancer of the stomach. Hemorrhage into the bowels, with melæna, and from other mucous membranes may also occur. The urine may become bloody and be loaded with albumin and casts, or it may even be suppressed. Uræmic convulsions or coma may succeed.

The third stage, however, instead of being attended with such alarming symptoms, may be milder than the first, so that at the end of a day or two the temperature suddenly falls to normal and the patient goes on to recovery. In other instances relapses occur, and in severe cases the patient dies in the first stage.

The mind in this disease is usually clear throughout, unless uræmic convulsions or coma occurs, and in children the disease is sometimes ushered in with convulsions or delirium. The duration ordinarily averages about a week or less. In fatal cases death results from exhaustion or uræmia.

Diagnosis.—During the first few days of the disease and at the commencement of an epidemic, it may be impossible for even an experienced practitioner to make a positive diagnosis.

Bilious remittent fever, especially should jaundice occur, might be mistaken for yellow fever. But in the former the remission occurs much earlier than in yellow fever, the temperature curve being entirely different. The pulse in remittent fever is much more rapid in proportion to the degree of temperature than in yellow fever, and its quality is not so gaseous or compressible. The spleen is enlarged in remittent fever, but not in yellow fever. Delirium is not infrequent in remittent fever, but is the exception in yellow fever until other symptoms are so pronounced that a mistake could hardly be made. Finally hemor-

rhages from mucous surfaces, including black vomit, are not observed in remittent fever.

Prognosis.—This differs according to epidemic influence, hygienic conditions, and the like. According to Da Costa, the death-rate varies from ten to seventy-five per cent. While it will never do to give up hope while there is life, the occurrence of black vomit and suppression of urine may be regarded as almost fatal. Severe symptoms at the outset, such as high temperature, deep jaundice, and very scanty and highly albuminous urine containing blood and casts with frequent vomiting, are unfavorable. On the other hand, the opposite of such symptoms is favorable, such as moderate amount of temperature, urine free and not much changed, slight jaundice coming on late, and mild gastric disturbance.

Treatment.—The disease is not contagious, but portable and infectious. Therefore, prophylaxis requires that infected vessels should be strictly quarantined. Persons having the disease may be isolated by removal to quarantine or hospital, and all things pertaining to them disinfected. By such means and the observance of the utmost cleanliness and strict sanitary measures the disease may be stamped out early. No internal remedy as a prophylactic has yet been found, but the utmost prudence in diet should be observed in time of an epidemic, and the night air should be avoided.

At the earliest sign of the disease, absolute rest is of the first importance. This point was insisted upon by the late Dr. Stone, of Louisiana, when he was sent for by the authorities of Norfolk, Va., during the terrible epidemic in that city and Portsmouth during the summer of 1854. There should be absolute rest on the back if possible, with good ventilation, for fresh air also is necessary.

So far as actual treatment is concerned, it is merely symptomatic. There is no antidote. Quinine has no control over the disease whatever, but ten or fifteen grains may be given early, as the patient may also be a malarious subject. Probably the first dose to be given would be fifteen grains of calomel, followed by a saline, to unload the bowels and relieve the kidneys, if thought to be necessary. As soon as the calomel has acted, small doses of morphine may be given hypodermically to relieve pain and restlessness. The ice-cap to the head is a great comfort to the patient and helps to relieve headache. Nausea and vomiting are best controlled by bits of cracked ice in the mouth and a mustard plaster over the epigastrium, but not sufficient to blister. Small sips of iced champagne or the hypodermic injection of morphine are also recommended. As the fever does not generally run high and is of short duration, antipyretics are

not indicated, the ice-cap usually being sufficient, with cold spongings if necessary. In case of marked internal hemorrhage, from one to three grains of ergotin should be given hypodermically, as well as one-quarter grain of morphine, as in typhoid fever. The use of the so-called styptics is of doubtful utility, and given by the mouth may give rise to vomiting.

Prostration and collapse call for stimulants, which may be given hypodermically and by the rectum if the stomach is too irritable.

Peptonized milk by means of Fairchild's tubes, and given in small quantities, is the best diet. But should the stomach be too irritable, it may be given by the rectum, with or without alcoholic stimulants as the case may be.

Pilocarpine muriate, one-eighth of a grain hypodermically injected during the invasion, has been considered a means of producing early diaphoresis and shortening the disease. I have had no experience with it in yellow fever, but, judging from its remarkably favorable action in remittent fever with bloody urine, I should be disposed to give it with the expectation that it would prove a valuable remedy. The kidneys are to be closely watched throughout the attack. As soon as the urine becomes scant and albuminous, dry cups may be placed over the loins, about half a dozen on each side, to be followed by hot, thick poultices on which the patient can rest. But these poultices are to be enclosed in flannel and oil silk or rubber, so as not to wet the patient's garments and the bedclothes. Otherwise they are nasty as well as harmful. But should the urine become very scant and bloody, or actual suppression take place, what then? Cathartics, even including croton oil and elaterium, are too slow and uncertain in their action and too depleting. Diuretics are obviously out of the question, the kidneys being already gorged to bleeding. Diaphoresis alone is left, unless we are to wait for nature's effort by vomiting to close the scene. How is diaphoresis to be produced sufficient to relieve the kidneys and to ward off uræmic convulsions and coma? Certainly not by the hot-air bath, which, by the way, not every patient and physician might be so fortunate as to possess, even if it is a simple affair made of tin and heated by an alcoholic lamp. I would suggest in these cases to give the patient (adult) ten minims of Magendie's solution of morphine hypodermically to strengthen the heart. It will also aid greatly as a diaphoretic. Then follow this by fifteen drops of Norwood's tincture of veratrum viride hypodermically, and place the patient in a tub of water, with a blanket wrapped around him, as in acute tubular nephritis. Or else an eighth of a grain of pilocarpine muriate, dissolved in ten minims of Magendie's solution, with the addition of, say, ten drops of

water, to make sufficient quantity, may be injected at once. In this way I have relieved suppression in remittent fever.

A good nurse, cheerful surroundings, and courage on the part of the patient are all necessary for a successful result. During convalescence, which is somewhat tedious, the diet should still consist of such liquids as peptonized milk, soups, and the like, until solid food can be taken with absolute safety.

Dysentery. Epidemic Dysentery. Chronic Dysentery.

Etiology and Pathology.—Dysentery is an infectious febrile disease, characterized by inflammation and ulceration of the mucous membrane of the large intestine. It is due to a specific poison, the germ of which is not known, but which has a peculiar affinity for the lower bowel. It may be sporadic or epidemic, and is usually acute, though it may become chronic. In the former case the inflammation generally appears to be of the ordinary catarrhal form, but in epidemic dysentery we often have to deal with a much severer grade resembling diphtheritic inflammation. The disease spreads, it is thought, through the medium of the stools of those affected. It is not known exactly how the poison enters the body, but it is probably through inhalation of infected air or drinking of contaminated water, and the like. Hence, it is not to be regarded as strictly contagious. The disease occurs chiefly in warm and tropical climates, and preferably in malarial regions, though there are exceptions to this general rule. Errors in diet, impure air and water, and exposure to cold and dampness as well as overwork and insufficient food, are among the exciting causes. Dysentery attacks both sexes, at all ages, but occurs most frequently among adults under thirty-five, and oftener among men than women, perhaps. It prevails chiefly in the summer and fall. One attack does not give positive immunity against recurrence, but lessens tendency to the disease.

Symptoms.—In nearly all cases, dysentery begins as a simple diarrhœa attended with colicky pains, loss of appetite, and perhaps headache. After a period varying from a day to a week, in ordinary cases, the stools become dysenteric and characterize the disease. Instead of abundant feculent and watery discharges preceded by rumbling of the bowels, and which give relief to the patient, the stools become scant, and consist of mucus and blood. There is a constant desire to go to stool, attended with bearing down or tenesmus, but little or no relief is obtained. The number of stools varies from twenty or less to one hundred or even two hundred a day. In many of these cases, however, only a little wind is passed, though the patient is apt

to count it as a stool. At first little hard balls of feculent matter, called scybala, may be occasionally passed, but soon these cease, and then all feculent matters disappear. As convalescence begins, the stools again become feculent. Along with tenesmus, there are generally more or less colicky pains called tormina. Tympanites is sometimes present, but is not usually a marked symptom, and some tenderness on pressure over the left colon is not uncommon. In some cases the bladder becomes affected, with frequent micturition, strangury, or even retention of urine.

Fever in this disease is not usually a marked symptom. The temperature rarely goes higher than 103° F., although, of course, there are exceptions.

The pulse is but little accelerated; in some cases it remains normal in frequency. The surface of the body feels cool, and

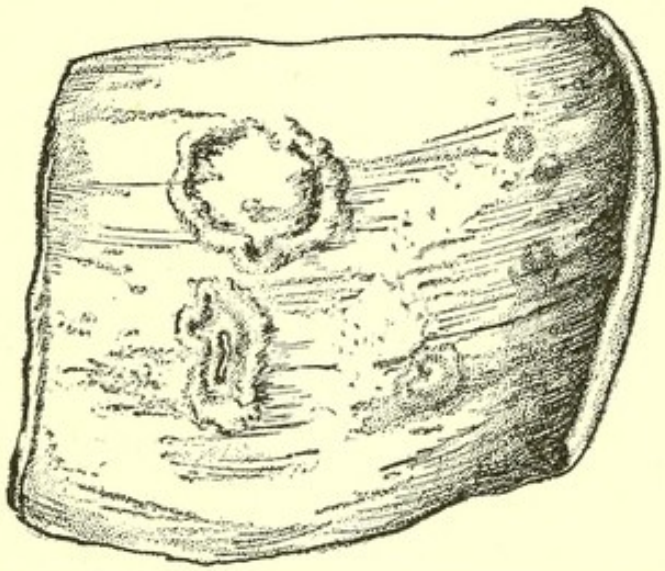


FIG. 39.—ULCERATION OF THE LARGE INTESTINE IN DYSENTERY.

the tongue is generally somewhat coated. As the disease progresses, the appetite is lost, and, owing to the impropriety of giving much food, the face shows some emaciation, and the eyes are sunken. Not infrequently there is a peculiar dysenteric odor about the patient.

Thirst is usually a prominent symptom from the start, and needs careful watching, as the patient is tempted to drink fluids indiscriminately. In this way a relapse may be brought on in a case that was progressing favorably. Vomiting sometimes occurs. In mild cases the patient recovers in about ten days on the average or, as Flint states, in from four to twenty-one days.

In epidemic dysentery usually, and in some cases of sporadic dysentery, the symptoms are much more severe than those described. Instead of prodromata, the disease may be ushered in by a chill. The stools very soon become dysenteric. Instead of

mucus and blood, shreds of mucous membrane may also be passed, or the stools may consist of blood and serum, giving rise to the name of bloody flux. In such cases the stools are likened to the washings of flesh, and they possess a characteristic and offensive odor. Owing to necrosis of the intestinal mucous membrane, fragments of the tubules of Lieberkühn are sometimes found. Tormina and tenesmus are less marked than in simple cases, and are sometimes absent. Perforation of the cæcum and rectum may take place, giving rise to fecal abscesses. Fatal peritonitis may also occur, due to perforation of the intestine, but this complication is fortunately not common. Abscess of the liver from septic emboli transported by the mesenteric veins is more frequent in the tropics.

In fatal cases the patient may die within a few days, of collapse, or as the disease progresses the pulse is feeble and frequent, the tongue brown and dry, sordes collect about the teeth, the patient becomes delirious, and dies of exhaustion. The mind is usually clear in this disease, and when delirium occurs it comes on late with exhaustion and other typhoid symptoms. Some authors describe malarial, scorbutic, and other varieties of dysentery, but the disease itself is the same, only it is complicated with other affections, and therefore no separate description is necessary.

Chronic dysentery is chronic inflammation of the mucous membrane of the large intestine, and very often there is no ulceration. It results in most cases from an acute attack. Not infrequently the inflammation extends up into the small intestine, so that chronic diarrhœa and chronic dysentery exist together, as, indeed, is not infrequently the case. This intractable disease may continue for years.

Diagnosis.—Sometimes a patient with the piles will give quite a fair history of an attack of dysentery. The same may be said of cancer of the rectum. Physical examination of the parts, however, will enable the physician to settle the question at once, should any doubt have existed in his mind in the first place.

In diarrhœa there are abundant feculent and watery stools, unattended with blood and tenesmus; so the diagnosis is easy.

Prognosis.—In simple catarrhal dysentery the prognosis is nearly always favorable. But in epidemic malignant dysentery the prognosis is equally bad. During the summer and autumn of 1886 there was such an epidemic in Wise and other counties in southwest Virginia, and even in that sparsely settled mountainous country 800 persons lost their lives of this terrible disease. The occurrence of perforation, with peritonitis or fecal abscess, as well as the formation of metastatic abscess of the liver, lungs, and the like, render the prognosis very grave. The prognosis in

chronic dysentery is always unfavorable; according to Flint, it is the most intractable and hopeless of diseases.

Treatment.—In an ordinary case of dysentery, if the patient be seen within the first day or two, the intestinal tract may be cleaned out and congestion of the intestinal mucous membrane relieved by a dose of castor oil (℥ ss.–℥ i.) mixed with twenty-five drops of laudanum. Or half ounce of Epsom salts may be used instead. In many cases, however, the patient has already taken various remedies so as to render such preliminary treatment doubtful or positively unnecessary. The patient should be at once put to bed in a comfortable and well-ventilated room, and absolute rest in the horizontal position is to be enforced. As soon as the saline cathartic or castor oil has acted once, or immediately, if neither was given, opium should be administered in some form. If the case be urgent, no time should be lost, but a hypodermic injection of five to ten minims of Magendie's solution of morphine may be given at once. After that, the patient may take by the mouth about twenty-five drops of laudanum every two or three hours until the pupils are moderately contracted and the tenesmus and tormina are under control. He should be encouraged to resist the idea of going to stool as much as possible, since the effort at straining only tends to make matters worse, like rubbing a sore eye. Flannel wrung out of mustard and hot water may be placed over the abdomen, but in general it is not called for if the opium treatment be properly carried out.

The diet is of the utmost importance. It should consist of nutritious and easily assimilated food, of which peptonized milk ranks first. It may be given in quantities of four to six ounces about every three hours to an adult. In this way life is sustained and fecal débris does not accumulate in the intestine to further inflame it, as such food is absorbed before it ever reaches the site of inflammation.

Thirst, which is often urgent, should be jealously watched. Small bits of cracked ice on the tongue occasionally is all that is necessary or should be allowed by way of luxury. A sip of tea now and then may also be permitted. Should the patient object to milk or any of its preparations, barley water may be substituted in small quantities. Keeping the patient flat on the back, semi-narcotized and with a well-guarded diet, is all that is necessary in most cases of sporadic dysentery.

In the tropics, however, ipecac has to be used. British surgeons in India, according to Reynolds, are, or were, in the habit of giving 20 grains of powdered ipecac at a dose and repeating it several times a day. We tried it in Bellevue Hospital in the summer of 1868, and it signally failed. In New York no ipecac is

necessary. But in the Southern States the fourth of a grain of the powder may be given two or three times a day with the opium. It acts, perhaps, by stimulating the functions of the liver and skin—the first producing antisepsis in the intestinal tract, the latter eliminating the poison by the skin. Some prefer to give opium by enema, 25 or 30 drops of laudanum in about four ounces of a warm solution of starch or mucilage. In mild cases often one injection is sufficient to put the disease under control. But there is no good reason why enemata of opium should be used in ordinary cases, and they are more inconvenient than giving the drug by the mouth. Whatever preparation of opium be commenced with had better be kept up throughout the disease. Hypodermic injections of morphine are rather troublesome and painful to some. Old pills of opium are too hard and indigestible in many cases, so that valuable time is lost, or suddenly the patient shows signs of opium poisoning from a number of old pills becoming digested at the same time. Laudanum or black drop are perhaps the best preparations, being liquid and easily absorbed. But if the patient objects, then the powder of morphinæ sulphat. may be given on the tongue, in doses of a sixth of a grain for an adult, and cautiously repeated.

According to Flint and other observers, patients with dysentery stand a great deal of opium. This is no reason, however, why it should be given in excess, the objects being to relieve tenesmus and tormina, and to lessen peristalsis.

In severe cases of epidemic dysentery, the opium treatment, alone or with ipecac, is not sufficient. The patient also requires local treatment of the bowels. This is best done by irrigation by means of clean tepid water with a little borax in it (℥ i. : Oi.). A long flexible double catheter may be used as in washing out the bladder. Strong injections are contra-indicated, the object being merely to wash out the bowel and prevent general sepsis. Ulcerations will not be likely to extend under this method, but on the contrary will heal more quickly. An injection containing a very small amount of bichloride of mercury is serviceable in some cases, just as in washing out the nares in diphtheria. (℞ Hydrarg. bichloridi, gr. iij. ; sodii chloridi, ʒ i. ; sodii biborat., ʒ ij. ; glycerini, ℥ ij. ; aquæ, Oij. M. S. Inject warm.) The injection should be made once a day, and oftener if well borne by the patient. Great care should be exercised in introducing the catheter with skill and gentleness. By using the double catheter, the danger of rupturing the bowel at points of severe ulceration will be avoided.

When typhoid symptoms occur, such as dry, brown tongue, frequent and feeble pulse, muttering delirium, and the like, stimulants are called for. A tablespoonful of whiskey or brandy in

peptonized milk may be given as in typhoid fever. Should vomiting prevent, it might become necessary to give brandy and morphine hypodermically (Magendie's solution, gtt. v.; spts. vini gal., ʒ i. M.).

In malarious regions, not infrequently the disease is complicated with some form of malarial poisoning, as evidenced by periodicity in exacerbations and remissions of the fever. In these cases quinine must be given early. If the patient can take it in solution, so much the better. If not, it may be given hypodermically, since pills of quinine might not be digested. (℞ Quininæ muriat., gr. xv.; sodii chloridi, gr. iiiss.; aquæ destil., ʒ iiss. M.) Since the solution for hypodermic use is large, it may require two or more injections at any given time. This may be done morning and noon, and being highly efficacious, a few days of such treatment is usually sufficient to break up the malarial element. Often the morning injection alone is sufficient.

In chronic dysentery, besides maintaining the strength of the patient with nutritious diet, alcoholic stimulation, and the like, local treatment of the mucous membrane of the bowel becomes necessary. The difficulty lies in the fact that it cannot all be reached. The injection of nitrate of silver (gr. i. to ij. : ℥ i.) is one of the best plans of treatment. Sulphate of zinc (ʒ i. : Oi.) is also highly recommended. There is no use in taking these remedies by the mouth, since they never reach the part for which they are intended. Bismuth subnitrate in ʒ i. doses three or four times a day, however, does reach the mucous membrane of the intestine and helps to dry up the discharge. When one remembers how difficult it is to stop old gleet sometimes, it is easy to see how well-nigh hopeless is the task of arresting the discharges of chronic dysentery.

Parotitis. Mumps.

Etiology and Pathology.—Parotitis, exclusive of traumatic causes, may occur either as an idiopathic disease or as a symptomatic or metastatic affection. Idiopathic parotitis or mumps is an acute infectious disease, characterized by inflammation of the mucous membrane lining the ducts of one or both of the parotid glands. The germ of the specific poison is unknown, but it enters the mouth and extends along the membrane lining Steno's duct into the lesser ducts and follicles. The interstitial tissue of the glands becomes infiltrated with serum, and there is more or less œdema of the surrounding connective tissue, causing them to become swollen and enlarged. There is little or no tendency to suppuration. The disease may occur sporadically, but usually it appears as an epidemic. Both glands are generally affected, either simultaneously or one after the other, and

one attack gives immunity against a second. The submaxillary and sublingual glands are also sometimes inflamed coincidently. It may attack both sexes, at any age, but usually about puberty. Males are said to be more subject to the disease than females.

Symptoms.—After an incubation of a week or two, the disease may be ushered in by chilly sensations or a distinct chill. Not infrequently both are wanting. There is some headache, lack of appetite, and a moderate febrile disturbance. In a day or two pain on opening the mouth is experienced, with some difficulty in swallowing. Pain and swelling of the parotid gland, just in front of the ear, are now observed; and a piece of pickle or anything mixed with vinegar when taken into the mouth causes a smarting sensation in the buccal cavity, owing to the sensitiveness of the mouth of Steno's duct. This is regarded as a sure test by the laity. The swelling increases, and gives the patient's face a characteristic appearance. In four or five days this begins to subside and the fever disappears. As already stated, both glands may be affected simultaneously, or first one and then the other. In rare cases only one gland is affected, the other becoming the seat of the disease in after-years. In a week or at most two weeks the patient has recovered.

During an attack of mumps, one or both testicles may also become affected by metastasis, so called. According to Granier, this occurs in about twenty-four per cent of the cases. In my own experience it appears to depend on the character of the epidemic. In some of these the testicles are frequently affected, in others they wholly escape. From destruction of the epithelium lining the seminiferous ducts and failure of any further secretion of spermatozoa, the testicle often becomes atrophied, though atrophy of both testicles following mumps must be regarded as extremely rare. According to Granier, atrophy of the testicles occurs in ten per cent of the cases of mumps. The taking of cold during an attack of mumps is thought to favor metastatic orchitis. Metastatic inflammation of the mammæ and ovaries may similarly occur. Rarely in some epidemics does parotitis present grave symptoms accompanied with convulsions in children, and delirium and typhoid symptoms in older persons. According to some authors, the disease is contagious as well as infectious. It may occur at any season of the year, but I have observed most cases in spring and fall.

Symptomatic parotitis occurs sometimes in such infectious diseases as typhoid and typhus fever, pneumonia, and the like, where the disease is probably due to the primary infection causing a catarrhal inflammation of the mucous membrane in this and other localities. It is always to be regarded as a rather grave and unpleasant symptom.

Metastatic parotitis is a secondary complication following injuries, surgical operations, and acute inflammations with purulent exudations. In these the cause is due to embolism. Veins surrounded by tissues that are undergoing inflammatory processes have formed in them, under certain predisposing conditions, coagula that are presumed to be septic in their character. The clots or thrombi in turn become disintegrated, and the septic emboli resulting are carried along in the general circulation until they lodge somewhere. As a result local inflammation occurs, which becomes suppurative if the patient lives long enough. Many of these emboli lodge in the liver and lungs, while other finer ones pass on and are arrested in more remote organs as the parotid glands, where the capillary vessels are smaller. As to whether one parotid gland or the other is more frequently the seat of metastatic inflammation is not settled, but in seven cases reported by me in the New York *Medical Record*, September 10th, 1881, including that of our late United States President, Garfield, the right parotid gland was affected in three, the left in two, and both in two cases. Perhaps the course of the blood to the right parotid gland being in a more direct line from the heart, the poison would be carried more frequently to the right than to the left side.

Diagnosis.—The diagnosis of mumps is a very simple thing occurring in a person previously healthy and never having had the disease. Care should be observed in correctly locating the seat of pain and swelling over the parotid gland just in front of the ear. Swelling of these organs occurring in the course of acute infectious diseases or pyæmic conditions is almost certain to be a symptomatic or metastatic affection, in spite of the statement and belief of patients that they never had the mumps or only had it on one side.

Prognosis.—The prognosis of mumps or idiopathic parotitis is almost always favorable. In some severe cases swelling of neighboring glands and extensive œdema may involve the glottis, causing sudden death by œdema glottidis unless promptly relieved by surgical operation. The most serious result is atrophy of the testicle in some cases. But symptomatic parotitis occurring in the course of typhoid fever and the like must always be regarded as a grave and unpleasant symptom, while metastatic parotitis is usually a serious and often fatal complication. It is quite true that some do recover, but Trousseau states that in his experience all the cases proved fatal.

Treatment.—In mumps the patient should not be exposed to cold, and the cheeks may be bandaged lightly with flannel or cotton batting tied over the head. The diet should be light. A small dose of paregoric may be given to allay pain and relieve

insomnia if necessary. Should orchitis occur, rest in bed for a day or two may be necessary, and a suspensory bandage should be worn for a week or so afterward. In several cases in which I had the late Prof. Henry B. Sands, M.D., in consultation, the ice-bag applied to the testicles and rest in bed gave speedy relief, and no atrophy followed. A tobacco poultice is also highly recommended by some. Blood-letting in former days was regarded as a specific cure for orchitis in this disease, but at present it is regarded as unnecessary. The treatment of suppurating parotitis, on the other hand, is chiefly surgical. Alcoholic stimulation is usually called for to sustain life.

Syphilis.

Etiology and Pathology.—Syphilis is a contagious disease depending on a specific poison the germ of which is now claimed by some to be the bacillus of Lustgarten. Its mode of spreading is by direct inoculation as may occur during sexual intercourse, vaccination with syphilitic humanized virus, punctures made with infected instruments, the drinking out of the same cup used by syphilitic subjects, by kissing, and the like. Not a few instances of direct inoculation occur in the act of examining the syphilitic vagina or rectum, in which cases the chancre appears on the finger of the operator. Children sometimes acquire the disease from nursing syphilitic women. A syphilitic father begets a syphilitic child, and the mother becomes secondarily infected through the fœtal circulation. The poison is most virulent in the first and second stages, where it exists in the chancrous discharge and affected glands, as well as in the blood when it becomes a constitutional disease. In the third and declining stages the poison appears to be found chiefly in the syphilitic discharges from affected parts. One attack of syphilis appears to prevent a second as a rule.

The pathological changes produced by this disease are too varied to be gone over minutely except in a work specially devoted to the subject. The disease is divided into three stages. During the first stage it is characterized by the initial lesion or chancre. This is an indolent ulcer with a hard base, as will be described. In the second stage there are various eruptions on the skin and mucous membranes, enlargement of glands, falling out of the hair and eyebrows, and exostoses, with iritis. In the third stage the deeper tissues become involved, and gummata are formed, chiefly in the liver, but also in the lungs, brain, and spinal cord. The disease is of an inflammatory nature, and in severe cases, unless proper treatment be resorted to, every tissue in the body may successively become involved, so that in the course of time the person affected is changed throughout, and is indelibly

stamped for life. "Half a century may pass away," said the late Prof. Wm. H. Van Buren, M.D., "and still the trail of the serpent will be visible."

Symptoms.—After a period of incubation varying from ten to forty-six days, but averaging about twenty-four days from the time of exposure to the cause, a small, dark red, and somewhat elevated and indurated spot is noticed on the mucous membrane of the glans penis or prepuce, or wherever the abrasion happens to be where the poison enters. In some cases this is all that may be found, and even that may escape notice, but constitutional syphilis will follow, all the same. Usually there is only one spot. Soon, however, the papule ulcerates, giving rise to an indurated, indolent, shallow ulcer with little or no pus unless it becomes highly irritated. In about six weeks or less this primary sore has healed, leaving a white cicatrix. Under treatment it may heal in much less time. On the other hand, when neglected and irritated, it may last much longer. Swelling of the nearest lymphatic glands occurs in from one to two weeks after the appearance of the chancre. These two—the chancre and swelling of the nearest lymphatic glands—constitute the first stage, and, as already stated, it lasts on the average about six weeks.

The second stage now begins, usually with more or less loss of appetite, perhaps some fever, and a general feeling of indisposition. If the chancre appears on the sexual organs, the lymphatics in the groin on both sides are usually somewhat enlarged, and perhaps a little tender on pressure. The enlargement is not generally confined to one gland only, but to several, although the gland nearest the chancre will usually be a little larger than the others. There is no disposition to suppuration, and these glands may become indurated and enlarged for years, even after the patient has completely recovered.

In about two months, more or less, and following close upon the symptoms of indisposition just mentioned, the first eruption appears. This is a roseola, and appears first on the breast, sides, and abdomen. In cases of doubt it frequently can be brought out by a warm bath. This macular roseola is soon followed by a papular eruption, with crusts on the scalp. The hair of the scalp and eyebrows often falls out, as well as that of the axillæ and elsewhere. The nails may also be attacked. Vesicular, pustular, and ulcerating eruptions may likewise occur in the second stage, especially among the dissipated and those of a faulty constitution. These syphilitic eruptions or syphilides are usually arranged in circles, and are free from itching and irritation. This absence of itching in doubtful cases is very important in diagnosis. They all disappear spontaneously in time, and, except the pustular forms, leave no scar. The mucous membrane of the fauces and

tonsils are inflamed at the same time, giving rise to syphilitic sore throat, which is almost always present, as well as nasal catarrh and laryngitis. Later on in the second stage mucous patches are formed. These are papules or elevated plateaux of mucous membrane, and they occur chiefly where the skin and mucous membrane join, as at the corners of the mouth, edges of the vulva, and about the anus. The epitrochlear lymphatic glands, as well as those in the back of the neck, become enlarged, and later on the glands in the axillæ and elsewhere are affected. Pains in the muscles and bones, especially the tibiæ and sternum, are usually present, and they are almost invariably worse at night after the patient has become warm in bed. Tenderness on percussion or pressure over the shins and sternum are common symptoms of syphilis. Periostitis giving rise to localized swellings and nodes, especially on the tibiæ and sometimes the clavicles, are not infrequent. Iritis, choroiditis, and more rarely inflammations of the auditory apparatus are among the complications. The palms of the hands and soles of the feet are frequently the seat of syphilitic eruptions.

After some six to eighteen months the secondary stage usually comes to an end and the patient may recover; or else, if he has a faulty constitution or has been neglectful of treatment, the third and last stage begins. There is no well-marked dividing line between secondary and tertiary syphilis. But in the latter form the disease, instead of being widely spread as in the second stage, is usually limited to certain areas, and extends deeply, with consequent destruction of tissue and permanent scars. Rupia and deep-seated ulcers of the skin and mucous membrane that do not tend to spontaneous recovery occur in tertiary syphilis. Orchitis occurs early in this stage also; indeed, it is found late in the second stage. Gummata of the liver, brain, and spinal cord characterize the third stage. These gummata or syphilitic new growths are so named from their supposed resemblance to gum. They vary in form and size. At first hard, they subsequently enlarge and soften and undergo caseous or calcareous degeneration. Their principal seat is in the liver, but they are also found in the various internal viscera, as well as the subcutaneous and submucous connective tissue.

Syphilis often causes abortion, especially about the fifth month of pregnancy. After one or more abortions, the child may be carried to full term, but is born dead. After this usual course of affairs, a child with inherited syphilis may be born alive at full term. The first stage of syphilis is wanting, of course, in a child thus born, and no signs of the disease may be visible at birth. After it is about six weeks old, secondary syphilis, as already described, but generally in a less marked degree, appears. The skin is of a

dirty color, and the upper incisors of the permanent teeth, as first observed by Hutchinson, are conical and notched at the free edges. They are known as pegged teeth. Hydrocephalus, deformities, idiocy, and eruptions of all kinds are often traceable to inherited syphilis. In a few months after birth, secondary eruptions appear, and mucous patches are observed about the mouth, nose, anus, and genitals. Nasal catarrh gives rise to irritating discharges and the so-called snuffles. The child has an old and withered look. The cornea is subject to a low grade of inflammation, giving rise to interstitial keratitis, with consequent impairment of vision. The iris and other parts may also become involved. Not infrequently there is photophobia, giving the child the habit of shading the eyes with the hands. The fingers and toes become enlarged from dactylitis. The deeper tissues are also subject to changes already referred to, including the formation of gummata in various organs.

Diagnosis.—The Hunterian chancre with the enlarged and painless lymphatics can hardly be mistaken for any other disease. The superficial and indolent character of the sore, with its hardened base and scant serous discharge, together with the fact that it is not auto-inoculable, distinguish it at once from the chancroid, which is usually multiple, is an acute irregular ulcer with sharply cut edges, and gives off an abundant purulent discharge. For all the well-known points of difference between these two diseases the reader is referred to surgical works or those specially devoted to venereal diseases.

In the early stage of secondary syphilis the diagnosis is not usually difficult with a correct history of the case. But doubts may arise when, long after the patient has had syphilis, some of the symptoms again recur. In such cases the early history is of the first importance; but should there be any question, rapid improvement under anti-syphilitic treatment would be decisive. The mucous patches, eruptions on the buttocks, coryza and snuffles, together with the fissures and excoriations about the mouth, nose, and anus, are characteristic of inherited syphilis in early life. Later on, the pegged teeth, already described, the scars, and history of the case, with the general condition of the patient, usually enable one to make a correct diagnosis. The history of the parents may also be of service when obtainable.

Prognosis.—Under modern treatment, even syphilis has been stripped of many of its terrors, thanks especially to the labors of Bumstead, Van Buren, Keyes, Taylor, and others of this city. Among the dissipated, the underfed and overworked, however, and those of naturally faulty constitutions, especially among those who have a tuberculous history, the prognosis is usually

unfavorable. The prognosis depends much also on the time when scientific treatment has been commenced and before deep-seated lesions have occurred. In some cases also, undoubtedly, syphilis is mild; in others it appears to be malignant and rebellious to all treatment.

When syphilis is inherited, the prognosis is favorable in proportion as the disease is late in manifesting itself.

Treatment.—True chancre should not be cauterized, as it does nothing toward preventing secondary syphilis. It, moreover, interferes more or less with an early diagnosis. When, therefore, chancre or an imitation of it appears, nothing should be done further than dusting it with a little oxide of zinc powder; and should it not heal readily, one or two dustings with a little calomel are usually sufficient. Throughout the whole treatment the general health is to be looked after, and intemperance and dissipation of all sorts are forbidden. Total abstinence from alcohol is best. But if the patient becomes weak and anæmic, a little claret with water may be allowed at dinner if absolutely necessary. Not infrequently what is supposed to be chancre disappears in a few days and is not followed by any signs of secondary syphilis. It is of the utmost importance, therefore, not to begin constitutional treatment until a positive diagnosis is made; otherwise the patient is forever afterward in a state of uncertainty about his true condition. It is often necessary to wait for the eruption before being able to make a positive diagnosis. But until this is evident, "do nothing," says Van Buren; "but frankly tell the patient he must wait, or else give a placebo while studying the nature of the sore and awaiting developments."

The iodides have little or no influence over early syphilis, but it is just at this time that mercury acts most beneficially. The object is not to salivate or destroy the nutrition of the patient by large amounts, but by a continuous system of small doses to keep the patient mildly under the influence of the drug for at least one year, to be followed by mercury and the iodide for about another year, in order to make a complete cure. Overwork, insufficient food, dissipation, and bad hygienic conditions in general, however, will render all treatment ineffective. Champagne is said to be specially injurious, but a glass or two of claret with water may be allowed at dinner if the patient becomes weak and anæmic. Mercury may be given by the mouth, inunction, fumigations, and hypodermic injections. The first method is the one most commonly employed, and is generally all that is necessary. In some cases, however, inunction or fumigation may be used to hasten the action of mercury in case of urgent necessity, as iritis, for instance. One application of mercurial ointment to the syphilitic eruption in children often causes its prompt

disappearance. I have never found it necessary to give it hypodermically, and consequently have no experience with that method. The forms of mercury to be used are the bichloride, protiodide, blue pill, calomel, and gray powder.

At first the patient may be given one-twelfth of a grain of calomel every hour or two during the first few days, when the gums may become a little reddened or touched, as it is called. Then the doses may be promptly stopped if salivation is to be feared, or else they may be given only three times daily. This is done in order to get the patient rapidly under the influence of mercury, so that no time may be lost. As soon as the calomel is stopped, or while it is being given from one to three times daily only, one of the other preparations of mercury may be commenced. Of these the late Prof. W. H. Van Buren, M.D., preferred the protiodide. The granules of Garnier and Lamoureaux are recommended by him. Each contains one-fifth of a grain of the protiodide of mercury. One of these should be given three times daily after meals, and the dose gradually increased until in a week or ten days the patient takes three ter die. Should it produce irritation of the mouth or bowels, the dose may be modified for a time and then gradually resumed, but it should be kept up continuously.

The bichloride of mercury is more commonly used than the protiodide, since it may not be convenient to find French granules everywhere. When the bichloride is used, it should be given at first in doses of one-thirty-second of a grain ter die after meals, and gradually increased to one-sixteenth of a grain. It may be given in solution or in pill form, with or without iron. (℞ Hydrarg. bichloridi, gr. ss.; tr. gentian. comp., ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Shake. ʒ i. ter die after meals.) Gradually increase to double that dose. Or if the patient is anæmic, the following may be given: ℞ Hydrarg. bichloridi, gr. ss.; tr. ferri chloridi, ʒ iss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Shake. ʒ i. ter die after meals. The dose of bichloride to be gradually increased to double that amount unless the patient has already been taking one-sixteenth of a grain of the first mixture, when the same dose may be continued in the second. The bichloride may also be given in pill form with ferrum reductum, but it is more easily and surely absorbed when given in liquid. When one preparation has been commenced and is well borne by the stomach, it should steadily be continued for at least one year. Should the symptoms not yield to the bichloride treatment as already indicated, instead of enlarging the dose, and thereby irritating the patient's bowels, one-twelfth of a grain of calomel may be added several times a week to increase the mercurial influence, or else blue pill (gr. ij. with gr. i. ferri sulphat. exsiccat.) may be given

once a day or oftener, and the signs of salivation watched for and guarded against by at once stopping the additional remedy and using a saline cathartic if necessary. Different people are very differently susceptible to the effects of mercury, and each patient should be carefully watched until his dose is fully ascertained. In children the hydrarg. cum creta or gray powder may be used in doses of two grains ter die and gradually increased if necessary.

When is iodide of potassium to be used? As a rule, not until after six months or a year of the steady use of mercury. The physician is to be guided by the eruption and general symptoms. As soon as the eruption shows a tendency to collect in patches and remain chronic, and nodes and deep-seated lesions occur, the iodide must be used. In the very last stages of tertiary syphilis the iodide may be used alone; but in well-managed cases the mixed treatment, as it is called, should follow the first course. (℞ Pulv. potass. iodidi, ℈ viij.; hydrarg. bichloridi, gr. i.; aquæ, ℥ ij. M. Sig. Shake. ℥ i. ter die after meals.) In rare cases the iodide may be given in much larger doses, but in general ten grains ter die is enough.

This mixed treatment should be continued for about one year, or until at least six months have elapsed without any syphilitic symptom. At the end of that time, with the ordinary dietary and hygienic precautions mentioned, the patient in the majority of cases is perfectly cured. On the other hand, irregular treatment might be kept up indefinitely until the precise condition of the patient is unknown, and the case becomes exceedingly difficult to manage with exact skill. The patient should therefore be warned beforehand that treatment is not to be stopped simply because the signs have all disappeared and the disease is supposed to be cured. It is almost certain to break out again. In some cases, no doubt, all traces of the disease have been stamped out in less than two years, but to make sure of it the treatment should be continued. In others the treatment, even when continuous, may have to be extended over a greater length of time. In all cases, as already stated, the treatment should be steadily continued until six months have elapsed without any sign of syphilis appearing. This rule holds good in those cases even that apply late in the disease or after one or more relapses during irregular treatment.

Of local treatment of ulcers and the like, little may be said here. The reader is referred to works devoted to the subject. But in general, dry dressings, such as dusting the parts with iodoform, oxide of zinc, or bismuth, are preferable to ointments and greases of different kinds.

Regarding the treatment of chancroid, the reader is referred to

works on surgery. It may be stated, however, that strong nitric acid applied to these ulcers is the surest way of getting rid of them. The nitric acid not infrequently has to be repeated. In one case in which I had the late Prof. Henry B. Sands, M.D., in consultation, the ulceration was so extensive that the patient had to be etherized first. The acid was then thoroughly applied by means of a glass brush. One or two suppurating buboes were thoroughly cleansed with carbolic wash. Although the patient did not need etherization again, I had to retouch the sore several times by means of the glass stopper. Under temperate habits and a nutritious diet, the patient made a rapid recovery, and never had a sign of secondary syphilis.

In rare cases the chancre is mixed—that is, we have to deal with Hunterian chancre and chancroid poison in the same sore. The diagnosis cannot be made at once. The nitric acid is used to destroy a supposed simple chancroid when after some six weeks secondary symptoms appear, as related. In that case, the constitutional treatment is the same as that already stated.

Rheumatism.

Etiology and Pathology.—Rheumatism is an infectious disease, apparently of miasmatic nature, and due to a specific poison the germ of which is not at present known. It may be acute, subacute, or chronic, and these varieties differ in degree, but not in kind. The disease attacks the articulations by preference, giving rise to rheumatic synovitis with effusion into the joints, without any tendency to suppuration. But other parts are also liable to be affected, notably tendons and fasciæ and the endocardium. The inflammation of peri-articular structures is doubtless due to extension from the synovial membrane, but the endocarditis that sometimes occurs is to be regarded as part of the affection rather than a complication. From the fact that the disease attacks joints by preference, it is called articular rheumatism; and as the acute variety is also attended by considerable fever, it is sometimes termed rheumatic fever.

Acute articular rheumatism or rheumatic fever attacks both sexes, at all ages, but males more frequently than females, and chiefly between the ages of fifteen and thirty-five. Although sporadic cases not infrequently occur, yet the disease is often endemic or epidemic. It prevails chiefly in temperate climates and during the winter and spring months. Exposure to cold and wet, as is usual among icemen, 'longshoremen, and those living in cold and damp apartments, especially basements, favors the development of this disease, particularly among those who are in a lowered state of vitality from overwork, insufficient food, previous disease, and the like.

It is true that gonorrhœa sometimes gives rise at first to what is known as gonorrhœal rheumatism, as will be described, but one attack of gonorrhœal rheumatism appears in many cases to predispose to the ordinary type. Nor does one attack of acute articular rheumatism grant immunity against future seizures, but on the contrary predisposes to them. The younger the patient the more liable is endocarditis to occur during the course of the disease. Finally, heredity appears to exert a decided influence, according to Fuller, in about twenty-eight per cent of all cases. Prout first expressed the belief that rheumatism was caused by excessive accumulation of lactic acid in the blood due to defective nutrition, and its insufficient elimination by the skin from exposure to cold. More recently this view has been also held by Richardson, who has produced endocarditis by injecting lactic acid into the peritoneal cavity of dogs. This view of the pathology of rheumatism, however, as yet lacks positive proof; but, from the fact that it occurs at certain seasons of the year as an epidemic, it more recently has come to be regarded as an infectious disease, as already stated; the exact nature of the poison, or how it enters the body, being as yet unknown.

Symptoms.—The attack may be preceded a few days or hours by some headache, loss of appetite, and a general feeling of indisposition. Sometimes only dyspeptic symptoms are present. The onset may begin with chilly sensations or a distinct rigor. Often the patient, however, is awakened in the night by a severe pain in one of the large joints, the knee, for example, or may first notice it on attempting to get out of bed in the morning. Soon one or both ankles become painful, and the affected joints are found to be swollen, hot, and tender on pressure. The surface around the affected joints becomes more or less reddened. Fever now sets in, if indeed it did not exist before any swelling took place. The temperature rises usually to about 103° F. in ordinary cases, and is generally in proportion to the amount of swelling of the joints and the number involved. The fever follows no regular course, but as a rule is irregularly remittent. Sometimes it is even lower at night than in the morning. The pulse is hard and rapid, running up to 115 to 120 per minute. The patient is bathed in sweat, which continues during the fever and is not due to a fall in temperature. The perspiration has a peculiar acid odor. The tongue is heavily coated white and the bowels are constipated. The urine, as might be expected, is scant, high colored, and loaded with urates. Both the urine and perspiration are usually intensely acid, but there is as yet no proof that lactic acid exists in greater quantity than in health. The acidity is due rather to uric acid, than lactic acid. The chlorides are diminished, and a slight amount of albumin

is not infrequently found, but it has no special pathological interest.

The joint affection is erratic; that is to say, it travels from one joint to another, symmetrically or irregularly. The larger joints are usually affected early in the disease, but it may extend so as to involve them all. This does not happen simultaneously, however, but usually inflammation appears in one set of joints while it rapidly subsides in others. In this way the disease, without proper treatment and under bad hygienic conditions, may last several weeks. But under present methods of treatment, the average duration is about three weeks. In some cases, however, the patient may get well in a week.

Recovery begins by lowering of the temperature, the pulse beats less frequently, the sweating ceases, and the swelling and pain subside. The tongue also cleans off, there is not so much thirst, the urine becomes more abundant and normal, the appetite returns, and the patient may go on to complete recovery. But relapses are not infrequent, and for some time afterward there will be felt more or less pain usually about the joints that had been affected.

In about one-fifth of the cases, according to Macleod, the heart becomes affected. But whatever may be the percentage of such cases, the heart lesion is usually endocarditis rather than pericarditis, and it occurs much more frequently among patients under twenty years of age than over. The endocarditis invariably affects the left side of the heart, and, although it may fortunately end in resolution, it not infrequently gives rise to some valvular lesion. Of these, mitral regurgitation is the most frequent. During fœtal life endocarditis affects the right side of the heart, giving rise to pulmonary obstruction and the like, but after birth the left side becomes affected. This is probably due to the fact that the left side has more work to do after birth, the very opposite condition holding during fœtal life. For further study of endocarditis and pericarditis, the reader is referred to what has been already said on that subject. Delirium occurs in some cases when the heart is affected, though the mind is usually clear in this disease. Whatever be the cause of delirium, it is to be regarded as a grave symptom. Sometimes it is due to rheumatic meningitis, and it is then accompanied by high temperature—105° to 109° F. Among other serous membranes involved, there may be pleurisy and even peritonitis, the latter being of rare occurrence. Laryngitis, bronchitis, and pneumonia, as well as tubular nephritis, may be among the complications.

During the course of the disease not only may sudamina appear on the skin, especially the back, but in some cases there are erythema nodosum, urticaria, and cutaneous ecchymoses. Some-

times atrophy of certain muscles, especially the deltoid, takes place, due to rheumatic paralysis, and not to neuritis. Such muscles respond promptly to the faradic current, and do not exhibit the reaction of degeneration.

Chorea is sometimes a sequel, especially in young subjects.

Subacute articular rheumatism usually results from one or more attacks of the acute. There is little or no fever, and, although the articular pains are annoying on motion, yet the patient rarely has to remain indoors. A few of the larger joints are commonly affected, and the patient is generally anæmic. After several months, more or less, the disease disappears under proper care.

Chronic articular rheumatism is usually found among those in advanced life, and who have been subjects of acute rheumatism in former days. Only a few of the larger joints are affected, but unlike rheumatoid arthritis it does not produce their disorganization. From this fact, the previous history of the case, and the age of the patient, a diagnosis can almost always be made with certainty.

Gonorrhœal Rheumatism.—Although this is called rheumatism, it is no more that disease than is pyæmic affection of joints. And yet rheumatic subjects are prone to take gonorrhœa easily, and certainly one attack of gonorrhœal rheumatism predisposes to the ordinary articular variety.

Gonorrhœal rheumatism usually occurs during a prolonged attack of gonorrhœa, especially the first. It occurs preferably after the patient has been suffering with gonorrhœa for a month or more. For some unknown reason, it almost invariably attacks the joints of the lower extremities, usually one knee-joint, or one or both ankles, or lastly the hip. Pain in the bottom of the heel, either with or without swelling of one of the above-named joints, is quite common in old clap or stricture of the urethra. Ankylosis may follow in joints affected with gonorrhœal rheumatism, and it is sometimes a very serious disease. A curious fact is that conjunctivitis not infrequently precedes the joint affection, and often involves only the eye on the same side with the diseased joint.

In like manner, swelling of joints or so-called rheumatism may occur in scarlet fever, small-pox, and the like, and be regarded as a secondary arthritis due to the pyæmic condition, or in some cases a veritable articular rheumatism may accompany or follow those diseases. In neither case is any further separate description necessary.

Diagnosis.—Acute articular rheumatism is distinguished from gout by the fact that in rheumatism the constitutional disturbance is greater, there are profuse sweating and a tendency to heart

disease, and a greater number of joints are affected, and among them often the larger articulations. There is also diminution of uric acid in the blood in rheumatism. In pyæmia, there are recurring chills, the sweating has not the acid odor of that in rheumatism, metastatic abscesses occur frequently, and if there is synovitis it is usually purulent and not erratic. In gonorrhœal rheumatism the disease is confined to the joints of the lower extremity, usually the knee, ankle, or one hip. The history of gonorrhœa would lead to a certain diagnosis.

Prognosis.—This is nearly always favorable unless the heart becomes diseased. From uncomplicated rheumatic fever, according to Aitkin, the rate of mortality is only about one-tenth of one per cent. When death does occur, it is usually due to softening of the walls of the heart, with sudden cardiac failure, or else cerebral meningitis. The joints are rarely permanently injured; and unless disease of the heart occurs, rheumatism is not a serious affection. In the chronic forms the contraction of tendons may lead to great inconvenience, but even in these cases a course of treatment at some hot springs will often bring about a complete cure.

Treatment.—The patient should be placed under good hygienic conditions, and have a gentle and capable person to act as nurse. The diet should consist of peptonized milk or some similiar food that is nutritious and easy of digestion, such as soups, broths, and the like. If the bowels are constipated, a little calomel may be given at bed-time, to be followed by a saline cathartic next morning.

No remedy has yet been found to act so beneficially as salicylic acid in some form. To an adult it is best given as the sodium salicylate in solution. (℞ Pulv. sodii salicylat., ʒ vi.; aquæ, ℥ vi. M. Sig. Shake. Tablespoonful every two hours during the first day, until the ears ring; after that every three to four hours.) In case this remedy is not well borne by the stomach, ten to fifteen grains of salicylic acid in capsules may be given every hour. The former plan has the advantage of not having to wake up the patient in the night to give it. During its administration the pulse and heart should be watched, for in some it acts unfavorably by depressing the heart. This is especially true in elderly people, to whom the drug should not be given, as it produces heart failure, vertigo, and the like.

How long are we to give sodium salicylate or some preparation of salicylic acid? If in six or eight days the patient is not markedly better, it may just as well be discontinued. In most cases, however, by that time the patient is so far improved that the drug may usually be stopped anyhow. Five grains of salol may then be given ter die in capsules for a few days, when the

sodium salicylate may again be renewed. Or instead of salol, ten grains of antipyrine may be given ter die. In other cases fifteen drops of wintergreen on a lump of sugar may be substituted, though I have had no experience with it. Lemonade for the great thirst is the best drink. Opium has sometimes to be administered in some form in order to allay the intense pain. If the patient objects to the hypodermic injection of ten minims of Magendie's solution of morphine, the same amount may be given by the mouth in some simple vehicle.

Shall we use alkalies? About 1847, Willis introduced this treatment, which was subsequently taken up by Fuller, about 1855, so that it is now known as Fuller's alkaline treatment. In those cases where I have used it, no good result whatever followed, except to make the urine less irritable to a strictured urethra. If the disease really were due to lactic acid in the blood, Fuller's method ought to be a sure thing, but unfortunately it does little or no good. The method is to give half a drachm of potass. bicarb. well diluted every four hours until the urine becomes alkaline, and to continue this until fever and joint symptoms have disappeared. Under this plan Fuller claimed that the heart rarely became affected. Some physicians combine this alkaline treatment with the sodium salicylate, giving them alternately instead of antipyrine, for instance.

Quinine is undoubtedly a good remedy in those cases where patients have been malarious subjects.

Of all these remedies, however, so far as an acute attack of articular rheumatism is concerned, especially if it be severe and occur in a patient between fifteen and thirty-five, for instance, who is in fair condition otherwise, there is no remedy to equal the sodium salicylate. It abates fever, lessens pain, and reduces swelling, sometimes in a marvellously short time.

I have not mentioned colchicum, since it is a remedy not to be used in this disease. It depresses the heart and it does not in any way relieve the patient. External applications are of no value. A little vinegar rubbed on the joints if not too painful, or a little cotton batting lightly applied, gives patients the idea that something is being done for them.

Endocarditis occurring, as evidenced by the dyspnœa, palpitation, and mitral murmur (functional basic murmurs are common), should be treated as indicated when speaking of that disease. And so for other complications.

In subacute articular rheumatism, sodium salicylate does little or no good, but salol, gr. v. in capsule ter die, may be tried. A generous diet should be allowed, and tonics, including iron, should be given. Frictions of the joints with the lin. sap. camphorat. or lin. volatil. and the like are of use. The clothing should be

comfortable, and the patient should remove if necessary to a warm, dry climate during the winter and spring months.

In chronic articular rheumatism the treatment is similar to that of the subacute variety. Moderate exercise and bathing the joints under a douche of warm water, together with passive motion, in order to overcome stiffness or shrinkage of fasciæ and the like, should be systematically employed. Finally, if the patient have means enough, a course at Carlsbad, Teplitz, or our own hot springs in Virginia or Arkansas will often effect a complete cure in apparently hopeless cases.

In gonorrhœal rheumatism sodium salicylate is of course out of the question. There is no rheumatism, in fact, to treat, but a gonorrhœal synovitis. Cure the clap and dilate the stricture, and the patient gets well of his so-called rheumatism, pain in the heel, sciatica, and the like.

Muscular Rheumatism.

Etiology and Pathology.—Muscular rheumatism or myalgia is a painful affection of voluntary muscles, and is not attended with fever or any other sign of local inflammation, such as swelling or redness. The pathology of the disease is not understood, but as it appears to occur sometimes epidemically it has been placed here with articular rheumatism. By some it is thought to be of the same nature as that disease; but inasmuch as it is unaccompanied by the fever, sweating, and tendency to heart complications, as observed in articular rheumatism, the two affections are considered to be independent of each other. Though it may occur in children, it is more common among adults. Exposure to cold and damp, especially to draughts of cold air, and straining, appear to be exciting causes. Hence, it is of very common occurrence among laboring-men. In some cases it appears to be due to uric acid in the tissues, as observed among those suffering with lithæmia.

Symptoms.—The disease receives different names for particular localities. Thus, in the lumbar region it is called lumbago; in the side, pleurodynia; and in the neck, torticollis, cervicodynia, or wry-neck. Other names, like scapulodynia, dorsodynia, and cephalodynia, are sometimes used, indicating muscular rheumatism in certain localities. Pain in the affected muscle is usually the only symptom worthy of note. This pain is generally much aggravated by motion, so that in wry-neck the head is drawn to one side and held as if in a splint. Twisting of the body in pleurodynia, or even the act of respiration may cause severe pain, as in pleurisy. In lumbago, the patient stoops and moves about with great pain and difficulty. On pressure, the muscle is very

tender, so that the patient shrinks at the idea of being examined. As already stated, there is no fever, and the pulse is unaffected. The disease is usually acute, lasting only a few days or a week, but in rare cases it becomes chronic and is then very tedious.

Diagnosis.—Pleurodynia may be mistaken for dry pleurisy or intercostal neuralgia. But in pleurodynia, the disease being superficial, the affected muscles are very tender to the touch, and there is absence of the pleuritic friction sound or any of the signs of pleuritic inflammation. Moreover, in pleurodynia the pain not infrequently changes about to other muscles, and is often associated with lumbago.

From intercostal neuralgia it is readily distinguished by the fact that in neuralgia there are usually three points of tenderness following the affected intercostal nerve: one where it leaves the spine, another about the middle of its course, and a third farther in front near its termination. The patient may give the history of neuralgia elsewhere, and not infrequently has been a malarious subject. Tenderness over the muscle on either side of the spine readily causes lumbago to be distinguished from renal colic, in which the pain shoots downward along the course of the ureter, and is not affected by pressure in the lumbar region.

Prognosis.—The disease commonly terminates in a few days, and even when it becomes chronic it is never dangerous, but only tedious and annoying, especially when sciatica results from, or is associated with, long-continued lumbago. In many of these obstinate cases, old stricture or gleet should be looked for.

Treatment.—In many cases none is required. When severe, however, treatment often becomes necessary. Ten grains of antipyrine three or four times a day in solution or capsule is efficacious. When this is not borne well, five grains of antifebrin may be used instead. Besides this, some hot applications may be made, as the placing of a hot bottle to the side, going over the neck with a heated flat-iron, and the like. In severe cases, with much suffering and insomnia, the hypodermic injection of five or ten minims of Magendie's solution may be resorted to in the afternoon as a last resort. Do not give it at bed-time, as it often keeps the patient awake all night. But when given in the afternoon, say about five, the stimulating effect will have worn off so that the patient both sleeps soundly and suffers no pain. Great care should be taken not to repeat morphine more frequently than is absolutely necessary. It is just in such diseases that the physician, taking no thought for the future welfare of his patient, yields to importunity until the serpent's coils are fastened around the helpless victim. Beware, then, O physician, about giving opium to those having so insignificant an affection as myalgia. It is just the trap that is too often set for the weak

and unknowing. Electricity also has reputation for the cure of these cases, but I have never had occasion to use it. Sodium salicylate is of little or no value in this disease. Lithia water is highly recommended to those suffering with uric acid (see Gout).

CHAPTER VII.

CHRONIC GENERAL DISEASES.

Gout.

Etiology and Pathology.—Gout is a disease the cause of which is excess of uric acid in the blood. As shown by Garrod, of London, in 1848, uric acid is invariably present in the blood in gout This condition is known as the gouty or uric-acid diathesis or lithæmia. It appears to be due to defective oxidation caused either by taking more albuminoid food than can properly be oxidized, or else by function so defective that a moderate supply of such food cannot undergo the normal transformations. For the latter reason, the poor may also have the disease. There are two forms of gout, regular and irregular. In regular gout the joints are affected, in the irregular form non-articular tissues, or else there is simply functional disturbance of organs. Not only are the joints inflamed in regular gout, but the deposit of urate of soda takes place in the affected tissues, so that the disease differs entirely from articular rheumatism.

Men about middle life or past are more subject to the disease than women, from difference chiefly in mode of life. Children are rarely affected. According to Garrod, heredity causes the dis ease in half the number of cases, and this percentage is higher among the upper classes. Alcoholic beverages both predispose to the disease as well as excite an attack. Especially is this the case with malt liquors and such heavy wines as Port, Madeira, and sherry. Brandy, whiskey, and gin, on the other hand, in moderate quantities and well diluted, as well as claret, do not have such tendency. As Garrod states, diluted alcohol in the form of distilled spirits has little power to cause gout. The eating excessively of animal (albuminoid) food favors the production of gout by increasing the formation of uric acid more than other nitrogenized compounds. Rich gravies, sauces, and pastry, in fact anything likely to produce indigestion, are all favorable to its production.

Lead-poisoning is frequently a cause of gout, for according to Garrod, about thirty per cent of his gouty patients in the London Hospital had been subject to the influence of lead.

Not only in the articular tissues do we find deposits of urate

of soda, but they occur as tophi in other parts, as the cartilages of the ear, nose, eyelids, tendons of the hands and feet, and the like. Endarteritis deformans and gouty kidney are liable to occur. Besides this, calculi may be formed in the pelves of the kidneys, giving rise to pyelitis and renal colic. The disease may be acute or chronic.

Symptoms.—In some cases an attack of gout is preceded by premonitory symptoms, such as dyspepsia, cramps in the legs, palpitation, and irritable temper. In others, however, there is no warning. The patient, usually a man of middle life or past, is awakened out of sleep shortly after midnight with a pain in the metatarso-phalangeal joint or ball of the great toe, a part that is so often the seat of injury from tight or ill-fitting boots or shoes;

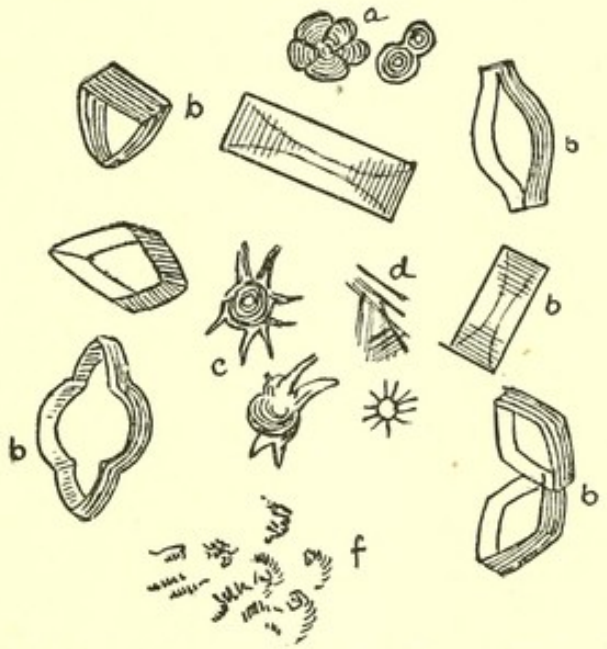


FIG. 40.—URIC-ACID CRYSTALS AND URATES IN THE URINE OF GOUTY PATIENTS.

for other things equal, gout first attacks the small joint that is the seat of previous injury. The part becomes swollen, red, and hot, and very sensitive, so that he cannot bear the weight of the bedclothes on it. This distant locality favors the deposit of gout—the urate of soda—which, in turn, acting as a foreign body, causes pain and swelling of the unyielding and rigid tissues. There is usually some chilliness, followed by a moderate amount of fever, with corresponding increased frequency of the pulse. This fever is entirely secondary to the joint affection, and varies according to the intensity of the attack and the number of joints involved. There is but little sweating. The tongue is coated white, the bowels constipated, and there is more or less thirst, with great restlessness. The urine is scant and high colored, and deposits a brick-dust sediment on cooling. Under the microscope numerous uric-acid crystals and urates will be discovered.

The pain and other symptoms subside during the day, but an exacerbation usually takes place toward night. In a day or two the swelling reaches its height and the patient feels relief. However severe the inflammation, it never leads to suppuration, although this result may follow inflammation produced by chalk deposits acting as foreign bodies. In a few days the swelling begins to subside and the part pits on pressure, followed by desquamation of the cuticle. The attack may last a week or more without proper care and treatment. Instead of the metatarsophalangeal joint of one foot being attacked, it may occur in both, either together or alternately. On an average of about twelve months the paroxysm returns, and other joints in time become affected, the lower extremities first and then the upper. The paroxysms recur at shorter and shorter intervals, so that in time they become very irregular. Of the joints affected in gouty subjects the hips and shoulders appear to be less liable than any others.

Chronic gout follows repeated attacks of the acute form. In this condition not only are the paroxysms more frequent and prolonged, but the articular structures become changed. This is especially noticeable in the upper extremities. Chalk-stones or tophi are deposited in different structures, such as cartilages and tendons, as already stated. This infiltration of bursæ and tendons causes rigidity of joints and sometimes great deformity. While some joints of the fingers, for instance, are flexed, others become curved backward. Joints become enlarged and ankylosed, and bursæ may become distended to the size of a hen's egg or even larger.

At first these deposits are fluid, like milk. They subsequently become thicker, until finally, when all liquid is absorbed, nothing but chalk is left. Sometimes phosphate of lime is also found, but this is altogether a secondary formation to the urate of soda, which, acting as a foreign body, has given rise to inflammation. In some cases suppuration and abscesses result. During the condition of chronic gout, the patient is usually the subject of such symptoms as dyspepsia, palpitation, torpid liver, irregular bowels, and irritable temper.

Besides gout affecting the joints, it may involve non-articular tissues, as already stated, when it is called irregular gout. In another form of irregular gout only functional disturbances of various organs appear without any gouty inflammation. Among the affections of irregular gout or as sequelæ to the regular form may be mentioned endarteritis, which sometimes leads to thoracic aneurism; also bronchitis with asthma, palpitation of the heart, and angina pectoris. In some cases valvular lesion may result. Gastric and intestinal disturbances are also thus caused, as well as

the gouty kidney. Neuralgia, headache, vertigo, and apoplexy, are some of the nervous affections. Even lunacy and epilepsy are occasionally attributed to the same source. Cutaneous eruptions are not uncommon.

Diagnosis.—The diagnosis of gout from rheumatism is mentioned under the latter disease. While gout usually attacks men at middle life or past, and generally among the upper classes, rheumatism affects both sexes at all ages and of every condition. The blood in gout contains an excess of uric acid, never in rheumatism. The larger joints are usually affected in rheumatism, the smaller ones in gout. The heart is rarely affected in gout, frequently in rheumatism. The fever in rheumatism is primary and is much more marked than the fever in gout, which is purely secondary and in proportion to the intensity of the inflammation and number of joints affected. The sweating in gout is scarcely perceptible, in rheumatism it is profuse and has an acid odor. Finally, Garrod's simple test would settle the question: Draw about one ounce of blood and, after coagulating, pour off the serum into a flat glass dish somewhat larger than a watch-glass. Into this place a fine linen thread, and set it aside until dried to a gelatinous consistency. If excess of uric acid be in the blood, as it is in gout, its crystals are readily visible on the thread, under a low magnifying power or even an ordinary lens. This is called Garrod's thread test for gout.

Prognosis.—The later in life gout appears, the better for the patient, as it will have less time to work harm. On the other hand, the prospects are bad if it begins in early life. Hereditary gout is much more obstinate than acquired, and usually appears earlier. The appearance of tophi, even on the helix of the ears, is not a good sign. Gouty patients are more subject to other diseases than healthy people. One attack almost insures a return of the affection at some future time in spite of treatment or precautions. The latter, however, greatly modify the disease. Abundant pale urine, of a low specific gravity, and containing albumin, indicates that the patient has gouty (cirrhotic, small, red) kidney, which is incurable and is certain to cause a fatal issue in course of time. The patient rarely, if ever, dies from the effect of an attack. It is a good sign to find the paroxysms becoming shorter and returning at longer intervals. On the other hand, increased duration and severity of paroxysms with decreasing intervals are unfavorable.

Treatment.—This differs for the paroxysm and the interval.

During the paroxysm, or an attack of gout, the patient should remain in the horizontal position, or with the affected part elevated as in any other case of injury or inflammation about the foot. If the pain be intolerable, a moderate amount of Magen-

die's solution may be hypodermically injected, say about ten drops. But it is best to avoid opium if possible, since it interferes with the action of remedies that may otherwise cut short the attack.

Colchicum, according to Garrod, is as much of a specific in acute articular gout as quinine is in malarial fever. The wine of colchicum (any part of the drug answers) should be given in doses varying from ten to twenty-five minims every six hours, according to the severity of the case and condition of the patient, especially the heart. Its action is sedative and purgative, but to its peculiar effect on the liver is attributed its virtue in gout. By stirring up the liver, it eliminates the poison and thus shortens the attack. When marked cerebral or gastro-intestinal symptoms occur, the colchicum may have to be discontinued. The only external application worthy of trial so far has been the following: ℞ Atropinæ muriat., gr. i.; morphinæ muriat., gr. viij.; aquæ, ℥ i. M. Sig. Apply to the inflamed part on a piece of lint, and cover with oil-silk. Aconite and its preparations are thought to be too irritating. I have had no experience with cocaine, but a twenty-per-cent solution might be tried in the manner above described.

During the interval the patient should take outdoor exercise, and for that reason wealthy people should go to a climate in winter where they can follow these directions. The diet should be sufficient but guarded. Tea should be drunk instead of coffee. Meat should be taken in small quantities; the white meat of poultry is to be preferred to the dark, and lamb or mutton to beef. Rich gravies and sauces, salads, and pastries are to be avoided, as well as all sweets. Claret wine with water may be allowed in moderation. All green vegetables are allowable, as a rule; it is the dressing, including grease, vinegar, and pepper, that renders lettuce objectionable, for by itself it is harmless.

The spending of a month at Carlsbad, Royat-les-bains, or Contrexeville would be of the greatest benefit to gouty patients. At home, the drinking of Saratoga Hathorn, Congress, and other waters is to be recommended at various times; but perhaps the various lithia waters are the best. In chronic gout, besides what has been already said, tonics containing iron may be required. Iodide of potassium is also indicated when gouty periostitis and fibrous inflammation are present. (℞ Pulv. potass. iodidi, ʒ viij.; vini sem. colchi., ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals.) Malt liquors and all wines except claret should be avoided. A little brandy, whiskey, or gin, well diluted, may also be allowed at times if necessary. There are various remedies that have reputation for curing gout, but they need not be mentioned here. They are usually valueless, and a list of them can

be obtained from the United States Dispensatory or any extensive work on materia medica.

Rheumatoid Arthritis.

Rheumatoid arthritis, arthritis deformans, or rheumatic gout, as it is generally termed, is a progressive disease of joints of an inflammatory nature. There is, however, little or no febrile disturbance. The pathology of the disease is unknown. It may be acute, but occurs far more frequently as a chronic disease. Rheumatoid arthritis occurs chiefly among the weak and debilitated, and for that reason is found more frequently among women than men. Excessive menstruation and rapid child-bearing predispose to it. Heredity has little or no influence, neither has the drinking of alcoholic liquors, further than they produce chronic debility. It may occur at any age, in both sexes, and sometimes among the tuberculous and rheumatic. In some cases there appears to be no known cause. In general, it is found among the poorer classes, and by the laity is regarded as the poor man's gout. At first a joint, the knee, for instance, becomes painful and swollen, with little or no fever. With or without any treatment, this disappears for the time being. After a month or more, that or some other joint is affected in the same way, only the trouble has come this time to stay as well as to extend to other joints. In this way all the articulations of the body may become affected, causing complete ankyloses and deformities, and rendering the patient helpless. The hands become thin from absorption of fat, the ends of the fingers and the joints become nodular, and the wrists ankylosed.

At first there is an effusion into the joint due to increase of synovial fluid. The resulting pressure on the cartilages causes them to be absorbed, so that, after the effusion has disappeared, the ends of the bones grate together. Sometimes ligaments are destroyed and spontaneous dislocations result. The articular extremities of bones become enlarged, not by deposit, but by actual hypertrophy. The elbows and knees suffer most, and the hands become distorted earlier than the feet. The jaws and neck, though frequently the seat of the disease, rarely become fixed.

Diagnosis.—In chronic rheumatism there is little disposition to structural changes in joints; in rheumatoid arthritis such change is marked and progressive. In gout there is hereditary influence, lead-poisoning, high living, and other causes to be noticed, all of which are wanting in rheumatoid arthritis. In gout also there are deposits of urate of soda about the affected joints, and uric acid in the blood, as readily ascertained by the thread test. The urine in gout is also often scant, and deposits the brick-dust sediment of uric acid on cooling. All these signs are absent

in rheumatoid arthritis, and the urine is unchanged, as are the other fluids of the body. The acute variety may be mistaken for gonorrhœal rheumatism, but it is rare, and the history of the disease would be conclusive.

Prognosis.—Though the disease rarely destroys life, yet it may be regarded as practically incurable, and the patient becomes more and more helpless with the number of joints involved. Some live to a great age if only a few articulations are affected.

Treatment.—From what has been said of this disease, little need be expected from treatment. It is idle to advise poor creatures to change their climate and live on nutritious diet, when they, poor at first, are now unable to earn a living. And yet that is exactly what ought to be done if possible. Fortunately in New York the poorest can get a quart of milk and other articles of food each day from the New York Diet Kitchen. This with cod-liver oil, iron tonics, and rubbing the affected joints with some stimulating liniment, is about all that can be done. Blistering the joints is also recommended, but rubbing, as a rule, is better. Treating the general condition and improving it by exercise, generous diet, and tonics offer the best chance of preventing the disease from extending. Mineral waters, unless they be ferruginous and tonic, do more harm than good. No depleting measures are to be thought of. Even in the very rare attacks of the acute form, supporting measures, with rest of the part, are indicated.

Diabetes Mellitus.

Etiology and Pathology.—Diabetes mellitus is a disease, as the name implies, that is characterized by the presence of sugar in the urine. The term glycosuria is used to include those cases in which there is a small amount of sugar in the urine, such as may happen after eating freely of molasses or other sweets, and sometimes accompanies dyspepsia. There is no relation between glycosuria and diabetes mellitus. Again, the disease may be one of two grades, the lesser and greater. In the former case, the affection is not infrequently found among elderly people. The sugar not only varies with substances eaten, but at times entirely disappears from the urine.

Greater diabetes, or the graver form of the disease, attacks men more frequently than women, and occurs usually between thirty and fifty years of age. Various causes have been assigned. Gluttony, the want of exercise, exposure to cold, fright, and concussion of the brain and spine have all been brought forward as causes. Diabetes also occurs in the course of other diseases, as phthisis, syphilis, and the like. But whatever be the exciting

cause, it is evident that a predisposition remains back of them all. Further than heredity, this is obscure.

Regarding the pathology of diabetes mellitus, it may be said to be yet unknown. That it is not a disease of the pancreas is proven by the fact that sugar in the urine continues even though starchy food be entirely cut off. Moreover, on post-mortem examination the pancreas is rarely found to be changed, though in some cases Niemeyer states that it is hypertrophied. The truth is, there is no anatomical lesion characteristic of the disease yet discovered. Claude Bernard found that by irritating the floor of the fourth ventricle of the brain, sugar was found in the urine, but concluded that this was due to the stimulating effect it produced on the glycogenic function of the liver. On the other hand, Tscherinoff maintains that it is due to defective or glycophthinic function of the liver, by which sugar fails to be destroyed in that organ, and so enters the blood in too great quantity. All such arguments are, however, theoretical. Practically, the exact reason for sugar in the urine in these cases is unknown.

But it is more than probable that the source of the sugar is the same as that in health, and chiefly from the ingestion of carbohydrates or starchy foods and sugar. That being the case, it is not destroyed as it is in health, owing to defective function somewhere, and consequently it is excreted by the kidneys. The latter organs simply excrete the sugar—they have nothing whatever to do with its presence in the blood. Urea is also increased in this disease, showing that albuminoids are more fully oxidized and transformed in this disease than in health, the very opposite of what takes place in gout.

Symptoms.—Diabetes mellitus usually is insidious in its approach. For several weeks or months the patient may be subject to symptoms indicative of more or less ill health. There may be some loss of appetite, headache, indisposition to work, with now and then what appear to be rheumatic muscular pains, especially in the lower extremities. The first symptom that actually causes any apprehension on the part of the patient is the necessity of rising during the night to urinate, or else irritation from the saccharine urine causes great itching of the prepuce or vulva. The amount of urine passed is increased from forty-five to one hundred ounces daily, and then to several gallons or even one hundred pints. Upon examination the urine is found to be of a high specific gravity, ranging from 1030 to 1060 or even higher. It is clear and has often a peculiar sweetish odor. The amount of sugar in the urine may vary from a mere trace to as high as ten per cent in bad cases. The high specific gravity is partly due to the increased amount of urea, but more particu-

larly to the presence of sugar. One of the best of the many tests is Trommer's. Put a drachm or two of the suspected urine in a test-tube, with about the same amount of pure liquor potassæ. Shake this well, and then add a few drops of a ten-per-cent solution of sulphate of copper until the whole is deeply colored. Then gently heat over an alcohol flame or a Bunsen burner, not to the boiling-point, however. If sugar is present, the liquid turns brownish-red on account of the deposit of suboxide of copper. If not present at first, the tube may be set aside for several hours, when the change may be observed. Fehling's test is also a good one, but the solution should be fresh and carefully prepared. The principle is the same as in Trommer's test, both depending on the change of color due to the formation of the suboxide of copper. About two drachms of Fehling's solution (caustic potash and copper) are poured into a test-tube, and then heated as above described. While the solution is boiling, the suspected urine is added drop by drop. If sugar be abundant, a drop or two is sufficient to cause the brownish-red suboxide precipitate. But if none occur at first, as much urine as there is of the solution, may be gradually added until the deposit occurs. If no deposit form, even after setting the tube aside for an hour, the urine may be considered to be free from sugar. There are various other tests, but those mentioned are the best and most convenient. While boiling the urine, the smell of burnt sugar is not infrequently obtained. At the same time it turns dark. This is called Moore's test, but is very crude. For other tests, as the fermentation test and quantitative analysis, the reader is referred to works especially devoted to that subject. The reason why the urine is increased in quantity is because the saccharine serum of the blood attracts to itself all the fluid in the tissues. There is therefore great thirst; and consequently, from drinking fluids and partly from osmosis, the pressure in the kidneys becomes greatly heightened, with the result of increased flow of urine. The sugar also acts as a stimulant to the renal function. As the disease progresses, the tissues become more or less desiccated, and emaciation results. The tongue is red or coated and the gums bleed easily. The mouth is dry, and the skin itches. From the fact that the lenses of the eyes become desiccated, opacity results, with more or less dimness of vision. In one case that came under my notice, a gentleman about fifty years old consulted an eminent oculist in one of our neighboring cities for cataract. One lens was abstracted, but as recovery was slow and tedious, and the patient continued to lose ground, the urine was examined and found to be loaded with sugar. Impotence also results in some cases. This is partly due to failing health, but undoubtedly also in part to drying up of the

seminal liquor and desiccation of the spermatozoa. Furuncles and even carbuncles appear later in the disease. In some cases carbuncle, with exhaustion, is the cause of death. Caries of the teeth, as in phosphorus poisoning, may also occur. As the disease progresses, tubular nephritis sets in. This is due to the irritation produced by the sugar, as well as the extra work thrown upon the kidneys. Consequently, late in the disease albumin is often present in the urine. The average duration is about four years, but in malignant cases it may be less; while in others the disease may exacerbate and remit, so to speak, for many years. Death is usually due to exhaustion or to some intercurrent affection. According to Loomis, twenty-five or thirty per cent of cases die of phthisis, and ten to twenty per cent of uræmia. Somtimes death occurs before any emaciation is observed.

Diabetic coma, however, occurs in some cases and is speedily fatal. It is generally preceded by premonitory symptoms such as nausea, headache, and dyspnœa. Suddenly the patient is seized with mild delirium, which in turn gives place to drowsiness and terminates in coma. The breathing is stertorous, the face cyanotic, and the pulse frequent and small. The temperature is characteristic. It falls below normal, to 85° F. or even lower. The breath and urine smell like pippins or chloroform. In some cases convulsions occur, but in others again the coma comes on without being preceded by any of these symptoms.

The cause of diabetic coma is not yet fully explained. It is due to some poison in the blood, and is thus to be differentiated from apoplexy, which may also occur; but in apoplexy there are wanting the odor in the breath and urine, nor does the latter become dark red upon the addition of ferric chloride. According to Kussmaul, true diabetic coma is due to the presence of acetone in the blood, and he calls this condition acetonæmia. Jacksch, of Vienna (now of Gratz, Styria), believes it to be due to acetacetic acid. These theories, however probable, as yet lack positive proof. It is more than likely, all the same, that true diabetic coma is due to some poison in the blood; and in this regard it somewhat resembles uræmia and ammoniæmia.

Diabetes insipidus or simple polyuria may be mentioned here. It is characterized by abundant and pale urine of a low specific gravity, containing no sugar. It occurs in both sexes and at all ages, but usually in young adult or middle life. Men are somewhat more liable than women. It is sometimes due to chronic interstitial nephritis, but it may also be brought on by vaso-motor dilatation of renal capillaries due to blows on the head, concussion of the spine, fright, and the like. Drinking copiously of iced water and exposure to cold when over-

heated are also supposed to be causes, as well as heredity. As an idiopathic disease it is infrequent. The symptoms attending this condition when of nervous origin are ill defined, the passage per diem of twenty to fifty pints of pale urine of a low specific gravity, but not otherwise abnormal, being the most common. It may, however, become a grave affection resembling diabetes mellitus.

Diagnosis.—This depends upon the finding of sugar in the urine and the high specific gravity of the latter; by these means it is distinguished at once from diabetes insipidus. It then remains to ascertain whether it be a simple case of glycosuria or of true diabetes mellitus. For this reason a positive diagnosis cannot be made without repeated examinations of the urine under different conditions of diet, as well as by taking other symptoms and the previous history of the case into consideration. The urine passed a few hours after a hearty meal often contains sugar even in a healthy person. On the other hand, that passed early in the morning on rising will be quite free from it usually, except in true diabetes mellitus. Pruritus vulvæ should always lead one to suspect the possibility of diabetes. I have known women to be treated with all sorts of applications without relief, when examination of the urine revealed the cause of the pruritus. To a less degree men suffer with irritation of the prepuce. But these signs, taken together with debility, furunculosis, double sciatica (pains in the calves of the legs), impotence, and cataract, should always be looked upon with suspicion by the practitioner. Polyuria and thirst would be still more suggestive. But long before the disease has made such progress, the necessity for rising at night to pass water will probably have caused some one to examine the urine.

Prognosis.—Glycosuria can hardly be regarded as a disease. The lesser form of diabetes mellitus is also curable in many cases. But inasmuch as diabetes mellitus is progressive, and the lesser form has a tendency to develop into the greater, the presence of sugar in the urine should always be regarded as a sign for caution and prudence on the part of patients. In those cases where sugar is never absent from the urine, and is but little reduced by diet or treatment, the prognosis is extremely grave. Although, according to Niemeyer, the average duration is about four years, yet in some cases of the malignant form of the disease the patient may die in a few months. In others, again, a fatal termination may be indefinitely postponed.

Treatment.—There is no specific cure for diabetes mellitus. Beyond the treatment of symptoms as they occur, drugs are of little value. But regulating the diet is of the first importance. By appropriate food, not only is the quantity of sugar in the urine

reduced to a minimum even in the graver form, but other symptoms are ameliorated or disappear, while those having intermittent glycosuria may be entirely cured.

The diet should therefore consist of such foods as are entirely free from sugar or any substance, as starch, that can be converted into it. If bread is needed, it should be bran bread; that is, bread made of flour from which all starch has been eliminated. Or if other bread is used, it should be thoroughly roasted so as to destroy the starch. Such bread is readily obtained; but if, after using it, sugar is found to be increased, it should be stopped as a defective article of food. Potatoes, rice, sago, tapioca, corn, carrots, beets, peas, and parsnips all contain starch and sugar, and are to be avoided. Alcohol in any form, especially beer, is to be eschewed. Water in moderation does no harm. Tea and coffee without milk or sugar can also be taken, especially the former. On the other hand, meat, fish, the white meat of poultry, bacon, ham, and eggs may be allowed. Also most green vegetables, as spinach, cauliflower, summer cabbage, turnip tops, water-cresses, mustard, broccoli tops, mushrooms, sorrel, the green parts of lettuce, sauerkraut, tomatoes, and string beans can be eaten with impunity. A moderate amount of exercise is also beneficial, but care should be taken not to overdo it, so as to avoid exhaustion. It is important and worthy of remark here that patients who have undergone treatment from home, at some watering-place, for instance, and who have been markedly improved, suddenly have a return of the excessive amount of sugar in the urine after a long and fatiguing journey, especially if they take a glass or two of beer *en route*.

As for drugs, opium or some of its preparations are needed at times to prevent frequent micturition and to allow the patient to obtain sleep. Of these preparations of opium codeine is about the best. At least, it is a very popular remedy at Carlsbad and other watering-places. It does not produce so many of the bad after-effects as opium, and is equally efficacious in allaying pain, promoting sleep, and preventing the frequent desire to micturate. Further than that, it has no control over the disease whatever; the same amount of urine is excreted in twenty-four hours, but the bladder does not, under the influence of codeine, eject it so often. In other words, it controls the irritability of the bladder. At first it may possibly diminish the amount of urine, but certainly after a few doses this effect is lost. It is used instead of morphine or crude opium, not because it is a specific antidote for diabetes, but simply because it is more pleasant, or rather is less unpleasant, in its after-effects, such as nausea, vomiting, constipation, colicky pains (morphine belly-ache),

and the like. The dose of codeine is one-fourth grain, but it may be gradually increased to one grain and repeated. Bromide of arsenic is worthless, as a rule, if not always.

A word regarding mineral waters so called. Willis first introduced alkalies in the treatment of diabetes, so early as 1675. About 1835 Mialhe employed them because he supposed that they would accelerate the decomposition and combustion of sugar in the organism, and hence the supposed therapeutical value of the Carlsbad, Vichy, and other alkaline waters in this disease. Braun, of London, states that not only in cases of lesser, but in greater diabetes he has observed improvement and a check to the progress of the disease effected by Carlsbad waters. Seegen, of Vienna, observed in twenty cases, including both forms of the disease, that the symptoms in all were alleviated, the sugar in the urine remaining at a minimum during forty-six weeks. But the results were not lasting, although some remained in fair health for a number of years, even on a mixed diet. On the other hand, Leichtenstern states that improvement in these cases was due rather to strict attention to antidiabetic diet and other concurring incidents of a bath cure, than to the drinking of the waters. P. Guttmann, Riess, Külz, and others, of Berlin, have shown by a long series of experiments on many patients that the use of the Carlsbad water has not the least power of diminishing the amount of sugar in the urine in diabetes mellitus. Leichtenstern states that for many years he has been convinced of the uselessness of Carlsbad water in diabetes, and has confined its use to cases only where it was an object to overcome obstipation or stomach disorders. (Ziemssen's "Handbook of General Therapeutics," vol. iv., p. 11, William Wood & Co., New York, 1885.) What is true of Carlsbad alkaline saline waters in this disease is true for other alkaline waters, as Vichy, Saratoga, and the like. The antidiabetic diet and concurring incidents during a stay at watering-places, then, are beneficial, rather than the waters themselves. Dyspepsia, boils, carbuncles, and other complications are treated on general principles as they arise. In such cases the reader is referred to what is written on those subjects.

In diabetes insipidus the treatment is to remove the cause if possible. By keeping the body warmly clad, and the skin active, the function of the kidneys is to that extent relieved. Nutritious diet is indispensable. Ten drops of the tincture of jaborandi ter die would help to promote sweating. A summer spent at the Rockbridge Alum springs, in Virginia, would be of the greatest benefit. But a permanent cure need not be expected unless the cause be ascertained and removed.

Anæmia.

1. Anæmia is deficiency of red corpuscles in the blood or oligocythæmia. It therefore refers to the quality of the blood rather than quantity. When diminished in volume, it is called oligæma. Hydræmia or watery blood and spanæmia or poor blood are also used sometimes to express this condition. The proportion of white to red corpuscles in the normal condition is about one to three hundred. Simple anæmia is caused by loss of blood, as by excessive menstruation and hemorrhages from various causes; also by insufficient food and overwork, and in connection with prolonged and debilitating diseases in general. The spleen is not usually enlarged in simple anæmia. The symptoms, such as lassitude, debility, more or less headache, nervousness, and irregular bowels, need not be dwelt on. One of the most trustworthy signs is the presence of venous hum in this form of anæmia. This peculiar humming or roaring sound is due to the anæmic condition and is best heard over the jugular veins in the neck. It appears to be produced loudest by the rushing together of thin blood in the bulb or ampulla, formed by the union of the internal jugular and subclavian veins. In addition to this, anæmic murmurs are frequently heard about the heart, more particularly its base. Besides the pallor usually observed about the face and surface of the body generally, the mucous membranes are also anæmic, such as the lips, inside of the eyelids, and the like. These appearances, taken together with venous hum, are diagnostic signs of great value.

The treatment of simple anæmia is to remove the cause if possible, regulate the bowels, and, besides a sufficient quantity of good food, iron in some form should be given. Of the latter, tr. ferri chloridi, ten drops ter die in water after meals, is about the best. It may be taken through a tube in order not to discolor the teeth. The solution ferri albuminat. is also an excellent preparation, being easily digested—dose, one to two teaspoonfuls ter die before or after meals. Blaud's pills have a great reputation also, and are one of the best preparations. (℞ Ferri sulph., potass. carbonat., āā ʒ i.; pulv. tragacanthi, q.s. M. ft. pil. No. xxx. Sig. One or two ter die.) There are many other preparations of iron, but those are sufficient. Iron will not, however, act well if the bowels are constipated. For this reason a laxative pill, such as the pil. aloes comp., may be given two or three times a week, impressing on the patient at the same time the necessity of regularly going to the privy, whether there be inclination to do so or not.

2. *Progressive Pernicious Anæmia.*—In this disease there is also diminution of red corpuscles of the blood, without increase

in the white. Not only may the red corpuscles be reduced to one-tenth the normal amount, but, according to Quincke, many of them become deformed and hammer-shaped (poikilocytes); nor is the spleen or any of the glands enlarged. It occurs more frequently, perhaps, in women than in men, and from twenty to forty years of age. It is caused by repeated pregnancies, uterine hemorrhages, chronic debilitating diseases, and finally it may come on without any known cause. It appears to be due to changes in the ganglia of the sympathetic nervous system, as evidenced by disturbance of the muscular coats of the intestine, giving rise to inanition, as well as by hemorrhages from the capillary blood-vessels. The patient suffers often with dyspnœa when the red corpuscles of the blood become markedly diminished in number. The intellect becomes impaired and the patient grows apathetic. The appetite is poor. Tinnitus aurium and vomiting with fainting fits are not infrequent. Loud systolic cardiac basic murmurs are common, and venous hum in the neck becomes well marked. Capillary hemorrhages from various parts occur, including the retina, with more or less disturbance of vision. There is one symptom especially that is not to be overlooked in this disease, and that is fever (100° F. to 101° F.). Unless fever develops to some extent, the case will rarely, if ever, prove to be one of pernicious anæmia. Toward the end not only is there fever, but usually dropsy, which may be due to a true tubular nephritis, or else there is local œdema due to the anæmic state. The prognosis is hopeless, and the patient usually dies in about a year. This disease was first so named by Biermer, in 1871. It, however, resembles in many respects the Japanese beri-beri.

As pernicious anæmia is a hopeless disease, little can be done in the way of treatment. Nutritious food, iron tonics, and even alcoholic stimulants may be tried, however, in order to prolong life.

3. *Hodgkin's disease*, lymphadenoma, or pseudo-leucocythæmia is characterized by progressive anæmia, increase in size of the spleen, and widespread enlargement of the lymphatic glands. In the anæmia of this disease there is not only decrease in the number of red corpuscles of the blood, but increase of the white.

The spleen is somewhat enlarged, and this is due not to actual hypertrophy, but to adventitious growths disseminated through it, resembling lumps of suet. Clinically it appears to be a malignant constitutional disease, the swelling of the glands being secondary. The cervical lymphatic glands are usually the first to enlarge. Soon those in the axillæ also begin to swell. In the same way glands in the groin and elsewhere become enlarged if the patient lives long enough. It attacks both sexes, at all ages, but is thought to occur about three times more frequently in males

than females. The disease was first described in 1832 by Dr. Hodgkin, and for that reason it is known as Hodgkin's disease.

The prognosis is always unfavorable. Syrup of iodide of iron with cod-liver oil appears to be the best remedy. (℞ Syr. ferri iodidi, ʒ i.; olei morrhuæ, ʒ viij. M. Sig. Tablespoonful ter die after meals.) It is better to begin with a small dose of the iodide of iron, and gradually increase it, as it may upset the stomach

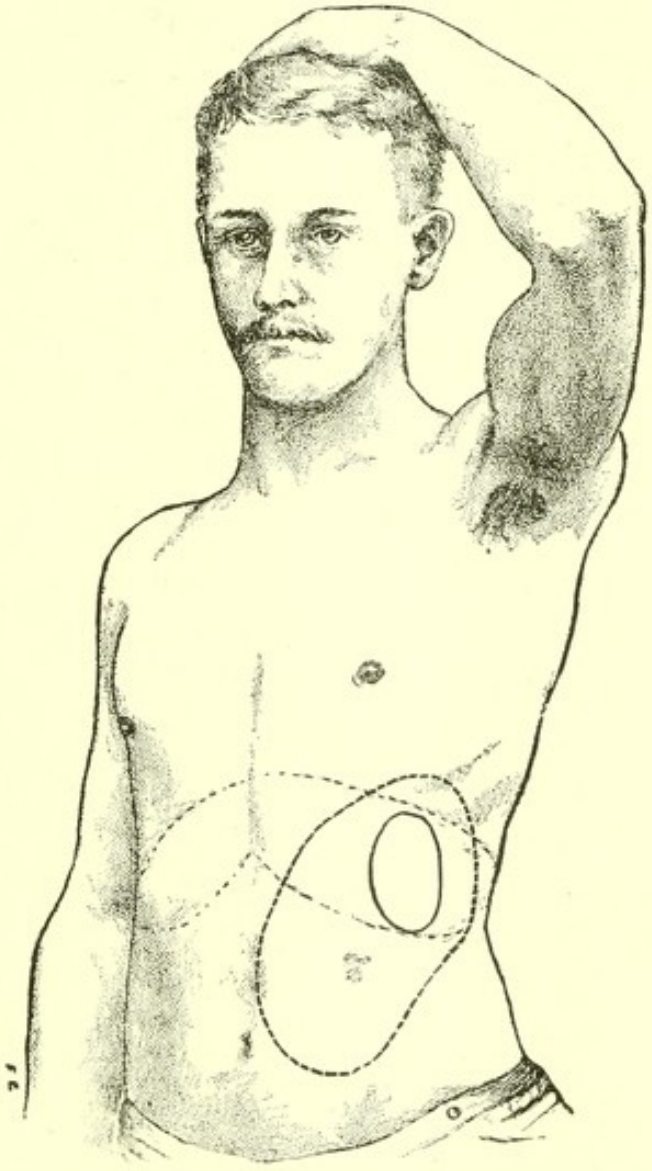


FIG. 41.—ENLARGEMENT OF THE SPLEEN IN HODGKIN'S DISEASE.

if given in too large doses at first. Arsenic has also been highly recommended. Two or three drops of Fowler's solution may be added to each tablespoonful of cod-liver oil and iron. External applications do no good. The compound iodine ointment may be tried, not oftener than every other night, in order not to blister the parts. Early extirpation of enlarged glands by surgical operation promises the best results. But it should be done early, since the enlarged glands may involve adjacent parts, and then it becomes difficult, if not impossible, to operate.

4. *Leucocythæmia* or leukæmia is a disease characterized by marked increase of the white corpuscles of the blood and enlargement of the spleen. The red corpuscles are also diminished, and some of them are deformed, enlarged, or smaller than normal, giving rise to poikilocytes, macrocytes, and microcytes. After death, Charcot's octahedral crystals are found in the spleen, marrow, and blood. They are identical with Leyden's asthmatic crys-

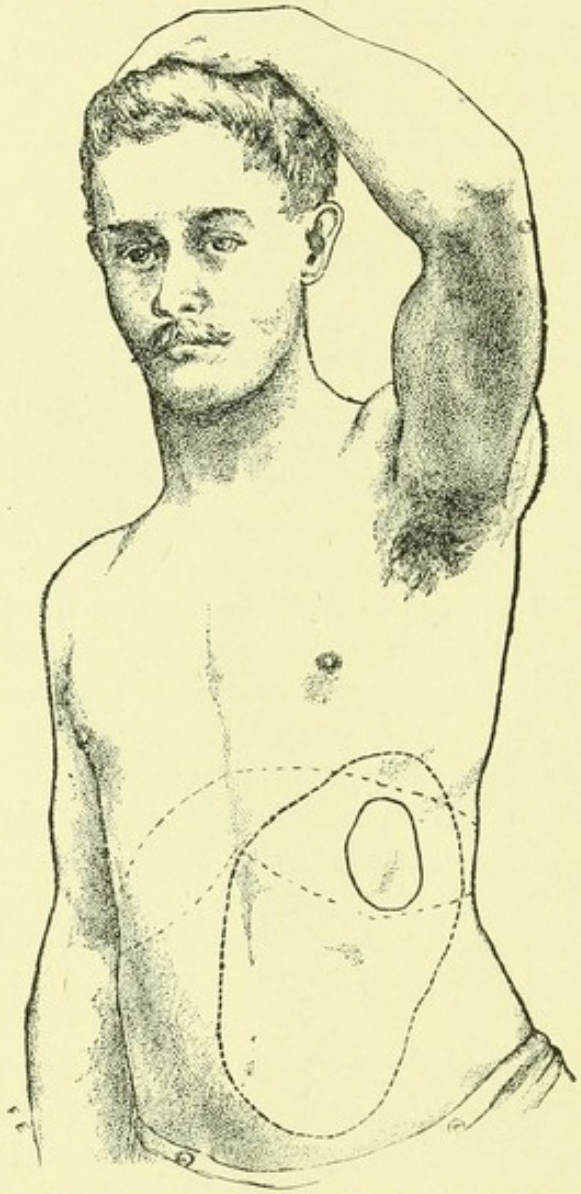


FIG. 42.—ENLARGED SPLEEN IN LEUCOCYTHÆMIA.

tals. The enlargement of the spleen is due to actual hypertrophy of the true splenic tissue. From the normal weight of seven ounces it may be increased to fifteen or twenty pounds, and be a foot long or more. The healthy spleen, about five inches long, gives slight percussion dulness from the ninth to the eleventh rib, in the axillary line. It usually enlarges downward and forward in the direction of least resistance, but not always. In one case I saw several years ago with the late Prof. E. D. Hudson, M.D., the spleen reached up to the axilla, but could hardly be

felt below the border of the ribs at all. The liver was also enormously enlarged, which I believe to be more common than is generally supposed, especially where the patient suffers severely from malarial poisoning. In the above-mentioned case the bulged sides presented the appearance of double pleurisy with great effusion. Not infrequently lymphatic glands are found to be enlarged also, and the bone marrow affected, causing the latter to have a somewhat puriform appearance. The lymphoid cells of the marrow are greatly increased. For this reason some authors distinguish three forms of leucocythæmia—the splenic, myelogenous, and lymphatic. They are always present at the same time, however, in various proportions and may be regarded as manifestations of the same affection.

The disease is found in both sexes, at all ages, but twice as often among men as women. It is chiefly caused by repeated attacks of intermittent fever, and hence is most frequent in malarial regions. It also follows uterine hemorrhages and prolonged and debilitating diseases.

Dyspnœa, loss of appetite, and debility attend this affection, as well as others in which anæmia is marked. Owing to anæmia of the brain, there are vertigo, tinnitus aurium, and attacks of syncope. Capillary hemorrhages also occur in various parts, including the retina. Vision may in this way be disturbed. As the disease progresses, fever of an intermittent character sometimes ensues. In some cases, especially in children, the affection advances rapidly, but usually lasts several years. The prognosis is generally unfavorable. The longer the disease has been allowed to go without proper treatment, the more unfavorable becomes the prognosis. Death is usually due to exhaustion, which may be hastened by obstinate hemorrhages.

The early diagnosis, especially in mild cases, may be difficult, but the anæmic condition, enlargement of the spleen, with the history of the patient, will usually lead to a correct conclusion. This is easily confirmed by microscopic examination of the blood. The proportion of white corpuscles to the red in normal blood is about one to three hundred, so that only two or three white corpuscles (leucocytes) are seen at any one time in a given field under the microscope. In this disease, however, the proportion is one to twenty and less, or the white corpuscles may even be more numerous than the red, so that several hundred leucocytes may be seen in a field. According to Huss, the disease should not be regarded as leucocythæmia unless the proportion be at least one to twenty of white to red. But in the earlier stages this may not be observable.

The treatment has for its object to diminish the number of white corpuscles as well as to increase the red. For that purpose

attention is directed to the spleen. Whatever be the functions of this organ, it is highly probable that it manufactures white corpuscles. When hypertrophied, therefore, it produces too many. Hence, unless we can reduce the size of the spleen, all efforts toward merely increasing the red corpuscles will be without avail. Just here, then, it may be observed how important it is always to examine the spleen in cases of anæmia. If the organ is enlarged, even in simple anæmia, the action of iron and nutritious food will not be so rapid as if the spleen were of normal size. How are we to treat enlarged spleen? Ergot, electricity, and showering with cold water seem to be utterly useless. Quinine should be given in full doses, gr. xv. – ʒ ss. a day, for two or three days, at intervals of several weeks, especially if the case follow malarial poisoning, or if intermittent fever occur. Quinine is thought also to contract the spleen. But the external application of the iodide of mercury ointment (gr. ij.– ʒ i.) is the chief reliance. The ointment of red oxide of mercury is also good. They should be applied over the spleen about every other night; but if the patient is very susceptible to the action of mercury, the ointment should be stopped for a time.

Of internal remedies, quinine, as already mentioned, is by far the best. Iodide of potassium is of little or no benefit. The same may be said for arsenic. Cod-liver oil and some preparation of iron, as already indicated, may be tried. Finally, the spleen may be excised. In spite of all treatment, however, the patient usually succumbs after several years, unless the disease is recognized early, and proper treatment adopted at once. In some of these cases mistakes in diagnosis, no doubt, account for not a few of the supposed cures.

5. *Chlorosis* or green-sickness is a cachexia of young virgins, rather than anæmia, though they are both usually described together. It remained for Prof. T. Gaillard Thomas, M.D., of this city, to show that a girl might be chlorotic and still not anæmic. Amenorrhœa or retarded menstruation is the essential element of this disease. It is a mistake, therefore, to be talking about chlorotic women who menstruate, or chlorotic men. According to Dr. Thomas, it is a neurotic cachexia and not simply anæmia, although the latter is usually associated with it. It is supposed to be a neurosis of the ganglionic system of nerves. It occurs at puberty, and appears to be due to insufficient nutrition, want of exercise and wholesome mental occupation, and anything that is calculated to disturb the nervous system at puberty. The complexion becomes pale with a yellow, greenish tinge, and hence the term chlorosis. Œdema is not infrequent, and there are dark circles about the eyes. The appetite becomes morbid, so that patients eat the most unheard-of articles, such

as ashes, sand, slate pencils, and the like. The breath becomes foul, the bowels constipated, and the feet cold. Loud basic cardiac murmurs are often present, as well as venous hum in the neck. Fainting under excitement is not uncommon. There are languor, vertigo and debility, headache, neuralgia, capricious temper, and inability to sleep. The patient becomes a nuisance to herself and every one else.

The diagnosis rests entirely upon the fact as to whether or not the girl has ever menstruated. The prognosis is usually good, unless phthisis is developed meantime.

The treatment consists in a change of scene, good diet, attention to the bowels, and giving iron as already mentioned. Do not begin to give such a patient opium or any of its preparations for the pains, sleeplessness, and the like. It acts like a charm at first, but soon she becomes a victim to the opium habit, and then she can never stop, as she has not the strength to do so. It takes a strong man to put down the opium habit. Instead of this, therefore, give her Graily Hewitt's mixture (℞ Spts. æther. comp., spts. ammoniæ aromat., tr. lavandulæ comp., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. as required, every two or three hours, say). In case of palpitation, ʒ i. tr. digitalis may be added; and for constipation ʒ i. tr. nucis vom. Dr. Thomas' favorite remedy is: ℞ Liq. potass. arsenitis, ʒ ss.; tr. nucis vom., ʒ i.; vini ferri amari ad fl. ℥ ij. M. Sig. ʒ i.–ʒ ij. ter die in water after meals. As soon as the menstrual function is established, the disease terminates.

Hæmophilia.

Hæmophilia is a term used to express the condition known as the hemorrhagic diathesis; and is hereditary. It differs, therefore, from scurvy. It occurs at any age, and more frequently in males than females. The disease is rare, but when present depends upon abnormal delicacy and thinness of the walls of blood-vessels, as well as lack of coagulability of the blood itself.

Spontaneous hemorrhage in this condition is of doubtful occurrence. It is usually due to some injury, however trivial. Even in bleeding from internal surfaces, it is thought to have been always started by some mechanical injury, as coughing, straining, or the action of rough particles of food. This absence of spontaneous bleeding is an important differential diagnostic point between hæmophilia and the acquired hemorrhagic tendency, as in scurvy, purpura, and other kindred affections. After the bleeding once begins, it becomes very difficult to arrest it, owing to the lack of disposition on the part of the blood to coagulate. Anæmia, neuralgia, debility, joint swellings, and frequent ecchymoses from the most trivial causes are the results of this diathesis.

As the patient grows older, the tendency to bleed becomes less and less. It is impossible to tell how much blood is going to be lost at any one bleeding, and so the prognosis is always uncertain. If, however, the patient lives to middle age, the chances for long life are good, as the disease constantly grows milder. The patient may, however, die of severe hemorrhage, or may be left in such an exsanguinated and debilitated condition as to fall an easy prey to some other disease.

Treatment.—The general condition of children should be looked after, and improved by means of nutritious food, good hygienic surroundings, and proper exercise. Fresh air is indispensable, and bathing is often of advantage. The confining of a child with this affection to close and ill-ventilated apartments is altogether wrong. Mechanical injuries of all sorts, even the swallowing of coarse or rough food by which internal bleeding might be started, are to be avoided. In the same way violent exertion or anything likely to bring on nose-bleed is to be prohibited. As the child grows up and becomes more and more hardened, the tendency to bleed becomes less and less.

Should hemorrhage occur, however, if it can be reached, surgical means alone need be employed. I once attended a man who became nearly exsanguinated by bleeding from what appeared to be a mere pin scratch of the upper lip. Druggists and friends had applied iron and various styptics without the least avail. A delicate silk thread tied around the bleeding point stopped it effectually at once. In case of internal hemorrhage, no such means, unfortunately, can be employed. Ergotin, alum, sulphate of copper, and bismuth may be tried with or without ice bags, but no remedy is certain to check the bleeding. The resulting debility and anæmia may be treated as already indicated.

Rickets.

Etiology and Pathology.—Rickets or rachitis is a disease of childhood, and is characterized by a softened condition of bones, due to a want of lime in them. In normal dried bones the proportion of lime is about sixty-five per cent, but only about twenty-five per cent in rickets.

The real cause is unknown. Heredity is often charged with it, as well as syphilis and tuberculosis, but proof is wanting. Overcrowding in damp localities in large cities, with improper nourishment, and bad hygienic surroundings in general, are favorable for its production. Insufficient amount of lime in the food, lack of absorption from intestinal catarrh, and excess of lactic acid holding the lime in solution have all been advanced as the causes of this disease, but yet remain simply as unproven

theories. Niemeyer regards it as the inflammation of epiphyseal cartilages and periosteum, but gives no satisfactory explanation of the cause of the inflammation; Wagner regards it as due to an irritant in the blood; Oppenheimer looks upon it as a peculiar form of malaria; and, finally, others regard it as being due to some specific cause, the nature of which is entirely unknown at present. It usually attacks children from two to three years old, but, according to Rehn, it is not developed after the

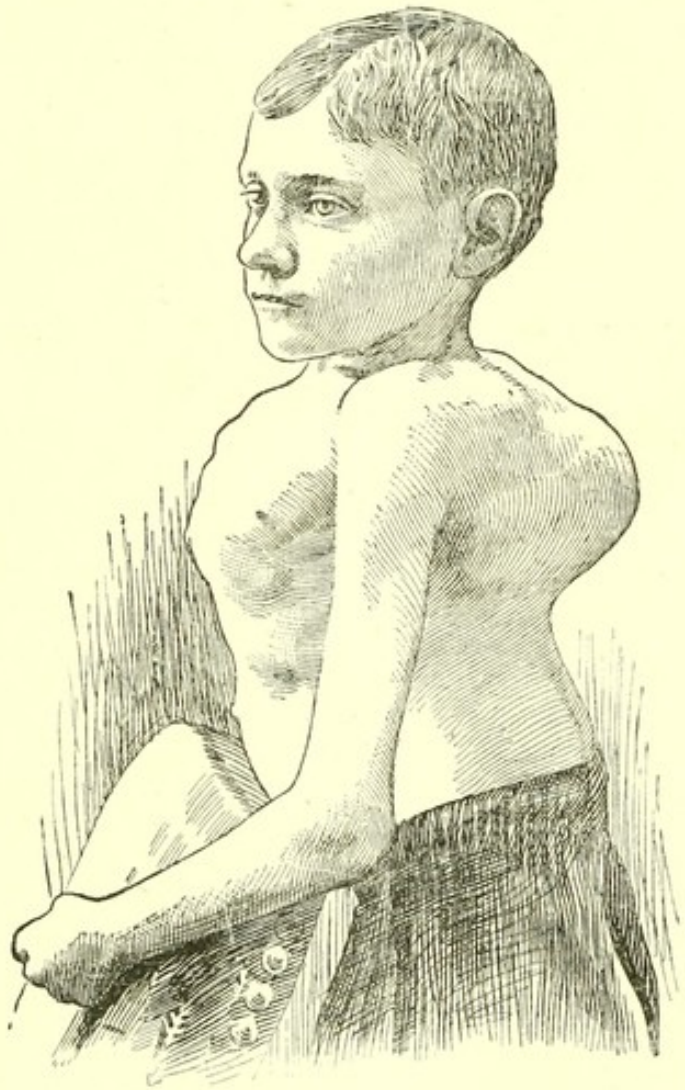


FIG. 43.—RACHITIC DEFORMITY OF THE CHEST.

third year. The disease, however, is in many cases late, that is, developed at ten or twelve years of age or even after puberty. Sometimes it is congenital or fœtal. It affects both sexes alike. In this country it is a much rarer disease than in Europe, and negroes are more often affected than white people.

Symptoms.—It usually begins insidiously. Perhaps the first indication is inability of the child to walk as early as expected, but, as the disease progresses, characteristic deformities occur.

Pigeon-breast is due partly to atmospheric pressure and partly to the tension of the diaphragm during inspiration. The

chest is drawn in laterally, while the sternum projects abnormally. The ends of the ribs where they join the cartilages are also knobbed and can be easily felt through the skin.

The head becomes enlarged and somewhat square-shaped, or elongated antero-posteriorly, and the fontanelles remain open much longer than usual, sometimes until the third year. According to Fleischmann, the lower jaw is angular, with the incisor teeth standing in a straight line, owing to the action of the mylohyoid and masseter muscles on the soft bone. Dentition is retarded and irregular. The incisors often do not appear until the end of the first year. The ends of the long bones become enlarged, especially the lower ends of the radius and ulna, and of the tibia and fibula, but the shaft is more or less curved, due to the softened condition of the bone. This is especially noticeable in the lower extremities, producing the condition of bow legs, with a peculiar waddling gate. Green-stick fracture occurs sometimes also, as is well known. The spine will become more or less curved if the child be allowed to sit up or walk, and the abdomen protrudes. The pelvis has its antero-posterior diameter shortened, which is an important factor in child-birth, and should be remembered. Sweating about the head is a common symptom. As already stated, rickets may come on insidiously without premonitory symptoms; but sometimes there are fever, diarrhœa, restlessness, and occasionally drowsiness or even stupor, giving Oppenheimer the idea that it was due to malarial poisoning; but as such symptoms do not occur in all cases, and as quinine has no influence over it, there appears to be no proof that such poison exists. Anæmia and emaciation are almost always present, and the child is peculiarly liable to attacks of false croup or spasm of the glottis. The liver and spleen may be enlarged. The disease usually runs a chronic course, lasting for months or years. Finally, the fontanelles close and the patient becomes stronger. In some cases deformities persist through life, and even should there be complete recovery the subject is generally below the average height. Acute rachitis sometimes occurs, the disease terminating usually in recovery in a few months.

In case of fœtal or congenital rickets, according to Loomis, the chicken or pigeon breast is not so likely to be present.

Diagnosis.—Rickets might be confounded with hydrocephalus or osteomalacia: but in hydrocephalus there is more or less hebetude of mind with drooping of the head, whereas the opposite is the case in rickets, where the child holds the head erect, and mental disturbance is usually absent. Osteomalacia is a disease of adult life where the bones, once hard, become softened. Rickets is a disease of childhood where the bones remain soft.

Prognosis.—This usually is favorable when the child can be

placed under good hygienic surroundings, and receive proper care and nourishment. Death may result, however, and then is more frequently due to some complication, as pneumonia, diarrhœa, and the like, rather than to exhaustion.

Treatment.—This consists in good hygienic surroundings, such as fresh air and cleanliness, together with nutritious diet. The latter, of course, has to be suited to the age of the patient. Milk or some of its preparations is the chief reliance. If the child has been at the breast over nine months, it should be weaned as soon as practicable, since the mother's milk becomes more and more unfit as food after that period. Eggs, scraped beef, beef juice, and the like are also recommended. Intestinal disturbances are to be treated according to the conditions presented. Of medicines, iron and cod-liver oil are considered to be the best.

Remedies containing lime may be given, but they do not appear to be of any decided benefit. The best and simplest way is to give about two teaspoonfuls of lime water in the milk which the child takes. Lime water may also be combined with cod-liver oil. Phosphate of lime in powder may likewise be administered, in doses of twenty grains ter die, with a little sugar. According to Kassowitz and others, phosphorus is a good remedy. It may be given in cod-liver oil. It is important that the child be kept on a mattress without high pillows, so as to prevent deformities. But should these occur, orthopædic treatment and instruments should be resorted to.

Osteomalacia.

Osteomalacia is also a disease in which there is a deficiency of lime in the bones. But, unlike rickets, the disease is one of adult life, in which bones of normal hardness become softened by absorption and disappearance of lime elements instead of their being prevented from ossifying from want of those elements. It occurs much more frequently in women than men. Rapid childbearing and unfavorable hygienic conditions favor its occurrence. The real cause, however, is unknown. It appears to be endemic in some countries, and is of more frequent occurrence in Europe than in the United States of America. Excess of lactic acid is claimed by some as the cause, and it is true that this acid does hold the lime salts in solution. Whether or not lactic acid is always found in the bones, and, if so, what gave rise to its presence, remains to be settled. The softening process begins within and extends outward, until pliable fibrous tissue remains.

The disease begins gradually, pain being the first symptom, especially about the back and extending along the sciatic nerves into the thighs. Muscular debility and impaired motion become more and more marked, until the patient finally is bed-ridden,

as it is called. Pain in this disease is much more marked than in rickets, so that even the weight of the bedclothes may be unbearable.

Deformities occur as the bones become more and more softened. Spinal kyphosis (angular curvature) is generally the first to take place. The head is bent forward and downward on the sternum, which becomes very prominent, while the thorax is much decreased in its lateral diameter, giving rise to dyspnœa from compression of the lungs and heart. The pelvis also becomes narrowed laterally, so that the symphysis pubis projects in front, while the sacral promontory is pushed forward, giving the superior strait the characteristic heart-shaped form. Childbearing, therefore, becomes a very serious question in such conditions. The bones of the head and face do not undergo so much change, but the extremities are liable to distortion.

Fever and other constitutional disturbances are of rare occurrence. The appetite is usually good, and internal organs as a rule undergo no particular change. The urine, however, often contains lactic acid, and sometimes albumin.

The disease exacerbates and remits, and is chronic in its course. The duration is from two to ten years, but the result is generally fatal. The cause of death is exhaustion, unless brought about by some complication, as pneumonia. The diagnosis is not generally difficult. The disease is peculiar to certain localities, as already stated. Among these may be mentioned, northern Italy, Flanders, Westphalia, and the country along the Rhine. Rickets, as already stated, is a disease of childhood. Osteomalacia also does not cause enlargement of the epiphyses of long bones or thickening of the bones of the head like rickets. In diffuse carcinomatous affections of bones, the cachexia and appearance of cancer elsewhere would at once distinguish it.

The treatment is similar to that of rickets, already described. Narcotics, however, to relieve pain, have to be resorted to as occasion demands. All treatment, however, appears to be of little permanent benefit. Quinine may be tried if there be much fever, especially if it shows a tendency to be periodic. Women in this condition should be informed of the dangers of child-birth attending it.

CHAPTER VIII.

DISEASES OF THE NERVOUS SYSTEM.

NERVOUS diseases may be divided into functional and organic, and the latter into diseases of the peripheral nerves, the spinal cord, and the brain. By functional disease here, as elsewhere, is meant disease without any known anatomical change. It should be remembered, however, that modern and improved methods of investigation render it highly probable, though not absolutely proven in all cases, that many of these so-called functional diseases are only symptoms of various anatomical lesions.

FUNCTIONAL DISEASES.

CHOREA.

Etiology and Pathology.—Chorea or St. Vitus' dance is a motor neurosis characterized by involuntary and irregular movements of voluntary muscles, the intellect remaining undisturbed.

It probably has its seat in the corpus striatum. In fact, chorea may be regarded as symptomatic of disturbance of that body. In most cases this disturbance appears to be caused by local congestion due to vaso-motor dilatation of the minute arteries of the corpus striatum, as may occur in childhood during the period of special activity of sensory-motor ganglia, and also in connection with rheumatism, certain mental conditions, reflex irritations, and the like. In some cases, however, embolism of the capillary vessels has been found. These vessels, given off from the middle cerebral artery and without anastomosis, are peculiarly liable to embolism, as may occur from endocarditis and valvular lesion. Choreic movements in dogs have been produced by injecting starch into the carotids, causing embolism of the minute cerebral vessels.

That the disease is located in the brain, and not in the spinal cord, appears to be proved by the facts that chorea often is single, or confined to only one side—hemichorea; and it is not likely that only half the spinal cord would be affected throughout its entire length without the other half becoming involved at some point or points. Moreover, during sleep the choreic movements cease. In continuous spinal irritation, also, the movements are tonic and

not clonic. If both corpora striata are affected, as sometimes happens, then the chorea is double or affects both sides.

Chorea is most common at the ages of second dentition and puberty. It is very rare before six, and not common after fifteen. It affects girls twice as often as boys. Hereditary tendency to nervous diseases in general has great influence. It is more frequent among the poor, underfed, and over-crowded, as in large cities, though the higher classes or those living in the country are by no means exempt.

Rheumatism strongly predisposes to the disease, if it does not actually cause it. In many cases chorea is found to have followed acute or chronic rheumatism, or it may occur during an attack.

Pregnancy appears to be a cause sometimes. During this condition, chorea rarely occurs before the end of the second month or after the fifth. When once it comes on, however, it generally lasts until after delivery. Worms in the intestinal canal, masturbation, and fright are also among the causes. Finally, the habit of imitation so common among children may lead to a sort of spurious chorea.

Symptoms.—Chorea usually comes on gradually. The child is first noticed to drop things unintentionally, fidget with the hand, or walk awkwardly. Presently these signs become more and more observable. In attempting to take hold of an object, the latter is missed. Food is dropped instead of being carried to the mouth. From being scolded, the child becomes morose and peevish. The eyebrows are alternately contracted and expanded, the eyes roll, the mouth is drawn into various shapes, while the head is turned or bent forward or thrown backward, and the upper extremities undergo every movement of which they are susceptible. Sometimes the muscles of the lower extremities are also involved, and even those of the trunk. Respiration and deglutition appear alone to be not interfered with, according to Niemeyer, but in some cases even deglutition, in the author's experience, is disturbed. In one case I observed chronic hiccough, accompanied by a peculiar cooing sound. It occurred in a man about thirty-five years old, and when first seen he had already had it for four years. In other cases there is a peculiar crowing sound made in the larynx at different times, and speech may be interfered with. The muscles do not become exhausted by these involuntary movements, and the general health, as a rule, does not suffer. Only in prolonged and severe cases does this obtain and the mind become impaired.

Diagnosis.—It could only be mistaken for hysteria, imitative chorea as sometimes is observed among children, or disseminated sclerosis of the nerve centres. From the former it is readily dis-

tinguished by the great variety of involuntary movements occurring in chorea. Disseminated sclerosis of nerve centres usually affects adults, chorea children. In the former also there is paresis (imperfect motor paralysis) of both lower extremities.

Prognosis.—The course of chorea is chronic, and it lasts, usually, about six or eight weeks. In some cases its duration is three or four months, or it may in rare instances exacerbate and remit through life. Relapses may also occur at varying intervals. Recovery is the rule, however, though in rare instances death has resulted, not only from complications, but from the disease itself, probably from exhaustion.

Treatment.—In the first place, children affected with chorea should not be scolded and abused, since they are utterly irresponsible for their movements. In the second place, if any exciting cause be present, it should be removed, as worms in the intestinal canal, constipation, masturbation, and the like. If rheumatism be present, that should be treated by sodium salicylate, salol, frictions, and other means as already mentioned when speaking of the various forms of that disease. A generous diet is urgently recommended, consisting largely of milk or some of its preparations, even cod-liver oil if necesssary. The patient should be placed amid good hygienic surroundings if possible, with plenty of fresh air, and not be kept at school in a crowded room and overworked, and above all not to be teased by other children, or even abused by the school teacher for not doing the impossible.

As anæmia is nearly always present, iron in some form is indicated. In fact, the best remedy for chorea I have ever tried is a mixture of iron and arsenic. (℞ Liq. potass. arsenitis ʒ ss.; tr. ferri chloridi, ʒ i.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals.) The dose may gradually be increased to nearly double that amount. In some cases spraying the back over the spine for its whole length with ether, so as to almost freeze the skin, appears to give temporary relief, but exactly how it acts is not known. This may be done two or three times a week for about five minutes at a time. Electricity has its advocates in this as in other diseases. In some cases no treatment appears to be of any use. Frictions to the affected parts are recommended.

Under the supposition that the bromides lessen the circulation of blood in the brain, and that ergotin constricts the capillaries, either or both of these remedies, on theoretical grounds, would prove useful in relieving congestion of the corpus striatum and thus be of special value in the treatment of chorea. Unfortunately, however, results do not justify such expectation. (℞ Pulv. sodii bromidi, ℥ ss.; ergotin., gr. x.; glycerini, q.s., aquæ, ad fl. ℥ ij. M. Sig. ʒ i. ter die before meals.)

VERTIGO.

Vertigo is an attack of disordered equilibration, of variable duration, and without loss of consciousness. Other names for it are: giddiness, swimming of the head, dizziness, and the like.

The cerebellum is the centre of equilibration or co-ordination. Wrong impressions produced on it through the sensory apparatus, including auditory and visual impressions, may result in disturbance of motor co-ordination. Disordered equilibration or vertigo is the result. Hence, among other varieties we have auditory and ocular vertigo. Besides these, there are gastric, epileptic, migrainous, gouty, and, lastly, nervous vertigo.

Ménière, in 1861, first described auditory vertigo. Since then it has been known as Ménière's disease, *vertigo ab aure læsa*, auditory or aural vertigo. In this case there may be an actual lesion or the labyrinthine affection may be simply irritative as from pressure on the membrana tympani from wax or foreign bodies or syringing the ear, especially when there is perforation of the membrana tympani. There is, however, always coincident disease of the semicircular canals and cochlea, as evidenced by ringing in the ears and deafness. At the time of an attack, habitual tinnitus becomes suddenly increased, or else a loud sound is heard in one ear like the firing of a gun, blowing of a whistle, and the like. Vertigo soon follows, and surrounding objects appear to move in a direction from the ear affected. The patient has a feeling of moving in the same direction, or of rotating in a vertical axis. He reels and catches at surrounding objects for support. At other times he falls to the ground. Only in very rare cases, however, is consciousness lost. When attacked in bed, everything appears to rise and sink or turn round. Nausea and vomiting follow, attended by pallid countenance, coldness of the surface, and clammy sweat. Slight attacks last only a few moments, but in severe cases two or three days may elapse before the patient attempts to rise. A certain amount of deafness and tinnitus remains. During the interval the patient appears well, but suffers mental depression from fear of subsequent attacks with decreasing intervals.

Ocular vertigo may be caused by paralysis of the external rectus or insufficiency of the internal recti. According to Stephen Mackenzie, the vertigo in these cases is not due to diplopia, but to the incorrect notion formed of external objects or erroneous projection. The confusion thus produced causes vertigo and often reeling.

Gastric vertigo or *vertigo a stomacho læso* usually accompanies slight disorders of the stomach rather than grave lesions, though there are exceptions. It occurs more frequently when

the stomach is empty. Heartburn, belching, and flatulence, with irregular bowels and other symptoms of gastro-intestinal derangement, are usually present. Headache and vomiting, with buzzing in the ears, are not infrequent. The respiratory and auditory centres are so near each other that this form of vertigo is often associated with Ménière's disease, through filaments of the vagus (pneumogastric) nerve distributed to the stomach. Palpitation of the heart, through filaments passing to the cardiac plexus, also sometimes occurs.

Epileptic vertigo usually precedes a fit of epilepsy, or it may take the place of such an attack. The patient imagines himself moving, rather than surrounding objects. Loss of consciousness is more frequent in this form. Vertigo also accompanies acute and chronic disease of the cerebrum, as apoplexy or tumors and other lesions.

Migrainous vertigo occurs during an attack of migraine (megrim) or follows it. Sometimes it takes the place of migraine. It is usually slight, but may be severe and attended with nausea and vomiting. Tinnitus aurium and deafness are absent.

Gouty vertigo occurs in gouty people. The gouty diathesis predisposes to vertigo of any form. It often disappears after an attack of gout.

Nervous vertigo is due to nervous exhaustion, as seen among those who indulge in excessive venery, over-study, or the immoderate use of tobacco, alcohol, tea, and coffee. The vertigo is generally slight and occurs usually in the upright position, on heights, or in large crowds. Hence its frequency in church, theatres, and other places where crowds assemble. Deafness and tinnitus aurium are absent, but there are often present gastro-intestinal disturbance, palpitation of the heart, and dyspnœa.

Diagnosis.—Vertigo from any cause is to be differentiated from epilepsy by the fact that in the former consciousness is retained. The different forms of vertigo are distinguished by the causes on which they depend. In auditory vertigo, or Ménière's disease, for instance, there is lesion of the ear with deafness and tinnitus aurium. In ocular vertigo, examination of the eye discloses the cause. The symptoms of gastro-intestinal catarrh are prominent in gastric vertigo, and so on for the rest.

Prognosis.—This depends on the cause and the ability to remove it. In general, vertigo is not a dangerous affection. Recurrence of attacks may be expected in Ménière's disease when the lesion is primarily of the labyrinth.

Treatment.—Ménière's disease requires skilful treatment at the hands of the aurist. During an attack, however, the patient should be placed in the recumbent position, and ten to twenty grains of bromide of ammonium be given in solution about every

three hours. Small bits of ice swallowed are serviceable in relieving nausea and vomiting. Gastric derangement should be treated as in dyspepsia, if any exist. According to Charcot, five to ten grains of quinine ter die for several days is sometimes attended with good results. A blister behind the ear may be used.

In ocular vertigo, properly adjusted glasses often relieve the patient. Tenotomy of the recti muscles may thus be avoided. Gastric vertigo is relieved by proper diet and treating the dyspepsia, as elsewhere described.

In nervous vertigo the cause should be removed if possible, but no bromides should be used, as a rule. If dyspepsia is present, it should be treated. Abuse of tobacco, alcohol, tea, and the like is to be avoided, as well as overwork and excessive sexual indulgence. Nerve tonics, such as iron, quinine, and strychnine, may be given. (℞ Strychninæ sulphat., gr. ss.; tr. ferri chloridi, ʒ iss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals. Or: ℞ Strychninæ sulphat., gr. i.; ferri sulphat., potass. carb., āā ʒ i.; pulv. tragacanth., q.s. M. ft. pil. No. xxx. Sig. One ter die after meals.) The treatment of gout, migraine (megrim), and epilepsy is described under those diseases.

Epilepsy.

Etiology and Pathology.—Epilepsy is a chronic nervous disease characterized by fits of mental disturbance or loss of consciousness, accompanied by partial spasms or general convulsions.

These two elements, according to Reynolds, are the essentials of epilepsy: diminution of intelligence, and muscular contraction. The latter may escape observation, but without the former no convulsion, however severe, is to be regarded as epileptic. These two elements may exist in every variety of combination. Among predisposing causes heredity stands first. It affects both sexes. Age has a decided influence, as it usually appears at puberty or about forty, or from ten to twenty, and from thirty-five to forty-five. Of exciting causes may be mentioned such psychical influences as excessive joy, grief, anxiety, or fright; or peripheral causes, such as indigestion, worms in the intestinal canal, excessive venery, and the like. Brown-Séquard describes the case of a boy who frequently had epileptic fits upon jumping out of bed in the morning. Upon examination, an ingrowing toe nail was found to be the exciting cause, and the case was promptly cured by its removal. Sometimes it is due to general organic changes following diseases such as scarlet fever, diphtheria, pneumonia, rheumatic fever, pregnancies, and abortions. Lastly, there are physical exciting causes such as blows, injuries, tumors, and sun-stroke. In some cases there is no apparent exciting cause.

The disease in many cases is purely a functional one so far as has yet been discovered. Its seat, according to some, is in the medulla oblongata, upper part of the spinal cord, and in the vaso-motor system of nerves. It consists in perverted inclination of these organs to act, and thus the symptoms are accounted for. The epileptic aura, so called, is simply a peripheral symptom of centric disturbance. Immediately following this, or without it, we have: (1) Contraction of the blood-vessels supplying the brain, with resulting loss of consciousness and pale face; (2) tonic contraction of the muscles of the larynx and respiration arrest the act of breathing, which leads to (3) carbonic-acid poisoning, with resulting convulsions. According to others, epilepsy is of cortical origin.

Symptoms.—Prodromata are observed in about half the cases. The most common of those is vertigo. In other cases an aura, so called, precedes the attack. This aura may begin in the lower or upper extremities, and feeling like a pain or creeping sensation travelling up toward the head. In some cases there is a vague uneasiness about the epigastrium. Various fancies may precede an attack. Thus, in one case the patient imagined that she was about to be struck over the head by a strange-looking demon. An attack consists of three stages, following which are after-symptoms. There is no fever.

First Stage.—This lasts anywhere from a few seconds to half a minute. With or without warning the patient appears to try to look over and behind one shoulder or the other. Sometimes this is preceded by a yell or groan. Tonic contraction of all the muscles occurs, with loss of consciousness, so that the patient not infrequently falls to the ground—falling sickness. In some cases frightful burns and injuries have been caused by falling into the fire, on hot stoves, or from heights. Respiration is arrested, the pupils are dilated, the pulse weak, and the face, at first pale, soon becomes red or dusky.

Second Stage.—This lasts from a few seconds to ten minutes. It commences with the return of respiration. There is continued loss of consciousness, but, owing to carbonic-acid poisoning, this stage is characterized by the general clonic convulsions that now occur. Respiration is labored, often with a gurgling sound and foaming at the mouth. From biting of the tongue, blood is also mixed with the saliva. The face becomes dark bluish and turgid, and there is cold and often profuse sweating. The pupils oscillate, the pulse is hard and throbbing, and there is often palpitation.

Third Stage.—This occupies usually about ten minutes. Partial return to consciousness and sensation mark the beginning of this stage. The pupils are contracted, the features are haggard, and the sufferer is more or less exhausted. The patient

looks around in a bewildered manner, and is able to clear the throat of the excessive secretion of mucus. The eyes appear red from injection of the conjunctivæ. The respiration is more regular, and the pulse variable. The total duration of an epileptic fit ranges from five or ten minutes to twenty minutes. The chief danger is during the first stage; for it is evident that if this is too far prolonged, the patient dies asphyxiated.

After-symptoms follow an attack. These vary greatly, depending on the severity and length of the fit. In some cases the patient recovers rapidly and continues as if nothing had happened. Generally, however, the after-stage of stupor sets in. If it occur during the daytime, this stage lasts about an hour, but it continues longer at night, and gradually merges into the natural sleep.

During the interval the patient may be entirely well. Or else, memory becomes slightly defective, or the mind may become impaired with confusion of ideas. There is no means of recognizing the disease during the interval. A patient having had epilepsy once is liable to a recurrence of the fits, but there is no regular periodicity. In one-seventh of cases Reynolds found that patients had several fits in one day, and then were free from attacks for several weeks. Others occur in multiples of seven days. Eighty per cent of cases have fits oftener than once a month. The menstrual period does not appear to exert much influence in bringing on attacks of true epilepsy.

Petit mal is the term applied to very mild epileptic seizures in contradistinction to that just described or the *haut* or *grand mal.* In *petit mal* the patient has what appears to be vertigo, but there is temporary mental confusion or actual loss of consciousness, however transient it may be. This may or may not be attended with partial muscular contraction, but there are no clonic spasms. Of the complications of epilepsy, epileptic mania appears to be the most important, and occurs in about one-tenth of the cases. It usually follows convulsions, but rarely precedes them. The mania is usually of the furious and dangerous character, but sometimes it may be ecstatic or melancholic. Meningitis following epilepsy is generally due to a blow from falling or other accident. Apoplexy, idiocy, and paralysis do not appear to be sequelæ.

Diagnosis.—Absence of dilatation of the pupils and presence of over-acting clearly disclose the impostor. The talk of applying fire or other means of producing pain, in the hearing of the would-be patient, will often cause a speedy recovery.

Syncope often resembles *petit mal.* The former comes on gradually, however, and besides the feeling of faintness the patient is not always unconscious. *Petit mal* comes on suddenly, with loss of consciousness, but the pulse is stronger than in syncope. Hysteria usually gives the history of that disease before

the attack. When it occurs, there are no dilated pupils, bitten tongue, and asphyxia that occur in epilepsy. Convulsions (eclampsia, reflex epilepsy) in general, including puerperal convulsions, are usually easily distinguished from true epileptic fits.

In children during dentition, the convulsion is preceded by or attended with more or less fever, and consciousness is not entirely lost at first. No after-symptoms, such as stupor or paralysis, follow these fits. The same is true for convulsions due to worms in the intestinal tract, or over-eating. The fits come on more gradually, the paroxysm is of shorter duration, and there is not loss of consciousness at the onset. Discovery and removal of the cause settle the question. In children convulsions often usher in certain diseases. In these the patients are usually too young for epilepsy, and there is more or less fever, with signs of the disease in question.

In such organic brain diseases as softening, tumors, and meningitis, convulsions are merely symptomatic of the condition of which there are other marked signs. They are less sudden in their onset than epilepsy, the convulsive movements are irregular, are not attended with asphyxia, or followed by stupor. Sometimes they are limited to one side or one extremity, without loss of consciousness.

Finally, apoplexy, uræmia, and opium or alcoholic poisoning remain to be considered. In apoplexy there is hemiplegia, with one pupil often contracted while the other is dilated. In uræmic coma the breathing is easy, and the face pale and puffy. Examination of the urine shows the presence of albumin. In opium poisoning the pupils are contracted to a pin's point, the breathing is labored and stertorous, and the patient is with difficulty aroused, but at once falls back into the condition of stupor. In alcoholic coma, or the state of being dead-drunk, besides the presence of the smell of alcohol, the tongue would not be bitten, and the pupils are not dilated.

Prognosis.—Inherited epilepsy may still be regarded as an incurable disease. Beginning in early youth and having lasted many years, it is also usually incurable. The longer the disease has existed, the less become the chances of a cure. On the other hand, epilepsy associated with some cause that can be removed, is more amenable to treatment.

Treatment.—Aborting an attack should be done if possible. Ligating the limb from which the aura starts is an old practice, and, according to Brown-Séquard, it does little or no good. On the other hand, pinching or pricking the skin, the application of a lump of ice, galvanism, or throwing water in the face may stop an impending attack. The latter plan is very simple and convenient, and undoubtedly is sometimes effective. When mus-

cular contraction precedes loss of consiousness, forcibly drawing on the affected muscles in the opposite direction will sometimes succeed. A sharp blow on the muscles, with or without friction, also may have the same effect.

When disturbed respiration is the first symptom, inhalation of chloroform or ether may ward off repeated attacks. In like manner, the inhalation of amyl nitrite is often beneficial. A few glass pearls containing this substance may be crushed in a handkerchief and held to the nostrils, as in angina pectoris. Hypodermic injections of five to ten minims of Magendie's solution of morphine with $\frac{1}{50}$ grain of atropine, is also recommended. Snuffing powdered asarum, the taking of twenty-five grains of chloral hydrate, a stimulant, or a purgative, are sometimes effective. Running, jumping, breathing quickly, reading out loud and rapidly, in fact anything to occupy the attention of the patient, have all been found of use.

During an attack, a cork or some such contrivance should be placed between the teeth to prevent biting the tongue, and care should be taken, of course, that no injury is sustained accidentally, as well as to place the patient's head in a position to facilitate breathing. During the interval, peripheral exciting causes should be carefully looked for and removed if found, when possible.

The bromides have been the most highly recommended of internal remedies. Brown-Séquard's prescription is as follows: ℞ Pulv. potass. iodidi, ʒ ij.; potass. bromidi, ℥ i.; ammonii bromidi, ʒ iij.; potass. bicarb., ʒ i.; tr. columbo, fl. ℥ i.; aquæ destil., fl. ℥ vi. M. Sig. ʒ i. ter die before meals and ʒ iij. at bed-time for adults. The proportion of the ingredients may be changed. In *petit mal*, the ammonium bromide is increased, and the potassium bromide diminished. In case of weak pulse, carbonate of ammonia is used in place of bicarbonate of potash. It is imperative that this remedy should be used continuously, and persisted in, for at least two years after the last attack. Along with these, some tonic remedy, as strychnine or arsenic, should be taken after meals. Atropine and ammoniated sulphate of copper are also highly recommended by the same author, as also the bromide of zinc.

Quinine is harmful in the treatment of epilepsy. Arsenic is recommended in its stead, but should it become absolutely necessary to use quinine in case of malarial affections, Brown-Séquard recommends the valerianate as being the least harmful. Iron is also deleterious in epilepsy, as a rule; the citrate is the least objectionable, but should not be used except in cases of marked anæmia. Gelatin-coated pills of binoxide of manganese are recommended in place of iron.

Cod-liver oil is highly recommended, especially in *petit mal*.

Counter-irritation by means of blisters and surgical operations of various kinds, such as trephining the skull to relieve pressure on the brain have all been tried, but generally without any lasting favorable result.

Nitrate of silver, bromide of arsenic, zyzigium jambolanum, simulo, and a long list of remedies and so-called specifics have been used in epilepsy, but with little or no benefit.

Infantile Convulsions.

Infantile convulsions are epileptiform in character, and their frequent occurrence is owing to excessive reflex excitability of the brain.

They are often of reflex origin, as from indigestion, worms in the intestinal canal, teething, and the like. In some cases they usher in some severe disease as diphtheria, scarlatina, or pneumonia, for instance, while in the adult such diseases would be preceded by a chill. In other cases they occur in connection with cerebral disease, or are true epileptic fits, and, finally, they may occur without any known cause. Rachitic children are said to be especially liable to convulsions.

Infantile convulsions resemble epileptic fits—so much so that it is sometimes impossible to distinguish between them. In general, however, they come on more slowly than true epileptic fits, there is not the same total loss of consciousness always, and they are not followed by after-symptoms. Only one convulsion may occur, or they may continue for several days with variable intermissions.

The treatment of the convulsion consists in placing cold to the head, or the child may be put in a bath of 95° F. and the head showered with cool water. An enema containing a grain or two of chloral, according to the age of the child, is highly recommended by some. Finally, a drop or two of nitrite of amyl by inhalation may be tried. In severe cases inhalation of chloroform is recommended, but this should be very cautiously administered, and is seldom necessary. After the convulsion is over, the cause, if possible, should be found and removed. If the gums need lancing, it should be done at once and without hesitation. If worms are known to be present in the alimentary canal, they should be got rid of at once. The overloaded stomach may be emptied promptly by ipecac or some equally harmless emetic.

Hystero-Epilepsy.

Hystero-epilepsy, according to Buzzard, is a severe form of hysteria in which epileptiform convulsions occur, attended with peculiar forms of anæsthesia, paralysis, and contraction of mus-

cles. The causes are those of hysteria in general. It attacks women almost exclusively; but boys and even some men are not exempt. The symptoms, according to Charcot, are divided into motor and sensory. Usually there is an epigastric aura, followed by a yell or shriek. The face is pallid, the patient falls, and there is foaming at the mouth with tonic contraction of muscles. Sometimes the tongue is bitten. Clonic convulsions, with lividity of the face, may also occur. Relaxation and coma succeed, soon to be followed by violent gesticulations and often profane and filthy language. Dr. T. Gaillard Thomas has observed that it is a matter of wonder how refined ladies, even the unmarried, have learned to use such Billingsgate language. Hallucinations of hearing and vision, like one in delirium tremens, sometimes occur. The paroxysm terminates after a variable time, with hysterical laughter, sobbing, and the like. For a time the bladder is paralyzed, or there may be involuntary discharge of urine and inability to swallow food. This latter symptom may last indefinitely, unless the patient be forced. Contractures of limbs in women may follow, lasting for a few days or indefinitely. They do not relax during sleep, but do under chloroform. Pain over the left ovary is common, especially on pressure. Anæsthesia of half the body is sometimes observed, and this may be attended also with defective taste, smell, and hearing, and sometimes there is color-blindness. In a case that came under my charge at Bellevue Hospital, a pin could be stuck deeply into the left cheek or any portion of the left side of the body without the least sign of feeling on the part of the patient or without any escape of blood.

Diagnosis.—In this disease there is no facial motor paralysis or deviation of the tongue. So complete is the anæsthesia, also, that there is no reflex action as on pricking the skin, and the affection is confined to half of the body. In hemiplegia from apoplexy, there is always reflex action at first, and the paralysis affects the body on the side opposite the paralysis of the face. Hystero-epilepsy also gives an almost unmistakable previous history of hysteria.

Contractures may remain permanent, but they usually terminate suddenly, as after fright or some shock.

In case of long-continued succession of fits, in hysteria there is no rise of temperature, of course; but in epilepsy, as Charcot has observed, there is a very marked rise of temperature (105° F.) when epileptic fits succeed each other rapidly for a day or two, until the patent dies worn out.

Prognosis.—This depends upon the nature of the case, and the possibility of removing the cause, as in hysteria. On the whole, it is favorable.

Treatment.—Forcible pressure on the ovaries may abort the attack in women. If this is of no avail, and if the attacks are repeated or become troublesome, removal of the sensitive ovary by the very simple operation of laparatomy will often be a radical cure. Plates of various metals are said to cause a return of feeling or motion in an affected part, but at the same time these symptoms develop in the corresponding limbs of the opposite side and this is likewise true for contractures. As a therapeutical measure, therefore, these metallic plates are of little value, however useful they may be as a means of diagnosis. Electricity, especially the faradic current, is highly recommended by some, though it is of doubtful benefit. These cases, above all, are the proper subjects for treatment by hypnotic suggestion. Wholesome mental occupation and bodily exercise, change of scene, and removal from over-anxious and officious friends, when practicable, are necessary for a permanent cure. Marriage, no doubt, would be beneficial in many cases, but the right on the part of a physician to recommend marriage in a case where the ovaries may be thought to be in a diseased condition is a grave responsibility.

Catalepsy.

Catalepsy is a functional nervous disease characterized by attacks of more or less unconsciousness, suspension of sensation and voluntary power, and partial or general rigidity of the muscles, causing the latter to remain for a variable time in the position in which they are placed. The disease is probably of central origin, but nothing of this is definitely known. It may occur in both sexes and at any age, but nearly always affects women at puberty or soon after. It is either associated with hysteria or epilepsy, or else nervous exhaustion. Blows, fright, and emotions, especially religious, are among the exciting causes. Melancholia, the opium habit, and malarial poisoning are also reckoned among the etiological factors.

Vertigo, headache, and dyspepsia may precede an attack, but when the latter occurs it comes on suddenly and, in the majority of cases, with loss of consciousness. Muscular rigidity soon follows, and after a short time the limbs, though movable, remain in whatever position they are placed. In profound cases, reflex movements are lost, and none can be induced, according to Gowers, even by touching the conjunctiva. The temperature is generally lower than normal. Recovery is gradual or sudden after the attack has lasted a few minutes or several hours.

The paroxysms may recur periodically or irregularly, but during the interval the patient is usually well. In other cases hysterical symptoms occur.

Sometimes the disease may be simulated, but in these cases resistance is offered to the attempt to bend the limbs, whereas in catalepsy they gradually yield. The prognosis of simple catalepsy is usually favorable, especially if during the interval the patient enjoys good health.

Regarding treatment, the patient should be aroused to a state of consciousness during an attack. This may be done by the usual application of smelling-salts or snuff to the nostrils, or faradization. A speedy emetic, according to Gowers, accomplishes the same object, besides relaxing the muscles. For this purpose $\frac{1}{20}$ to $\frac{1}{12}$ grain apomorphine is an unfailing remedy when given hypodermically. Although I have administered it to children in other diseases, I have never found it to cause any alarming symptoms, but it will produce vomiting. It is probably the best remedy there is to cut short an attack of catalepsy. During the interval the general health should be attended to, and any other complication treated. Removal from home influence, as in hystero-epilepsy, often becomes necessary.

Hysteria.

Hysteria is a functional disease of the nervous system, characterized by morbid susceptibility to mental emotions without will power sufficient to control them. It also involves sympathetic nervous phenomena.

It affects women chiefly, and from puberty to thirty, but occurs sometimes at the menopause. Men are not totally exempt, as the name might imply.

Members of the same family often have it, and those who inherit a tendency to nervous affections are more subject to hysteria than others.

Masturbation and venereal excesses also give rise to it, as well as celibacy, though these causes have, no doubt, been over-estimated. It is oftener observed, however, among the single than the married. There is frequently some undoubted relation between hysteria and uterine and ovarian diseases.

Violent mental disturbance from grief at the loss of friends and property, disappointment in love, fright, and the like are also among the etiological factors.

Overwork and insufficient food are mentioned by authors as causes, but the laboring classes, as a rule, are remarkably exempt from the disease. On the other hand, want of wholesome occupation, allowing ample opportunity for introspection and self-contemplation, is one of the most fruitful sources of this affection. In large families and hospital wards, it sometimes becomes imitative or seemingly contagious.

Symptoms.—Emotions are excited easily, but cannot be con-

trolled. Weeping and laughter alternate with each other. Instead of these or following them, there may be hysterical coma, in which the patient falls into a deep sleep apparently, though cunningly aware of what is going on. This condition may last a few hours or days. Convulsions and even paralysis may occur. Owing to a craving for sympathy on the part of these patients, they often do not hesitate to practise deceptions. These attacks come on with varying intervals, but during the latter there is defective mental power as shown by their want of judgment in ordinary affairs. They are weak-minded. Pain is a frequent hysterical symptom. The most common is pain in the back or side, resembling lumbago or intercostal neuralgia. In other cases a joint may be complained of, or there is headache, described as feeling like a nail being driven into the head (clavus hystericus). Anæsthesia, hyperæsthesia, or tenderness are all complained of at some time or other. The anæsthesia is usually confined to one side, and much more frequently the left. Even the left conjunctiva may be rubbed without reflex action. Tenderness in the iliac region of the same side generally exists. Intolerance of light and loss of taste and smell may be present, as well as tinnitus aurium. Numbness or coldness of the left side, with a sense about the waist of pricking with pins and needles, have all been described by patients.

Globus hystericus is the feeling of a lump travelling up to the throat from the stomach, and causing a choking sensation. It is one of the commonest symptoms of hysteria, and is due to spasm of the muscular coat of the œsophagus. Sobbing often follows this sensation.

Spasm of other muscles occurs. In the larynx it produces a peculiar voice and cough. There is no expectoration, and it ceases as soon as there is no one to observe it. Hiccough may also occur from spasmodic action of the diaphragm. Clonic spasm of muscles about the head and shoulders is not uncommon, but tonic spasm of muscles of the limbs is much more frequent. Contractions may last for months, but there is no trophic disturbance. Dislocations, tumors in the abdominal cavity, and even aneurism have been simulated by contractions and spasmodic actions of muscles. Convulsions like those of epilepsy sometimes occur. Occasionally they are preceded by a cry or shriek.

Palpitation of the heart and attacks resembling angina pectoris may occur, or the patient appears to be seized with syncope. Vomiting, flatulence, irregular bowels, and phantom tumors due to accumulation of gas in the intestines, are all common to hysteria. Retention of urine, as well as frequent desire to micturate, may occur, and very rarely there may even be almost total suppression.

Diagnosis.—Hysterical coma is distinguished by the previous history of the case, the hysterical symptoms preceding it, the absence of organic disease, and examination of the urine so as to exclude renal affections. Hysterical convulsions are distinguished from epileptic fits by the fact that in hysteria the patient takes care to fall in a suitable place, and not in the fire, for instance. In hysteria, also, there is often more or less opisthotonus, the tongue is not bitten, and the patient takes care not to injure herself. Consciousness in hysterical convulsions is not lost, as in epilepsy.

Hysterical paralysis is usually of the paraplegic form. The muscles do not become wasted as in true paralysis; the sphincters are not paralyzed, and normal irritability is generally shown upon application of induced currents. The mouth is not drawn aside in hysterical hemiplegia, should it occur. The patient is able to swallow in hysteria, and although she may imitate aphasia by not speaking, yet she can easily express her wishes in writing, thus at once disclosing the deception.

Hysterical pain is distinguished from neuralgia by the fact that in the former case the pain ceases when the patient's mind is diverted, and it does not follow the course of nerves. Disseminated cerebro-spinal sclerosis may present many difficulties. If it has existed for months in a young woman and suddenly disappears, of course it was hysterical. But in the early stages it may be impossible to tell whether the symptoms, such as general weakness of limbs, slight tremors on voluntary movement, and the slow, drawling speech, may be due to hysteria or the progressive organic disease mentioned.

Prognosis.—Hysteria rarely, if ever, causes death of itself. The patient recovers, but has returns of the disease usually until after the menopause, but sometimes it ceases earlier, or it may extend into old age.

Treatment.—The general health of the patient should be attended to. If anæmic and dyspeptic, such conditions are to be treated as elsewhere directed. The bowels should be regulated. Good food and wholesome bodily and mental occupation are recommended. In some cases the patient is much more easily managed among strangers than at home.

Electricity, whatever it may do in other diseases, is one of the best remedies here. Faradization of the spot of anæsthesia and pain soon causes them to disappear. A stream of cold water poured into the face soon arrests hysterical convulsions, by reflex action on the ganglionic nerve centres.

Valerian and asafœtida are both good remedies in hysteria, but the bromides do no good. This point should be remembered.

Alcohol and opium should be banished from the list of reme-

dies in treating hysterical patients, except in cases of absolute necessity. Thus, a patient may in some way become so debilitated as to need milk punch or egg-nog, or pain may be so excessive as to necessitate the hypodermic injection of morphine, in very rare cases, by the physician himself. But the patient or friends should not be trusted with these things, as the alcoholic and opium habits are soon formed by hysterical women, and it is difficult, if not impossible, to break them from it. The same is true of chloral, sulphonal, and the like. Graily Hewitt's prescription is to be preferred. (℞ Spts. æther. comp., spts. ammoniæ aromat., tr. lavandulæ comp., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. as required, or ter die and bed-time.) It relieves hysterical headache, pain in the back, and elsewhere better than any remedy I have ever had the good fortune to try. Removal of ovaries by laparatomy may be performed in severe and hopeless cases, especially if they are found to be diseased during the operation. The question of marriage here also comes up. In slight cases with otherwise good health, it will do no harm in all probability. In severe cases the reverse may be expected.

Neurasthenia. Spinal Irritation.

Neurasthenia or nervous debility is a functional nervous disease of cerebro-spinal origin. No anatomical lesion is present, and the pathology may be said to be as yet unknown, although it is supposed by some to be due to anæmia of the brain and spinal cord.

Dr. Landon C. Gray makes out three forms of neurasthenia—reflex, lithæmic, and purely functional. In the first case the neurasthenia is due to certain vicious habits—onanism, excessive venery, and the like; and in the second form there is the gouty diathesis.

Neurasthenia may coexist with many other diseases, but in general as a functional affection it is supposed to be caused by overwork, excessive use of tobacco and alcohol, and long-continued excitement. Men are more subject to it than women, and it is most common during the active period of life. Americans are thought to be more affected by the disease than others, on account of their hurried mode of eating and living in general. It is more frequent in large cities, where excitement and anxiety prevail, rather than in the quiet of the country. Excessive and prolonged mental strain, with irregular hours, masturbation, and excessive sexual indulgence, are highly conducive to this disease.

The symptoms depend upon whether the brain or the spinal cord is affected. In the former case, according to Beard, there are tenderness of the scalp, vertigo, insomnia, mental depression,

and defective memory. Along with these there are often ringing in the ears, morbid apprehensions of various kinds, muscular weakness, and irritability of temper. When the spinal cord is chiefly affected, tenderness along the spine under pressure is often experienced. The pulse varies, and palpitation of the heart occurs at different times. Sweating of the feet and palms of the hands are often present. Dyspeptic symptoms, with flatulence, indicative of gastro-intestinal disturbance, are often observed, as well as abnormal sensations of numbness, itching, neuralgias, and the like. Seminal emissions with imperfect sexual function annoy the patient, and tend still further to weaken him and increase the mental depression. When the brain and cord are both affected simultaneously, there is a combination of the foregoing symptoms.

The absence of organic disease will usually enable one to make a diagnosis, taken with the previous history of the patient as to habits and the like.

Neurasthenia seldom proves fatal, and in the majority of cases, under sensible treatment, the patient gets well if he follows out the instructions. Relapses, however, not infrequently occur, and in some cases the patients drag out a miserable existence for years, become hopeless invalids, and finally die of some intercurrent disease.

In the treatment, the securing of sleep is of the first importance if insomnia be a prominent symptom. But this is not to be accomplished by giving opium *ad libitum*. Very soon the opium habit is formed, and these are the very patients who find it so difficult, if not impossible, to stop it. The same may be said of alcohol, for which the patient appears to crave. A few doses of sulphonal (gr. xv.–xxx.), to be taken at 8 P.M., are usually sufficient; for when once the patient can get a good night's rest the spell is often broken. Change of scene and easily digested food help in this matter. Moderate exercise and innocent diversion of mind by some light and enjoyable occupation will aid greatly in effecting a permanent cure. Tobacco, alcohol, late hours, irregular and hasty meals, and bad habits in general are to be dropped. Just how much good electricity does in these cases I am unable to state from experience, but it is recommended in this disease, as in many others.

Muscular pains, neuralgias, and abnormal sensations are got rid of by systematic massage, which, by the way, also promotes sleep. The operation, however, should be performed by one who knows how to do it, and at bed-time. I have known patients tormented with insomnia to fall asleep while this operation was going on. For the sweating of the hands belladonna or atropine is good, and probably the best remedy. I have also found it

to be excellent for the emissions when given with iron and cantharides. (℞ Tr. belladonnæ, tr. ferri chloridi, tr. cantharid., āā ʒ i.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.)

Spinal irritation is a functional nervous disease, associated probably with anæmia of the cord, but without any anatomical lesion.

It usually affects women from puberty to thirty; in fact, it may be called the neurasthenia of women. Overwork, insufficient food, mental anxiety, and the like, giving rise to neurasthenia, may cause the disease; also prolonged illness and various uterine diseases. Persons addicted to the alcoholic and opium habits are also liable to spinal irritation. Masturbation and excessive sexual indulgence are among the causes. Persons who inherit a tendency to nervous affections are more liable to it than others.

Tenderness over the spine on pressure or the application of heat or cold is a prominent symptom. It may be confined to some spot, or may extend more or less along the whole spine. The symptoms are those of neurasthenia when the spinal cord is the seat of that disease, to which the reader is referred. Palpitation, gastric symptoms, and attacks of syncope are not infrequent. The hands and feet are usually cold. In many cases torpidity of the liver and constipation are present. Neuralgic pains are frequent, and there may be choreic movements. The patients are subject to insomnia, headache, and vertigo, and the appetite becomes capricious and temper irritable. In some cases there is mental depression and even melancholia. A feeling of numbness in the lower limbs is often complained of. These symptoms are inconstant, but are referable to certain regions, according as the seat of the disease is in the cervical, dorsal, or lumbar region of the cord. The dorsal region is the most frequently affected of any locality, as evidenced by dyspeptic symptoms, capricious appetite, nausea, and even vomiting.

The disease, though quite amenable to treatment, is liable to return. Change of scene, nutritious and easily digested food, and rest are necessary for a complete cure. Opium should not be used, as it constipates the bowels, and such patients easily fall into the habit without the ability to break it. Alcoholic stimulants should also be avoided unless debility renders their administration absolutely necessary, and then they should be given in the form of beer, ale, or light wines. External applications, as friction over the spine at bed-time with camphorated soap liniment, are often beneficial. The application of the galvanic current is claimed by many to be serviceable. Among the remedies to be given, Graily Hewitt's mixture is about the best, especially if digitalis and tr. nux vomica be added. (℞ Tr. digitalis, tr.

nucis vom., āā ʒ i.; spts. æther. comp., spts. ammoniæ aromat., tr. lavandulæ comp., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Teaspoonful ter die before meals and at bed-time.) In this and similar affections, demoralizing habits are to be dropped and the will power encouraged, since much depends on the patient.

Sunstroke.

Sunstroke or insolation is a functional nervous disease attended by more or less shock and syncope, and in some cases intense pyrexia. The disease is probably due to a superheated condition of the blood.

Although it may occur by direct exposure to the sun's rays, yet this is not necessary. Some of the most fatal cases occur in the night. Long-continued heat and bad ventilation are more potent causes than direct exposure to the sun. A certain amount of dampness in the air also favors it. For instance, damp and ill-ventilated apartments, and cloudy murky weather with sufficient rise of temperature, cause the disease much more frequently than the same amount of heat with a dry atmosphere. Sudden onset of heat also favors it. Thus, people living in New York are more subject to the disease than those living in Richmond, although the mean temperature of the latter place is much higher than that of the former.

The drinking of alcohol is such a powerful predisposing cause that it cannot be overlooked. It is a matter of common observation that workmen or others who drink early in the morning are peculiarly liable to sunstroke. The same is true for soldiers. The latter, also, in former times, were handicapped by all sorts of absurd military accoutrements, including a barbarous hat. They also had to endure the torture of being strapped up in various ways, which greatly interferes with respiration.

Acclimatization has considerable influence in bringing about toleration to the disease. New-comers in hot climates are more likely to suffer than those accustomed to it. With the exception of signs of congestion, especially of the lungs, there are no anatomical changes worthy of note.

Symptoms.—The disease usually comes on suddenly. In some cases the patient complains of dyspeptic symptoms for a few days previously, and may not feel well. Suddenly there is a sensation of great depression. There is prostration of muscular force, the face is pale, the surface is cold and moist, and the pulse is frequent and feeble. In some cases palpitation of the heart, and even death from heart failure may occur. But under proper treatment, prompt recovery is the rule.

In other cases the respiration becomes markedly affected, the

patient is unconscious, and may die asphyxiated. Heart clot is thought by some to be the cause of death in these cases, but this occurrence is now considered to be purely post mortem. Owing to excessive heat, the respiratory centre becomes overwhelmed and the heart stops also, due to failure from its relation with the pneumogastric nerve. In a third class of cases there is intense hyperpyrexia caused by the action of heat on the nerve centres and vaso-motor nerves. It comes on at night frequently, and is usually found among the overcrowded and intemperate or those who have suffered from lowered vitality from previous diseases, bad hygienic surroundings, and the like. There are dyspnœa, great thirst, restlessness, and a burning hot skin, which may be parched in some cases or moist in others. The pulse varies, the carotids throb, and the pupils, at first contracted, become dilated. The urine may be suppressed, but owing to relaxation of sphincters, fæces are often passed involuntarily. The patient is unconscious, and sometimes epileptiform convulsions occur. Death not infrequently ensues from asphyxia or heart failure. Recovery is often incomplete. In some cases the mind remains permanently impaired, and there is a disposition to headache and a return of the symptoms every summer.

Diagnosis.—Apoplectic coma might be mistaken for that of sunstroke. But in the former the pulse is slow and full, the breathing labored, the pupils are unequally contracted, and the skin is cool. In sunstroke the reverse of this is true. The pulse is variable, but usually short and quick; respiration is rapid; both pupils are contracted at first, dilated afterward; and the skin is generally burning hot.

The early supervention of insensibility usually distinguishes it from remittent and other fevers.

Prognosis.—About fifty per cent die, according to Fayrer. The rate of mortality, however, varies with different seasons. Impairment of intellect, defective memory, and even epilepsy may result. Headache, impairment of eyesight, partial paralysis, derangement of various functions, with corresponding interference with general health, and intolerance to heat, are also among the sequelæ of this disease. In other cases recovery is complete.

Treatment.—In mild cases placing the patient in the shade, relieving pressure by unbuttoning the collar and clothes about the waist so as to allow free respiratory movements, and showering the head with cold water are usually sufficient to bring about complete restoration. Even then the patient should avoid exposure to heat, and over-exercise, for the time being.

In more severe cases this treatment has to be prolonged, and ice may be applied to the head, especially in those cases where

fever supervenes. The bowels should be relieved if constipation is marked, and this is best accomplished by a drop of croton oil applied to the tongue. If there are signs of heart failure, moderate alcoholic stimulation may be necessary, perhaps combined with digitalis. Antifebrin is the best remedy to lower the temperature along with the ice-cap; five-grain tablets may be given every two or three hours. Moderate inhalation of chloroform is about the best means of controlling convulsions if they occur. Great care should be observed, however, for fear of heart failure. Bromide of potassium in twenty-grain doses is often beneficial after the severer symptoms have subsided. In a very few instances bleeding has been thought to be of service, but this is seldom called for. Removal to a cool climate during the summer months may become necessary. Sequelæ are to be treated according to the nature of the case.

Paralysis Agitans.

Paralysis agitans, shaking palsy, or Parkinson's disease is a functional nervous disease of advanced life, characterized by trembling of voluntary muscles independent of exertion. In some cases rigidity of muscles follows.

There is no known anatomical lesion. The disease usually affects men rather than women, and comes on very rarely, if ever, before forty. Various causes have been assigned, as excessive sexual indulgence, abuse of alcohol, opium, and tobacco in early life, injuries, and severe illness. The first, probably, has more to do with it than anything else, but in many cases apparently even this is wanting.

The trembling generally begins in one hand, usually the right. Or only one finger or the thumb may be affected at first. The trembling may be continuous and steadily increasing from the first time it is noticed, or it may cease altogether and soon recur. In very rare instances the head is first affected, contrary to Charcot's statement, the motions of the head being lateral or up and down. Early in the disease the patient may be able to control these tremors by a powerful effort of the will, but this ability is soon lost. The tremors, however, cease during sleep or while the patient is under the influence of an anæsthetic.

In time the disease progresses. The whole arm now trembles, and then the leg of the same side becomes affected. After a while it begins in the other arm, and so progresses until in some cases the muscles of the whole body appear to be involved. The muscles of the upper extremity are, however, chiefly affected. While the patient is quiet, the tremors are sometimes barely perceptible. Any sudden excitement, however, will cause the patient to

tremble violently, so much so that speech is interfered with, and words are pronounced with difficulty.

Rigidity of muscles, especially of the trunk, usually comes on after the disease has lasted considerable time. The patient may become bed-ridden, and has to be fed and turned over and the position shifted from time to time, in order to avoid bed-sores.

The mind usually remains clear, and there is no suffering with pain as a part of this disease; neither is there any fever. In other words, the patient's general health may be perfectly good.

The course of the disease is chronic and usually progressive, though it may cease for a time. The patient finally dies of extreme old age unless carried off by some other disease. The lying in one position too long, together with enfeebled heart, may lead to lobular pneumonia, but even this is rare. In a case that I recently visited, the patient was a man in his eighty-ninth year. For fifty years he had shaken with this disease. During his last years the tremor became less, but rigidity finally occurred, and for several years before his death he was bed-ridden and had to be fed. His mind and memory were clear to the last.

Paralysis agitans never has been cured. Treatment, therefore, so far as we at present know, is useless. The general health and comfort of the patient should be attended to.

Athetosis.

Athetosis was first described by Hammond, in 1871. It is characterized by continuous and involuntary movements in which the fingers participate chiefly. These movements are very irregular and complicated, the fingers being all the time separated, flexed, extended, or intertwined in every conceivable manner. Sometimes the toes are affected, especially the big-toe. The muscles of the back of the neck and lower part of the face may also be involved, causing the head to be drawn back and move in various directions, distortions of the face, and sometimes interference with speech.

The disease may be symptomatic of other affections, as epilepsy, infantile hemiplegia, and the like, or it may be purely idiopathic. It is probable that it is of cerebral origin, but nothing as yet is positively known in this respect. Fowler's solution and electricity are recommended, but it is not known that they ever cured a case. Attention to the general condition of the patient is necessary.

Thomson's Disease—Myotonia.

Thomson, of Sleswick, in 1876, described this disease, which is characterized by tonic convulsions of voluntary muscles. The disease consists in hypertrophy of the affected muscles and is

of congenital origin. It has also been called congenital myotonia.

When a voluntary muscle has been at rest, and then is made to contract, it remains in that condition for a certain length of time, regardless of volition. In this way movements are often restricted, and the disease becomes a very inconvenient one. On examination the muscles are found to be hypertrophied, although the strength of the patient is not proportional. The disease lasts through life, and the patient has simply to get used to it. Mental depression from such a condition of one's muscles would naturally occur sometimes. There is no treatment. Fortunately the disease is very rare.

Tetanus—Lockjaw.

Etiology and Pathology.—Tetanus or lockjaw is a nervous disease characterized by tonic rigidity of voluntary muscles, causing trismus and opisthotonos. The muscles of the jaws are usually affected first, and then those of the face, neck, and back, the lower and, finally, the upper extremities. In severe cases all the voluntary muscles may become involved except those of the tongue, eyeballs, and hands. The disease may be of traumatic or rheumatic origin, and in the latter case it is sometimes termed idiopathic tetanus.

The exciting cause in traumatic tetanus, as its name indicates, is an injury of some sort. Punctural wounds of the extremities, especially among the tendons of the foot, are regarded as most conducive to this disease, especially among negroes. In fact, negroes appear to be more liable than others to lockjaw, from any cause. The disease follows gun-shot wounds in some cases, especially when the wound has been neglected and the patient has been disturbed by moving and jolting, as occurs among the wounded after battle. Mental depression favors its occurrence, and hence, as Loomis remarks, it is found especially among the wounded of the defeated army. The pathology of the disease is still unknown. There is no known anatomical lesion. Over-excitability of the cerebro-spinal motor centres is brought about in some unknown way. By some it is regarded as a specific infectious disease. Sometimes it appears to be endemic. Changeable weather, dampness, exposure to night air, and unfavorable hygienic conditions are said to favor its production.

Symptoms.—Traumatic tetanus rarely begins soon after reception of this injury. Several days or even weeks may intervene. In some cases the wound does not appear to heal as readily as might be expected. But this is not of much consequence, for the attack may follow regardless of the appearance of the wound or of antiseptic precautions.

Stiffness of the muscles of the lower jaw is usually the first sign. In rare cases this begins at the site of the injury. The patient finds that he cannot open the mouth to take nourishment, as usual. As already stated, this rigidity extends to the muscles of the face and neck, and thence to the back and abdomen. In a few hours many muscles become involved, but in some cases the extension of rigidity is slower, occupying several days.

The head is drawn back and the spinal column projects forward so as to produce opisthotonos. In severe cases the head and heels are not far apart and the patient remains in this arched position, leaving a space between the bed and his back. The lower limbs become rigid, but the arms usually remain unaffected. The abdomen becomes hard and retracted. Owing to rigidity of the thoracic muscles dyspnœa often becomes distressing and expectoration impossible. Choking from accumulated mucus is threatened. Pain extending along the diaphragm from before back, and drawing of the facial muscles, give the patient the expression known as the risus sardonicus. The pupils are contracted.

The pulse, at first normal, begins to increase in frequency, and it may run up to one hundred and fifty per minute, and is small or irregular. The temperature, at first normal, rises toward the end, and before death it may be 110° F. This rise is not due to fever, but probably to severe central nervous disturbance. In some cases the temperature falls below normal, and rises after death, as also happens in cholera sometimes.

The mind remains clear to the end, and there are no complications that are of uniform occurrence. In some cases paroxysms occur, in which the muscles become more and more tense. They are apparently reflex sometimes, and are brought on by the least disturbance—a draught of cold air, jarring of the bed, and the like. At others they occur spontaneously.

All the severe symptoms may be developed in a few days, and the patient may die in a week or even less. The cause of death is heart failure and asphyxia from inability to breathe, owing to fixation of the thorax.

But in many cases the attack is much milder. The muscular rigidity is confined to the region of the jaws, and does not extend to the trunk and extremities. There is no fever. The symptoms, however, may continue longer than a week.

In rheumatic tetanus the symptoms are usually of the milder form. Trismus neonatorum may be of traumatic origin connected with the cord, or rheumatic.

Tetanilla or tetany is a disease usually found among nervous women between puberty and thirty. It begins in the extremities, and the contractions are not permanent. Only in very severe

cases do the jaws become clinched, but even then the history of the cases and mode of onset are usually sufficient to enable one to recognize it.

Diagnosis.—Acute meningitis causes rigidity of the back and neck sometimes, and might possibly be mistaken for tetanus. But in the former disease there is no trismus, but there are such cerebral symptoms as headache and more or less loss of consciousness. In tetanus the reverse is the case.

Strychnine-poisoning produces intermittent tonic muscular contractions, and they are confined mostly to the extremities. The mind is perfectly clear as in tetanus, but the paroxysms are intermittent, complete relaxation occurring in the interval. The length of the paroxysms varies from half a minute to a few minutes, and the patient either dies in an hour at most, or else begins to recover.

Prognosis.—The temperature is a guide in this disease. As long as it goes no higher than 101° F., there is hope. Above this the case is a dangerous one. But from 103° F. and over, the chances of recovery are few. The time of death is usually between the seventh and eleventh day. If the patient is alive on the twelfth day, he generally recovers. As a rule, the cure is complete after twenty-five days, although some of the muscles may remain stiff after that, even. General rigidity, with frequent exacerbation, a rapid and feeble pulse, high temperature, and inability to swallow or retain food are signs of approaching death.

Treatment.—The object is to keep the patient alive for about twelve days at least, when the disease terminates of itself. There are no means of aborting it. Indian hemp, opium, and calabar bean have all been tried, and it is not proven that they influence the course of the disease. Chloroform is dangerous on account of its action on the heart. Hydrate of chloral, on the contrary, is of great service in bringing about sleep. Forty grains may be given to an adult at bed-time, and in severe cases thirty grains during the day. Besides this, the patient should have liquid food administered in some way; usually it can be given so as to enter the mouth between the teeth. Milk punch, in quantity of about four ounces, may be given every two hours. Egg may be added to it if the patient can take it. In some cases food has to be given by enema. In case the pulse becomes frequent and feeble, stimulation should be insisted on. If the pulse is strong, $\frac{1}{6}$ gr. extr. calabar bean may be given three to five times daily. It lowers temperature and diminishes muscular rigidity, but it should not be pushed to causing the patient to collapse.

Salicylic acid, the bromides, and curare have all been tried, but with little success, and tobacco is of doubtful utility.

DISEASES OF THE PERIPHERAL NERVES.

Facial Paralysis.

Facial paralysis or Bell's palsy is paralysis of the muscles of the face and is usually confined to one side. It is caused by damage to the nucleus or fibres of the portio dura of the seventh pair of nerves.

This most frequently happens by exposure to a draught of cold air while asleep. It is explained by the fact that a slight effusion takes place into the canal in the temperal bone by which

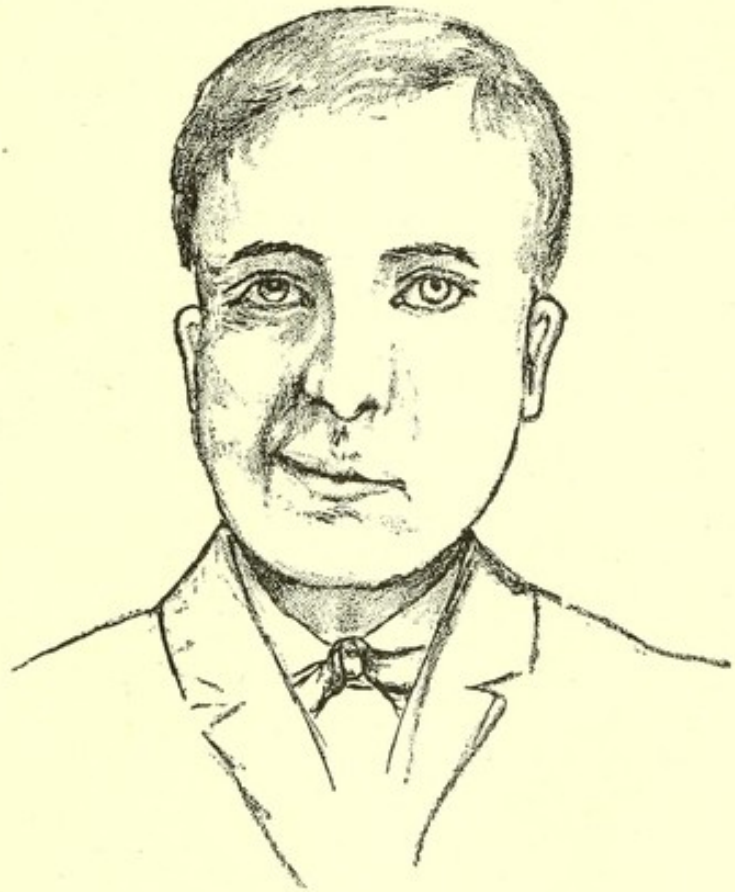


Fig. 44.—Facial Paralysis.

the nerve becomes pressed upon in its passage. From other causes, also, pressure on the canal may be produced, as from caries, hemorrhage, syphilis, and the like, and sometimes there is no known cause.

In the second place, the cause may be located outside the skull, as in case of blows or other injuries, or tumors, as a swollen parotid gland.

Third and lastly, the cause may be within the skull, as from meningitis, syphilis, tumors, fractures, softening, and the like. As already stated, double facial paralysis is rare. When it does occur the origin is apt to be central. Syphilis and diphtheria are said to be the most frequent causes.

Sympioms.—Facial paralysis usually comes on gradually. At first nothing is noticed except, perhaps, that fluid runs out of one corner of the mouth in drinking, and the eye on the same side cannot be closed. In a day or two, however, the signs are unmistakable. All the muscles on one side of the face are paralyzed in a complete unilateral case. The forehead remains smooth on that side, the eyelids open even during sleep, and the corner of the mouth dropped; while, on the unaffected side, it is drawn backward and upward. Whistling is impossible. The upper lip on the affected side cannot be raised, and the nostril cannot be dilated. The cheek is flaccid, and food accumulates on that side between the jaw and cheek. When the lesion is above the chorda tympani branch, the sense of taste at the tip of the tongue may be lost. Paralysis and obliquity of the uvula are rare, if indeed they ever occur.

In course of time, varying from a week to several months, recovery begins to take place in many cases. The ability to frown and close the eye returns first. The normal shape of the mouth, with power to move the lips, occur last.

Diagnosis.—Facial paralysis is easily distinguished from all other diseases on inspection, but it may be desirable to know where the lesion exists. Deviation of the uvula is not to be relied upon, since it is often one-sided in health. When no other paralysis exists, the probabilities are that the lesion is in the bony canal, or external. Associated with deafness, paralysis of the sixth nerve, or hemiplegia of the opposite side, the lesion is apt to be at the base of the brain or within the pons. Careful examination for ear disease and the history of syphilis or diphtheria should be made.

Prognosis.—This is usually favorable except in case of brain lesion. Recovery generally takes place in a week or month or two. In some cases, however, it is so slow that some of the muscles may become shortened and rigid, thus producing more or less permanent deformity. During the first day or two, the muscles on the affected side show increased irritability to both the faradic and galvanic currents; but subsequently the former is lost, while the latter is increased. In the nerve, irritability to both becomes lost in time. The electrical reaction of the nerve and muscles therefore, gives valuable aid in the prognosis.

Treatment.—The cause should be sought for. A blister behind the ear, and hot applications to the face, at first are indicated in most cases when due to taking cold. Afterward electricity to the affected side may be necessary. As the muscles will not generally respond to faradization, the interrupted galvanic current is indicated. This may be used every other day, each muscle being treated for a short time. In the mean while rub-

bing, kneading, and the like should be employed. Tonics containing iron and strychnine may also be given. (℞ Strychninæ sulphat., gr. ss.; tr. ferri chloridi, glycerini, āā ʒ i.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals.) Or Blaud's pill with strychnine added may be given. (℞ Ferri sulphat., potass. carb., āā ʒ i.; strychninæ sulphat., gr. i.; pulv. tragacanth., q.s. M. ft. pil. No. xxx. Sig. One ter die after meals.)

In case of syphilis, anti-syphilitic treatment is indicated, but iodide of potassium in the so-called rheumatic cases is of little or no use. Treatment of contracted muscles does little if any good, still they can be lengthened, temporarily at least, by pulling at them.

When the lesion is within the skull, the original disease, whatever it may be, has to be treated.

Neuritis and Neuralgia.

Etiology and Pathology.—Neuritis or, more properly speaking, perineuritis is inflammation of the connective-tissue sheath of the nerve. There are no recognizable changes in the nerve itself, but the connective-tissue sheath or neurilemma becomes hyperæmic or congested, and in this way causes pressure on the inclosed nerve fibres. Exposure to cold, syphilis, traumatism, and alcoholism are the chief causes. At other times the origin is unknown, and it may be associated with an eruption, as in herpes zoster and intercostal neuritis.

Symptoms.—When a motor nerve becomes involved, twitchings or even paralysis of the corresponding muscles may ensue, as in facial paralysis. When a sensory nerve is affected, neuralgia is the result. Finally, when a mixed nerve, like the sciatic, becomes the seat of the disease, both neuralgia and paresis to a variable extent may occur.

Neuralgia is pain due to disease of the sensory nerves. The pain is generally paroxysmal and confined to one side or even a certain locality. No constant anatomical lesion is found to account for neuralgia in many cases. Often, however, there is perineuritis. Sometimes the nerve trunk is hyperæmic or atrophied.

Neuralgia often occurs in families who inherit a tendency to nervous diseases. It rarely is observed before puberty. Malaria is probably one of the most frequent causes. Premature agedness is also said to conduce to the disease. Pregnancy, uterine disorders, sexual excess, and anæmia are contributing causes.

Exposure to cold and dampness, injuries, syphilis, tumors, gout, and the presence of lead and mercury in the system are also causes.

Usually there are certain tender points over the course of the

affected nerve, corresponding with its exit from a bony foramen, or else in its course through aponeuroses. Pallor, followed by blushing of the surface, and temporary loss of tactile sensibility are common. Often increased secretion of glands occurs when presided over by the affected nerve.

Neuralgia may be superficial or deep, and receives different names according to its seat.

Facial neuralgia, prosopalgia, tic douloureux, or simply tic is neuralgia, generally, of two branches of the fifth nerve (trifacial, trigeminal). Sometimes only one branch is affected, more rarely all three. It is generally unilateral and is caused sometimes by carious teeth. In middle life it is found more frequently among women than men.

When the first or ophthalmic division of the nerve is affected, there is pain over the eye and in the orbit. It is called sun pain because it often disappears toward night, when the sun goes down. It is also called brow-ache. (See Megrim.)

When the second or superior maxillary division is affected, there is great pain in the upper jaw, especially at the infra-orbital foramen. Pain in the teeth and parotid gland is sometimes present, accompanied with increased flow of saliva. The nostril also drips in some cases.

Lastly, when the third division of the nerve is affected, there is pain in the temple, the side of the tongue, and inferior dental foramen.

Clavus hystericus or hysterical nail is a name given to a form of tic where the pain is confined to one or two points, such as the supra-orbital or parietal foramen. It feels like driving a nail into the skull, and hence its name. It is usually found among young women who are anæmic.

Herpes or erysipelatous redness of the skin may attend facial neuralgia, and sometimes the eye becomes inflamed. Anæsthesia or hyperæsthesia may also result.

Occipital neuralgia or cervico-occipital neuralgia occurs when the posterior division of the second (occipital) cervical nerve is affected. The posterior divisions of any or all of the first four pairs may be involved, but that of the occipital nerve is the largest and most important for consideration. The pain, as the name indicates, is confined to the occipital region, and radiates thence in different directions, especially toward the ear and over the back of the head.

Cervico-brachial neuralgia occurs when the nerves of the brachial plexus and posterior branches of the four lower cervical nerves are affected. The pain is felt in the neck and shoulder, and extends down the arm. The ulnar nerve is especially af-

fected. Points of tenderness will be felt where the nerves become superficial and can be pressed.

Intercostal neuralgia is commonly unilateral, and, for some unknown reason, occurs on the left side more frequently than on the right. The anterior divisions of one or more dorsal nerves are affected. The general causes are the same as in neuralgia elsewhere. To those, however, may be added such special causes as cracked nipples in women, caries of vertebræ, and phthisis. Three tender points are usually described by authors as being diagnostic of this affection, namely: at the intervertebral foramen where the nerve leaves the spinal canal; secondly, about the middle of its course in the side, where the lateral branch becomes subcutaneous; and lastly, at its anterior termination near the sternum. These points undoubtedly do exist in some cases. In many, however, the tenderness is much exaggerated by the patient, who may be in a nervous, hysterical condition. It is easily distinguished from pleurodynia (myalgia, intercostal muscular rheumatism) by the fact that in the latter case the *muscle* is very tender to the touch and painful on motion. From dry pleurisy it is told by its following the course of the nerve with its three tender points, instead of being limited to a painful spot with perhaps friction sound and other signs of pleurisy. The cough, if present, is simply reflex. There is no fever.

In lumbo-abdominal neuralgia the course of the pain follows the same general direction that it does in intercostal neuralgia. Tender points are found at the spine, crest of the ilium, and in the hypogastric region, groin, and scrotum or vulva as the case may be. This is less frequent than intercostal neuralgia.

Sciatica or femoro-popliteal neuralgia occurs when the sciatic nerve is affected. Besides the causes of neuralgia in general, as already mentioned, stricture of the urethra in men should be borne in mind as a frequent special cause. One or more attacks of gonorrhœa, even without stricture, will often give rise to it. It affects both sexes and usually about middle life.

Tender points are felt in some cases, especially between the tuber ischii and trochanter major, in the popliteal space, head of the fibula, behind the malleoli, and in the bottom of the heel, the latter especially being characteristic of gonorrhœa. The pain may come on in paroxysms, or last indefinitely. Sometimes the limb becomes numb, cold, or may even be more or less paralyzed (paretic) from depressing influences communicated to the motor centres as well as the exquisite pain produced by motion. Sleep is rarely interfered with, but from continual pain and annoyance the general health begins to suffer. Muscular atrophy occurs in some cases. The disease has a decided tendency to recur.

It is distinguished from rheumatic affections of muscles as neuralgia is distinguished from myalgia elsewhere. In myalgia, pain occurs on motion, pressure, and the like. In neuralgia, the pain is spontaneous and more or less paroxysmal. In the early stage of hip-joint disease, it may be impossible to make a positive diagnosis. Soon, however, in hip-joint disease, movement of the joint gives great pain, and there are shortening and position of the limb so characteristic of hip-joint affection. In sciatica, the pain may be located in the hip for a time, but it is almost sure to be attended with tender points elsewhere, there will be little or no shortening, and the pain is more paroxysmal.

Obturator neuralgia affects the inner side of the thigh, and crural neuralgia is often associated with sciatica. The pain affects the front of the thigh, knee, inner side of the leg, and the foot. The long saphenous branch of the anterior crural nerve is affected chiefly.

Coccygodynia was first described by the late Dr. J. C. Nott, of Mobile, Ala., but who subsequently removed to this city. It occurs more frequently in women and in connection with some uterine disturbance. It follows difficult labor sometimes. The pain is severest in the sitting posture, so that jolting over pavements or a long ride by railway sometimes becomes extremely painful and disagreeable. In one supposed case that I saw with Dr. Emmet, fissure of the anus was found to exist instead of coccygodynia. Stretching the sphincter ani, under ether, promptly relieved it.

Of the deeply situated neuralgias may be mentioned cardiac, already referred to when speaking of angina pectoris; uterine and ovarian neuralgia, dependent on disorders of those organs usually; also neuralgia of the bladder, especially the neck, the urethra, testicles, rectum, kidney, liver, and stomach. Enteralgia is also a form of neuralgia, but usually dependent on lead poisoning. The absence of signs of organic lesion, as found by careful examination of the organs named, usually distinguish neuralgic affections from those dependent upon such lesions.

Diagnosis.—The diagnosis of neuralgia from myalgia has already been mentioned. That is to say, in myalgia (muscular rheumatism) the pain is increased on motion, the affected muscle is tender to the touch, and the pain does not occur spontaneously and in paroxysms. In neuralgia, the pain follows the course of the nerve or nerves affected, and there are usually certain tender points, especially where the nerve emerges from a foramen and becomes superficial in its course, or at its termination. Neuralgia is also spontaneous and is usually attended with no fever.

In the case of mixed nerves, it may lead to true paralysis, as

well as limited motion from great pain. Atrophy of muscles sometimes follows. Herpetic eruptions accompany intercostal neuralgia and sometimes tic and sciatica.

Locomotor ataxia gives rise to pains resembling intercostal neuralgia, and the like. But the tottering gait and the absence of tendon reflex, as easily determined by striking the patella tendon a sharp blow with the edge of the hand, while the leg is loosely crossed over the other, both belong to locomotor ataxia, and distinguish it at once. In organic diseases attended with pain there are other signs to be noted besides the pain. The same remarks in general apply to neuritis.

Prognosis.—In young people without any particular neurotic history, and after exposure to some evident cause, the prognosis is good. Occurring at middle life for the first time, and persistence in spite of treatment, are usually unfavorable so far as complete recovery is concerned. Neuralgia of the fifth nerve is regarded as the most persistent, though sciatica is sometimes very obstinate. Death is probably never the result of neuralgia alone, nor is life even shortened by it.

Treatment.—The cause, if found, should be removed. In tic, for instance, the teeth should be thoroughly examined by a skilful dentist, and treated if necessary. The general health should be attended to. In case of anæmia, iron in some form should be given. If food is not digested, and the patient suffers from dyspepsia, this should be treated and the bowels regulated.

In case of malaria, quinine may be given, but this need not be pushed to extremes. If five or ten grains twice daily do no good inside of a week, it might as well be stopped unless the patient is living in a malarious region, when larger doses for a longer time may be necessary, especially if periodicity in the paroxysms is noticeable.

When the patient is rheumatic, sodium salicylate is worthless. This remedy is good in rheumatic fever, but in chronic and subacute rheumatic pains it is of no value, as a rule; antipyrine is better. It may be given in ten-grain doses ter die if the heart is unaffected and there is no idiosyncrasy on the part of the patient against it. Salol in five-grain tablets or antifebrin in the same amount are also good. If the patient be gouty, potassium iodide and colchicum should be given. (℞ Pulv. potass. iodidi, ʒviij.; vini sem. colch., ℥ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals.) For sciatica, old gleet and stricture and the like should be looked for and removed if present. Ill-fitting shoes or boots should give place to others. As a remedy Dr. John T. Metcalfe, of this city, recommends aconite, colchicum, and belladonna as follows: (℞ Tr. aconit. rad., tr. colch. sem., tr. bella-

donnæ, āā ℥l.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Shake well and take a teaspoonful every three hours.)

In some of these cases of sciatica, however, a systematic course of warm baths as practised at the Arkansas or Virginia hot springs, Carlsbad, Teplitz, and such places is often beneficial and even curative, especially in the rheumatic form.

Blisters over or near the tender points are said to be sometimes useful and may be repeated, but I have never employed them. Nerve stretching has also been tried, but the results hardly encourage the operation except when everything else has failed.

Massage by a competent operator is of undoubted benefit, especially in conjunction with warm baths.

Electricity has its advocates in neuralgia, and undoubtedly is effective in some cases. The constant current may be used for about ten minutes, and sufficiently strong to cause the sensation of smarting like a mustard plaster.

In some cases of intractable ovarian neuralgia, laparatomy may be performed if all other measures fail and the general health suffers.

One remedy for neuralgia has been thus far purposely omitted, and that is opium in some form.

Regarding this potent drug, no doubt it has to be used sometimes to prevent suffering, but the physician should remember that neuralgia has been the starting-point of ruin for many unfortunate victims of the opium habit. If used at all, let enough be given at once hypodermically, by the physician himself, to be repeated only by him in person, if it be absolutely necessary. But the leaving of the syringe with the patient or friends, or the leaving of morphine powders and mixtures to be taken *ad libitum*, is bad practice, and is utterly reprehensible. The opium habit is too serious a matter to be treated lightly; and too much care and trouble cannot be taken to avoid fastening such a misfortune on any human being. Instead of opium, there are other remedies that often answer the purpose, as antipyrine, Hoffman's anodyne, lupulin, and the like. Hewitt's mixture is often sufficient to stop neuralgia and pain in the back in women. (℞ Spts. æther. comp., spts. ammoniæ aromat., tr. lavandulæ comp., āā ʒ ij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die or oftener.) The external application of aconite ointment is also good in many instances. Finally, in the majority of cases the neuralgia ends, like gonorrhœa or everything else that is earthly, as Dr. Van Buren states in his book on venereal diseases. Fortunate the woman, or even man, who has not meantime been unknowingly made the victim of the opium habit by a physician, so called.

Migraine.

Etiology and Pathology.—Migraine, megrim, sick headache, nervous headache, or hemicrania is periodic and unilateral headache, associated with nausea and vomiting. Hereditary tendency, anæmia, and general ill-health are among the predisposing causes. Those that excite an attack are such as produce exhaustion or depression, for instance prolonged hard study, grief from loss of money or friends, disappointment in love, sexual excesses and irregularities, bodily fatigue, and unfavorable hygienic conditions, including errors in diet, foul atmosphere, and the like. It is probably a disease referable to some disturbance of the sympathetic system of nerves. By some, however, it is considered as a form of neuralgia, and in some cases no doubt occipital neuralgia and neuralgia of the first division of the fifth nerve take part. Should these two neuralgias occur together, it would be impossible to distinguish them from some form of hemicrania. Older authors looked upon the disease as of hepatic or gastric origin. It occurs more frequently in women than men, and from twelve to twenty-five years of age. It ceases altogether at fifty, or in women after the change of life.

Symptoms.—Two stages are recognized in this disease: (1) disordered sensation, and (2) headache and coincident symptoms.

In the first place, a blind spot is observed in the centre of vision, which soon begins to spread with a ragged outline. Or else it may begin at the outer edge of the visual field, and gradually spread irregularly. Sometimes colors are seen interspersed. This lasts for about half an hour, and is not infrequently associated with more or less marked chilliness. Instead of this, the chilliness or a chill may only take place, or else there is a feeling simply of some impending evil, with great mental depression. In some cases these feelings last several hours. In others, again, the headache comes on without such symptoms.

The headache appears on the side opposite to the ocular disturbance. The pain is boring in character, and begins in the temple. From this point it gradually spreads. Nausea is now felt and vomiting presently follows. Relief is generally experienced as soon as the patient vomits, but the pain speedily exacerbates. The face is pale, the head hot and throbbing, and the attempt to sit up is attended with increased nausea, if not vomiting. The headache gradually wears off. The patient feels next morning as if he had been drunk the night before, and the attack is over for the present. In some cases the headache lasts only an hour or two.

Treatment.—During the interval the cause of the disease should be sought for, and removed if possible. Dyspeptic symp-

toms should be treated, the bowels regulated, and the diet should be liberal and nutritious. A moderate amount of outdoor exercise should be taken. For the anæmia, iron in some form, with or without strychnine, as the case may be, should be given. Cod-liver oil is highly recommended for its nutritive power, and, when well borne by the stomach, is of much value. The best way to give it is with diastase. A half-drachm of Forbes' diastase to each tablespoonful of oil may be given. (℞ Forbes' diastase, ℥ ss.; olei morrhuæ, ℥ viij. M. Sig. Shake and take a tablespoonful ter die.) The diastase helps powerfully in digesting the amylacea. Rest of body and mind is necessary, however, even if the patient has to undergo change of scene.

The shorter the first stage, the less will be the headache, so that, as soon as visual disturbance occurs, measures are to be taken for this end. The patient should at once lie down with the head low and on the opposite side of the affected eye. A tablespoonful of whiskey or brandy with water should be now taken at once, and a hot bottle applied to the feet if they are cold. If depression or the fidgets take the place of glimmering in the eye, then the following may be given, and repeated if necessary: ℞ Tr. hyoscyami, spts. chloroformi, āā gtt. lxxx.; tr. valerian. ammoniæ, ℥ ss.; aquæ, q.s. ad ℥ i. M. Shake. Sig. ℥ i. as required. Hewitt's mixture is also good. The patient should remain quietly lying down until all these symptoms have passed off. During the headache the room should be quiet and darkened. Sometimes a cup of coffee will relieve a slight attack, but in other and severe cases more positive remedies have to be used.

Guarana powder and sugar, each fifteen grains, may be given and repeated, and is often effective.

Nausea and vomiting may be checked by bits of ice swallowed. Bromide of ammonium (gr. xv.), tr. hyoscyami (gtt. xv.), and aromatic spirits of ammonia ℥ ss. in a little water are also recommended. Hewitt's mixture is probably as good as any. (℞ Spts. æther. comp , spts. ammoniæ aromat., tr. lavandulæ comp., āā ℥ ij.; aquæ, q.s. ad ℥ ij. M. Sig. ℥ i. as required.)

Writer's Cramp.

Writer's cramp or scrivener's palsy is a disease characterized by spasm, tremor, or paralysis of certain muscles of the hand or arm. It is probably due to peripheral lesion of the muscles themselves, or of their terminal motor nerves.

Others regard it as of centric origin, inasmuch as the muscles act in any motions except in those used in the occupation that caused the disease. Benedikt classes it among other allied conditions, which he terms generically the professional neuroses of

co-ordination. A similar affection is sometimes observed among violin players, telegraph operators, milkers, tailors, brick-layers, and the like.

The cause of the disease is over-use of certain muscles in the act of writing, for instance, where they are continuously called into harmonious action for the performance of some complicated work. Patients of a nervous disposition are more liable to the disease than others.

It comes on gradually, but once it has become well marked its progress is rapid. At first there may be spasm of one or two fingers so that the patient does not write with the same facility as usual. Soon it becomes impossible to write at all, or the hand trembles so that the writing is illegible. In other cases the fingers ache and become so tired that they are in fact paralyzed. Sensation is usually perfect, although numbness sometimes occurs. The extensors and flexors of the thumb and forefinger are most frequently affected. The disease rarely extends to the shoulder and trunk.

The diagnosis rests upon the history of the case and previous occupation of the patient. The prognosis is usually favorable if the disease is recognized early and treated promptly. The longer it has lasted, the more difficult is it to cure.

Treatment.—Rest from the usual occupation may effect a permanent cure. Attention to the general health is necessary, including the administration of iron and other tonics if indicated. In addition to this, Wolff's method of graduated exercises for the muscles, with suitable rubber bands applied to exert traction, combined with massage, will prove most effectual. Electricity and strychnine are of little use.

Paralyses of Peripheral Origin.

Paralyses are due to peripheral lesion when the affected muscles are cut off from communication with their nerve centres.

They may be caused by traumatic injury to the nerve in some part of its course, or there may be pressure upon the nerve from the presence of a tumor, thickening of the neurilemma (nerve-sheath) from perineuritis, effusion into a bony canal through which the nerve passes, or finally the patient may go to sleep lying in a position to cause pressure on the nerve. This is seen in cases of intoxication where the patient remains in one position for a length of time in a profound sleep, and lying upon one arm or the other. Some of these cases are considered when speaking of facial paralysis and paresis of the lower extremity in sciatica.

Altered electrical excitability of both nerves and muscles is also characteristic. After a week or ten days, if paralysis is com-

plete, there is loss of irritability of the affected nerve trunk to both electric currents, and diminished or lost irritability of the affected muscles to the faradic currents, while the sensitiveness of the affected muscles themselves to the galvanic or continuous current is increased. This is called the reaction of degeneration. Besides this reaction, the muscles rapidly undergo atrophy, and reflex stimulation becomes impossible. It is in these forms of paralysis that electricity is indicated both to restore innervation and prevent atrophy of muscle. If the affected muscles respond to the faradic current, this may be used from the first. In many cases, however, they do not, so that the galvanic or interrupted galvanic current has to be substituted. As improvement takes place, the faradic may then be used.

The diagnosis rests upon the electrical reaction, the localization of the paralysis, and the history of the patient.

Treatment of these cases consists in removing the cause if possible, massage of the affected muscles, and the application of electricity when necessary. When a man who has been drunk has gone to sleep on his arm and finds it more or less paralyzed next day, rubbing it with some liniment for a few days or a week is usually sufficient.

In conclusion it may be stated that this electrical reaction of degeneration is found in the paralysis of lead poisoning, also in certain forms of paraplegia and in the so-called infantile spinal paralysis, as well as the so-called spinal paralysis of adults.

DISEASES OF THE SPINAL CORD.

Congestion of the Spinal Cord.

Congestion of the spinal cord and its membranes may be active or passive. The latter is due to disease of the heart, liver, or lungs, by which the circulation is mechanically interfered with, as well as pressure from tumors and the like. Active congestion would be due to over-exertion, exposure to cold and wet, abuse of alcohol and opium, excessive venery, and finally it occurs in what is known as caisson disease.

The symptoms in passive hyperæmia of the cord, where there is general stasis of blood throughout the body, are not marked; but in active hyperæmia, especially when due to abuse of alcohol, and also in caisson disease, the symptoms are not infrequently characteristic and are similar to those in spinal meningitis, though not so severe. Neither is there any fever. Constipation, twitching of muscles, and suddenly starting and jumping while asleep are among the earlier symptoms. More or less paraplegia is often present, so that it becomes impossible for the patient to walk without reeling and staggering. Dyspnœa, the sensation

of an iron band around the waist, and priapism with seminal emissions and frequent micturition are observed in some severe cases, according as the upper, middle, or lower portion of the cord is chiefly affected. The disease rarely becomes chronic except in the passive form, but one attack renders the patient more liable to a recurrence.

Treatment.—Little treatment is needed in passive congestion of the cord, as there are usually no symptoms to indicate such a condition. But in acute congestion the treatment should be prompt. The cause, if ascertainable, should be removed if possible. The bowels should at once be unloaded with calomel and jalap āā gr. x. at bed-time. The patient should lie on the side, and ice bags should be applied to the spine. Ergot (fl. extr.) should be administered in drachm doses ter die. The diet should be light, but sustaining. Where the patient has been a hard drinker, it may be necessary to give a little stimulant, about a tablespoonful of whiskey in milk every four hours. In caisson disease, where congestion of the cord and other organs follows the sudden obstruction of air, the symptoms are often more marked. Complete paraplegia, anæsthesia of the skin of the lower half of the body, as well as bleeding from the ears, are often observed. The treatment of spinal congestion is similar to that for acute myelitis, to which the reader is referred.

Spinal anæmia might be due to obstruction to the aorta from thrombi, or pressure from tumors. Generally, however, it exists with anæmia of all the organs, including the brain. In these cases, symptoms of anæmia of the brain are much more prominent than those referable to the cord. Paraplegia in some few instances, however, has been known to follow great loss of blood. The treatment would be to remove the cause, if possible, and restore the normal circulation by nutritious diet, iron, and tonics.

Spinal Meningitis. Lepto-Meningitis.

Etiology and Pathology.—Spinal meningitis is inflammation of the pia mater of the spinal cord. The dura mater and arachnoid membrane may also be involved, as they frequently are. From the fact that the delicate membrane or pia mater is chiefly affected, the disease is also termed lepto-meningitis (*leptos*, delicate or thin). Pachymeningitis refers to inflammation of the dura mater, and arachnitis to inflammation of the arachnoid.

Spinal meningitis may be acute or chronic. It is most frequently secondary to some other disease, as is seen in cerebro-spinal and tubercular meningitis, or to extension of inflammation from caries of vertebræ, the presence of new growths, and the like.

As a primary disease, acute spinal meningitis is somewhat rare, and is observed chiefly among young adults. Blows and injuries of various kinds may give rise to it. Syphilis is also a cause. Abuse of alcohol, and excessive venery, are also said to produce it, and sometimes it appears to be of rheumatic origin, although it is disputed as to whether it is ever caused by exposure to cold and dampness.

Chronic spinal meningitis (chronic lepto-meningitis) rarely if ever occurs as a primary disease. It may follow the acute variety, but is most frequently observed as secondary to other diseases of the cord and vertebræ.

Symptoms.—Severe pain in the back, with stiffness of the vertebral column and tenderness over the latter, are among the early symptoms. Owing to irritation of the nerve roots, there are also pains in the trunk and extremities, and sometimes hyperæsthesia of the skin. The muscles often become rigid and exceedingly painful on motion. Sometimes the head is drawn back (opisthotonos). Cutaneous and tendon reflexes are rather diminished than increased, owing to the condition of the nerve roots. Paralysis rarely occurs unless the cord itself becomes involved, but incomplete paraplegia is sometimes observed. Dyspnœa may be a marked symptom if the respiratory muscles become rigid or paralyzed. Frequent micturition from irritable bladder gives place to more or less retention. In like manner defecation may be interfered with. A moderate amount of fever, preceded by a slight chill, is usually present, but the pulse is not markedly increased in frequency. Nausea and vomiting are commonly observed.

The symptoms vary somewhat according to the part of the cord most affected. Thus, opisthotonos, dyspnœa, palpitation, and pains in the upper extremities would point to meningitis in the upper and middle portions of the cord, while retention of urine and incomplete paraplegia, for instance, would indicate that the lower portion was affected.

The symptoms in chronic spinal meningitis are similar to those of the acute form, but are less marked and are of longer duration.

Diagnosis.—Acute lepto-meningitis might be mistaken for rheumatism, but the tenderness and rigidity of the spine in the former disease, together with cutaneous hyperæsthesia, and even paresis in some cases, would lead to a correct diagnosis.

In spinal irritation there is the history of a nervous and hysterical patient, the pain and tenderness are usually confined to one spot, and the symptoms rapidly change from one point to another.

Chronic lepto-meningitis may be mistaken for chronic mye-

litis. But the latter disease is accompanied with complete paralysis and muscular atrophy, the pain over the spine is not so marked, and is increased by pressure rather than motion.

Prognosis.—This is usually unfavorable. Death generally occurs in a week or ten days, but frequently in much less time. Some mild circumscribed cases recover, but in diffuse purulent inflammation of the spinal meninges recovery hardly ever takes place. In acute cases the patient often dies from paralysis of the muscles of respiration. In chronic cases, the course is protracted, and the patient dies of exhaustion or some intercurrent disease.

Treatment.—Since the patient usually dies, little need be said under this head. Pain should be relieved by hypodermic injections of morphine. If the patient be syphilitic, iodide of potassium and mercury are indicated. Warm baths (90° F.) are highly recommended as affording relief. The bladder should be emptied by means of the catheter when necessary. The diet should be nutritious and easily digested. Stimulants are given if the patient shows signs of sinking. In the chronic variety counter-irritation by means of blisters is indicated, besides the internal use of mercury and iodide of potassium. Bathing and the galvanic current are also recommended. The latter would tend to prevent atrophy of muscles if nothing else.

Myelitis.

Etiology and Pathology.—Myelitis is diffuse inflammation of the substance of the spinal cord. It may be ascending, descending, or transverse according to the direction taken. It is doubtful if the gray matter or the white matter alone could be involved in this disease. When the gray matter is chiefly involved, however, it is called central myelitis, and cortical when the white matter and meninges are mainly affected. When the anterior horns of the gray matter are the principal seat of the disease, as occurs in children, it is termed anterior polio-myelitis (*polios*, gray). But inasmuch as myelitis is a diffuse inflammation of the substance of the cord, the symptoms resulting are necessarily multiform. The disease attacks children and young adults most frequently. Exposure to cold and wet, bodily fatigue, as occur especially among soldiers, syphilis, and sexual excess are among the chief causes. It may be also due to traumatism and extension of inflammation, as, for instance, in spinal meningitis. Extension of inflammation of nerves to the cord is very rare, if indeed it ever occurs.

The disease is described by authors as acute and chronic. This has reference only to the mode of onset, as the course in any case is almost invariably chronic, lasting a year or more.

Symptoms.—These depend in great part upon the particular locality of the disease, whether it be in the cervical, dorsal, or lumbar regions, or in all of them. They also differ accordingly as certain tracts of the cord are more affected than others. In general, however, motor paralysis is one of the first, as well as most characteristic symptoms. In so-called acute myelitis, there may be a slight chill, followed by some fever and headache. But generally even these are wanting. The patient usually first notices that one or both legs feel weak. Soon complete paraplegia occurs. Or if the disease is situated in the cervical region, the arms also are affected. Spontaneous twitchings, probably reflex in character, are often observed in the affected limbs. As the disease progresses, the posterior columns and particularly the posterior horns of the gray matter of the cord become involved, and there are noticed disturbances of sensibility, such as formications in the affected limbs, numbness, and finally complete anæsthesia. Cutaneous reflexes are diminished or lost to about the same degree in lumbar myelitis, but are retained or even increased in cervical myelitis. The pupils are sometimes irregular in the latter case. Tendon reflexes in the lower extremities are diminished or lost in lumbar myelitis, especially when the posterior columns and gray matter are diseased, but are increased in dorsal myelitis, in which case cutaneous reflexes are also retained. Difficult micturition and finally complete retention of urine from paralysis of the bladder is a common symptom. Cystitis from retained and decomposing urine follows, as well as pyelitis and pyelo-nephritis. Constipation is noticeable at first usually, but subsequently there is incontinence of fæces from paralysis of the sphincter ani. In course of time impotence results.

The skin over the paralyzed muscles is mottled, dry, and hard, and the affected parts become cold and œdematous. Finally, bed-sores over the glutæi or in the sacral region are apt to occur, unless the patient's position is frequently shifted and the parts are kept clean and relieved from continuous pressure. The affected muscles undergo slight atrophy from want of use in some cases. In these the reaction of degeneration on application of electricity is absent. In other cases, where the motor cells of the anterior horns of the gray matter of the cord are diseased, the affected muscles do give the reaction of degeneration. In some cases of cervical myelitis the muscles become contracted in the legs and even arms sometimes, giving rise to the so-called spastic paralysis.

Diagnosis.—From leptomeningitis it is told by the fact that in myelitis there is pain on pressure at some particular portion of the cord corresponding with the seat of the disease, and not on motion. In meningitis, also, there is tenderness all along the

spine, and the muscles of the back are rigid; in myelitis they are flaccid. Paralysis is complete and is a marked sign of myelitis; whereas in meningitis, paresis (incomplete paralysis) is most common. In meningitis the cutaneous and tendon reflexes are not so frequently diminished or completely lost as in myelitis.

Compression of the cord by tumors, displacement of vertebræ, and the like, should be excluded by careful examination of the spine and history of the case. Moreover, in myelitis the symptoms may be more complicated than in pressure from some cause, which may only involve certain fibres.

Prognosis.—The disease is chronic in its course, however it may commence. It lasts a year or more and often with exacerbations and remissions. Recovery is rare, if indeed it ever takes place. The cause of death is exhaustion or some intercurrent disease.

Treatment.—At first electricity and strychnine are contra-indicated. But the patient should be kept as quiet as possible, and ergot should be given—teaspoonful of the fluid extract ter die. If there is a syphilitic history, mercury and iodide of potassium are indicated. (℞ Pulv. potass. iodidi, ʒviij.; hydrarg. bichloridi, gr. i.; aquæ, q.s. ad fl. ℥ij. M. Sig. ʒi. ter die after meals.) The diet should be nourishing and easily digested. The bowels should be kept regular by mild cathartics if necessary, and the bladder must be emptied by means of a catheter. This instrument should be gently used, however, and kept clean, otherwise cystitis, pyelitis, and the like are almost certain to result. In course of time the bladder should be washed out occasionally by means of a double flexible catheter. About a teaspoonful of borax dissolved in a quart of tepid water is usually sufficient. By this means the bladder is kept clean, and cystitis, as well as formation of stone, are often prevented.

Electricity is serviceable later on in the disease. The galvanic (constant) current is the best. Besides applying this over the vertebral column, the affected muscles may also be treated so as to prevent atrophy.

Cold-water baths are highly recommended. In the chronic stage, blisters may be applied over the tender spot, as determined by pressure over the spine. Bed-sores should be prevented by shifting the patient's position, or the use of the air cushion. The parts meantime should be kept clean by means of a wash composed of water and alcohol. A few grains of hydrarg. bichlorid. added to this wash help to toughen the skin. (℞ Hydrarg. bichlorid., gr. iv.; alcohol., ℥ij.; aquæ, q.s. ad fl. ℥viij. M. ft. lotio. Sig. Wash the parts night and morning.) Belladonna is highly recommended, but ergot is better. The two can be given together. (℞ Tr. belladonnæ, ʒi.; fl. extr. ergot., q.s. ad fl. ℥ij.

M. Sig. Shake and take ʒ i. ter die.) In spite of treatment, however, if the case be one of true diffuse myelitis, and not pressure paralysis, recovery is the very rare exception, the chief end gained being the comfort of the patient as far as practicable.

Anterior Poliomyelitis.

Anterior poliomyelitis, as its name signifies, is inflammation of the anterior horns of the gray matter of the cord (*polios*, gray; *myelos*, marrow). It may be acute or chronic, but is much more frequently acute.

This disease usually attacks children between one and four years of age, and hence is often called infantile spinal paralysis, or the spinal paralysis of children. In some cases also it attacks grown people—acute spinal paralysis of adults.

The disease generally attacks the anterior gray horn of one side, though both may be involved, as well as more or less white matter adjacent.

The etiology is obscure. It attacks children who were previously in robust health and whose parents are not in any way affected with nervous diseases. By some it is regarded as an infectious disease of which the spinal affection is only a manifestation.

Symptoms.—The disease comes on suddenly. Often there are convulsions or spasms that may last a day or two or more. Instead of convulsions, a chill may occur. Fever sets in, and the temperature runs up to 103°–105° F. In some cases the child becomes stupid, and remains in a somnolent condition for several days or a week. In others these initial symptoms are wanting. But in either event, paralysis is observed to occur in one or both legs or arms and to spread very rapidly. In a short time, however, this symptom disappears from many of the affected parts, and remains permanently only in some locality, a leg or an arm, for instance. In rare cases the paralysis entirely disappears, a very fortunate circumstance. But generally the peroneal muscles of a leg, or the deltoid of an arm, or perhaps both, remain paralyzed. With those exceptions the child's general health and condition are normal.

Reaction of degeneration for the affected muscles and nerves is marked, and the former undergo rapid and marked atrophy.

At first the paralyzed muscles are perfectly flaccid; but later on, contractures may take place. Both cutaneous and tendon reflexes are lost in the paralyzed limbs, and the skin over them becomes cool and cyanotic, without, however, loss of sensation.

In course of time, certain deformities may result, such as talipes or various forms of club-foot.

Micturition and defecation are not interfered with.

Diagnosis.—The sudden onset of the disease, loss of reflexes and retention of sensation in the paralyzed limbs, the reaction of degeneration and flaccid paralysis with atrophy of the affected muscles, without vesical disturbance, distinguish it from all other spinal affections.

Prognosis.—The disease rarely destroys life, but only in a few cases is complete recovery to be expected. Usually the muscles that are not restored within a few months remain paralyzed for life. But in many cases other muscles act vicariously, so that the patient becomes able to attend to the duties of life.

Treatment.—Absolute rest is necessary. Ice applied to the head is grateful to the patient, and helps to lower temperature if the fever runs high. At the same time the bowels may be opened by giving a dose of calomel. (℞ Hydrarg. chlor. mitis, gr. iij.; sodii bicarb., gr. v. M. ft. pulv. Sig. Take at bed time.) But as soon as paralysis appears or a diagnosis can be made, ergot in full doses should be given, half-drachm to a drachm of the fluid extract ter die, to which may be added belladonna. (℞ Tr. belladonnæ, ʒ i.; fl. extr. ergot., q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) After the acute symptoms have passed, attention should be paid to the general health by giving iron in case of anæmia, for instance, and placing the patient on a nutritious diet. Electricity should also then be used. The galvanic current is best, and should be applied to the motor points (or bellies) of the affected muscles every other day for about five minutes each. The negative pole is placed over the vertebræ and the positive pole over the affected muscle. The galvanic current may be interrupted, but the faradic current will be of no use, at first at least, simply because the muscles in this form of paralysis do not respond to it. When the paralysis is in the arm, the negative pole should be placed over the middle cervical vertebra, but when the leg is affected it should be placed over the lumbar vertebræ.

Strychnine does but little good, though it may be added to the iron. (℞ Strychninæ sulphat., gr. ss.; tr. ferri chloridi, glycerini, āā ʒ iss.; aquæ, q.s. ad fl. ℥ v. M. Sig. ʒ i. ter die.) Iodide of potassium does but little good, but in case of syphilitic history it may be given with mercury. (℞ Pulv. potassii iodidi, ℈ iv.; hydrarg. bichloridi, gr. ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die after meals.) The dose may gradually be increased to double that amount if it is well borne by the stomach. The syrup of the iodide of iron with cod-liver oil acts well in some cases. Massage of the affected muscles, and passive motion, should contractures occur, are both indicated. Salt-water baths are also advocated, but they are only a part of the general management of the case.

Spina Bifida.

Spina bifida, hydrorrhachis, or meningocele is a congenital fissure on the posterior aspect of the spinal column. It is usually situated in the lumbar or sacral region, and is due to arrest of development. The tumor caused by the protrusion of the dura mater and arachnoid membranes usually takes place after birth. In some cases, however, it may occur before birth and even be large enough to interfere with delivery. The tendency of the tumor is to enlarge. The only treatment is surgical. In some cases recovery has been complete, but there is always the danger of inflammation, so that spina bifida is to be regarded on the whole as a highly unfavorable condition.

Tumors of the spinal cord are not common. They may be in the substance of the cord itself or in the meninges. Glioma or connective-tissue tumor, originating in the neuroglia of the cord, and situated in the cervical or upper part of the dorsal region, is the most common. It is often preceded by injury.

Besides glioma, there are carcinoma, which usually encroaches on the cord from without; syphiloma, tubercle, myxoma, fibroma, and lipoma.

The early symptoms vary according as the meninges or the cord is chiefly involved. In the first case there are shooting pains, rigidity of the vertebral column, and pain on motion. As the cord is involved, so do we have more or less paralysis of motion and sensation in the lower extremities, according to circumstances.

From the fact that the tumor may involve the cord to any extent, it is evident that a great variety of symptoms must be described to embrace all degrees of the affection that might occur.

The locality of the tumor is determined in the same way as the seat of inflammation in myelitis. Indeed, it is sometimes difficult if not impossible to say whether or not the case is one of tumor or myelitis. In some instances, however, a tumor affects only one side of the cord, but myelitis generally involves both sides more or less. The symptoms in case of tumor also are subject to more sudden variations than in myelitis. The two diseases are, however, often associated; that is to say, the presence of tumor often excites myelitis.

The prognosis is usually hopeless and the treatment purely symptomatic. Besides supporting the patient, however, bedsores should be guarded against. If the case have a syphilitic history, iodide of potassium and mercury should be tried as already mentioned. The patient dies finally of exhaustion or some intercurrent disease.

Spinal Apoplexy.

Apoplexy of the spinal cord is hemorrhage into the meninges or substance of the cord or both. It is as rare as cerebral apoplexy is common. It is found usually in men from puberty to forty, but more particularly in young adults. It may follow injuries of course, or violent exertion, or any cause likely to produce active hyperæmia of the cord. It is observed to a slight degree in scurvy, and may be secondary to a certain extent in many diseases of the cord. But in other cases spinal apoplexy with speedy death may occur in a previously healthy young man of irreproachable habits. The hemorrhage may be confined to a single spot or it may be profuse and extend along the canal, giving rise to increasing signs of pressure on the cord. The hemorrhage may occur in the cervical, dorsal, or lumbar region, and the symptoms will be characteristic for those regions, as stated when speaking of myelitis.

The onset is sudden. In a case known to me, the patient, a young man, was at dinner when he suddenly found his arms paralyzed. Distressing dyspnœa and palpitation soon followed. Next day there was a general paralysis and the patient died from heart failure and asphyxia, his mind remaining clear until very nearly the end.

Even if death does not ensue immediately, myelitis is apt to follow, so that the prognosis may be regarded as very unfavorable.

If the apoplexy occur in the meninges of the cord instead of its substance, the so-called root symptoms are prominent, or symptoms of irritation, such as pain, hyperæsthesia, stiffness, the pain and tenderness increased on motion and pressure. But motor paralysis is incomplete or rapidly disappears, and there is absence of paralysis of sensation. When there is apoplexy of the cord, there is absolute paralysis of motion and sensation of parts, according to the portions affected. The treatment is little more than symptomatic. The patient should be kept at perfect rest, if possible, in the most comfortable position, and morphine and ergotin may be given to arrest hemorrhage. From five to ten minims of Magendie's solution of morphine may be injected hypodermically and from one to three grains of ergotin may be given in the same way. The ice bag may also be applied over the part where the hemorrhage is supposed to have occurred. If death does not take place, the subsequent treatment is that for more or less paralysis, such as draining off the urine, guarding against bed-sores, and otherwise rendering the patient as comfortable as possible.

Acute Ascending Paralysis.

Acute ascending paralysis is a disease characterized by paralysis beginning in the lower extremities and rapidly extending upward, the functions of the bladder and rectum remaining normal.

No lesion of the spinal cord has been yet found, and by many it is supposed to be of infectious origin, the toxic agent being unknown.

It attacks those of previously robust condition and at youth or middle life. Men are more frequently affected than women.

The disease is ushered in by certain prodromata, as headache, fever, and loss of appetite. There are also pain in back and limbs, as in many other infectious diseases. In a few days or a week or two, paresis of one leg and then the other is noticed, which rapidly increases until paraplegia is complete. Soon the upper extremities become affected in the same way. The cutaneous and tendon reflexes are usually diminished or lost, but degenerative reaction varies. Owing to vaso-motor disturbance, slight œdema of the lower extremities occurs, and there is often profuse sweating. The bladder and rectum generally remain intact. As the disease progresses, dyspnœa becomes marked, and swallowing and speech are interfered with, showing that more or less bulbar paralysis is present. The spleen is generally enlarged.

The disease is usually fatal in a few days or two or three weeks. In some cases, however, recovery is complete. The mode of onset and its rapid progress are generally sufficient to enable one to establish a diagnosis. The treatment consists chiefly in supporting the patient with nutritious diet until the poison is eliminated from the system. For this purpose milk punch, peptonized or not according to the condition of the patient's power of digestion, is the best diet. Ergot should also be given to lessen the chances of congestion of the cord. It may be administered hypodermically in doses of one to three grains ter die, or better perhaps by mouth in drachm doses of the fluid extract. Dry cups along the spine are also recommended. Later on, if the patient survives, the galvanic current should be applied as directed elsewhere. During convalescence improvement would be hastened by massage and baths.

Amyotrophic Lateral Sclerosis. Spastic Paralysis.

Amyotrophic lateral sclerosis is degenerative atrophy of the lateral columns of the spinal cord, with coincident disease of the motor cells in the anterior horns of the gray matter of the cord as well as of the nerve nuclei in the medulla oblongata of the hypoglossal, spinal accessory, and facial nerves. From the fact that the disease is attended with atrophy of muscles, it is termed

amyotrophic (myo-atrophic); and from the fact that the muscles become also contracted and rigid, it is also called spastic paralysis, although this name applies more properly to primary lateral sclerosis. It is purely a motor affection. The disease affects men more frequently than women, and those at puberty or in middle life. The etiology is obscure, but it is said to follow over-exertion in some cases. The disease begins as a rule in the cervical region,

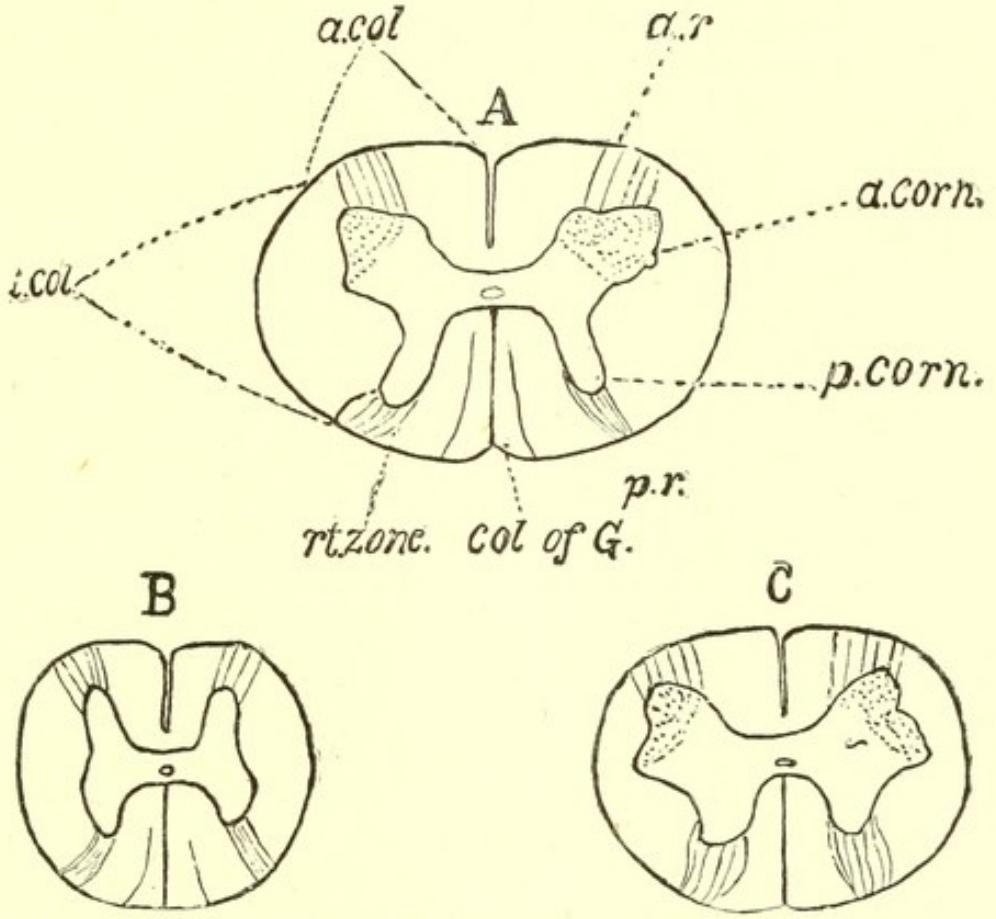


FIG. 45.—TRANSVERSE SECTIONS OF NORMAL SPINAL CORD, MAGNIFIED. A, Through middle of cervical swelling; *a. col.*, anterior column; *l. col.*, lateral column; *rt. zone*, root zone; *col. of G.*, column of Goll; *a. r.*, anterior roots; *p. r.*, posterior roots; *a. corn.*, anterior cornu; *p. corn.*, posterior cornu. B, section through middle dorsal region. C, section through middle of lumbar region. (Quain's "Dict. of Med.")

but usually extends downward into the dorsal and lumbar regions, as well as upward into the medulla.

Symptoms.—At first there is paresis of one arm. The limb becomes weak and easily fatigued, and in a month or so the other arm becomes affected in the same way. In the course of several months or a year the lower extremities are involved. The patient now walks with difficulty.

Atrophy of muscles soon appears. The extensors are involved first, especially of the thenar eminences as in lead-poisoning. Subsequently the triceps and deltoid are similarly affected. As this is a motor disease, the sensation of the skin remains intact,

and the tendon reflexes are increased. In the lower extremities, atrophy is not so marked as in the upper, but the so-called spastic symptoms are more prominent. The legs become stiff, and thus walking is interfered with. There is no difficulty of micturition or defecation. Bulbar symptoms appear later on in the disease, and both speech and swallowing are impaired. The tongue undergoes slight atrophy. Finally, dyspnœa becomes marked, so that the patient dies, in the course of two or three years, of asphyxia or some intercurrent disease.

Primary lateral sclerosis, spasmodic tabes dorsalis, or spastic spinal paralysis is degenerative atrophy of the lateral columns of the cord.

It is purely a motor disease, but differs from amyotrophic lateral sclerosis by the fact that there is no disease of the motor cells in the anterior horns of the gray matter of the cord, nor are the nerve nuclei in the medulla affected.

The etiology is obscure. The disease affects males chiefly and between twenty and fifty years of age. Exposure to wet and cold, as among soldiers, as well as injuries, are said to be causes.

Symptoms.—One leg or the other is first noticed to be weak. In the course of several months the other leg also becomes paretic. In addition to this there is marked increase of tendon reflexes, both at the knee and ankle. The muscles of the legs become firm and rigid. The limbs are extended, and so firmly set are the muscles that it is impossible almost to bend the knee except by very gradual and continuous effort.

The feet are in a condition of plantar flexion. Owing to this stiffness of the legs and feet, the patient walks in a characteristic manner. He shuffles along with very short steps, being unable to bend the knees, and the toes strike the ground first. This walking on the toes with stiff knees and short step is known as the *spinal spastic step*. Electric reaction of the nerves is diminished for both currents, while that of the muscles remains unchanged.

The bladder and rectum remain unaffected, and sensation persists unimpaired. There is no marked atrophy of muscles nor trophic disturbance of any kind.

As the disease progresses, the muscles of the trunk and upper extremities become affected, and paresis increases to paralysis. The mind remains clear, and sexual power is undisturbed for a long time. Gradually, however, other portions of the cord are involved, and then additional symptoms appear. The disease is slow in its course, lasting several years.

Diagnosis.—Progressive muscular atrophy is distinguished from either of the two foregoing diseases by the absence of spastic symptoms, as well as diminution or absence of tendon reflexes,

since the disease is limited to the motor cells of the anterior horns of the gray matter of the cord. Amyotrophic lateral sclerosis is distinguished from true spastic paralysis by the facts that in the latter disease there is no marked atrophy of muscles, and bulbar symptoms are absent.

Prognosis.—In amyotrophic paralysis, death usually results. The disease is slow in its course. The same may be said of spastic paralysis, but the prognosis is thought to be rather more favorable than in the first-mentioned disease. The course of spastic paralysis is slower, if anything, than that of amyotrophic lateral sclerosis.

Treatment.—Little or no benefit can be expected from treatment of these diseases. The best that can be done is to sustain life as long as possible by hygienic and dietary measures. Ergot, cod-liver oil, and the galvanic current may all be tried, if for no other reason than to give the patient the idea that he has friends left on earth and that something is being done for him.

Progressive Muscular Atrophy.—Pseudo-hypertrophic Paralysis.

Progressive muscular atrophy is a disease characterized by progressive atrophy of voluntary muscles, due to disease of the motor cells in the anterior horns of the gray matter of the cord.

The etiology is obscure, but the disease is said to be due to excessive muscular exertion, as observed among laborers. Injuries, exposure to wet and cold, and syphilis are among the causes. Hereditary influence is also considered to be a factor in the etiology. It affects men more frequently than women, and chiefly those of middle life.

Symptoms.—It usually begins in the upper extremities and first in the right arm, since that is the one generally most used. The muscles about the hand suffer first, causing flattening of the ball of the thumb and peculiar claw-shape to the fingers. Gradually the muscles of the forearm, arm, and shoulder become involved. The extensors suffer first, being the weakest. Afterward the flexors also atrophy. The deltoid and biceps are affected most. Then the muscles of the trunk, the trapezius and pectoral muscles being the first to suffer.

As the muscles of the trunk become involved, dyspnœa is more or less marked; and should the diaphragm be affected, it then becomes a very distressing symptom.

Tendon reflexes are entirely absent. This is first noticed in the upper extremities, as the disease usually begins in the cervical region, but as it progresses downward the patellar tendon reflex becomes more and more diminished. The reaction of degenera-

tion at first varies, but becomes more and more marked as the muscles become atrophied. Finally, they do not respond to the faradic current at all.

Fibrillary muscular twitchings are sometimes noticed, and from vaso-motor disturbances the skin over the affected muscles becomes cool and cyanotic. The sphincters of the bladder and rectum are undisturbed, and the cutaneous sensibility remains unimpaired.

As the disease progresses, bulbar symptoms finally appear, such as difficulty of speech and swallowing. After years of progressive atrophy, the patient finally dies asphyxiated, owing to paralysis of muscles of respiration, or else of exhaustion or some intercurrent disease.

Instead of commencing in the upper extremities, it sometimes begins in the muscles of the trunk and then extends to those of the extremities; but the general progress and symptoms are the same.

Diagnosis.—From amyotrophic lateral sclerosis it is at once distinguished by the absence, in progressive muscular atrophy, of spastic symptoms, as well as tendon reflexes. From other forms of paralysis, as in myelitis, tumors, and the like, it is told by the mode of commencement and progress, individual muscles becoming affected one by one, and the absence of interference with the sphincters. Cutaneous sensibility also remains unimpaired in progressive muscular atrophy.

Prognosis.—This is always unfavorable. It may last ten or fifteen years, but the end surely comes as already mentioned.

Treatment.—The galvanic current applied at different times, and kept up for years, as well as massage of the muscles, together with proper food, may defer the fatal termination for a time. Symptoms are to be treated as they occur. Beyond this absolutely nothing can be done.

Primary muscular atrophy is sometimes observed in children. In these cases the muscles undergo atrophy independently of spinal affection. The disease appears to be hereditary and runs in families. In some cases the muscles appear to be larger than normal on account of increase of fat; hence the term pseudo-hypertrophy. In other cases the atrophy is apparent, as was first remarked by Erb.

The disease is progressive in character, the patient finally dying asphyxiated from paralysis of the respiratory muscles, or some intercurrent disease. Electrical excitability is diminished in the affected muscles, but the reaction of degeneration is never complete. Micturition, defecation, and sensibility are not interfered with, and bulbar symptoms do not occur. There is no special treatment.

Cerebro-Spinal Disseminated Nodular Sclerosis.

This disease, as its name implies, consists in the presence of sclerotic nodules in the brain and spinal cord.

Charcot distinguishes three varieties according as the brain, cord, or both are chiefly affected. For that reason the symptoms of the disease greatly vary in different cases. The nodules in the cord are chiefly located in the white substance. In the brain they are to be found principally in the corpus callosum, walls of the lateral ventricles, and pons.

The etiology is obscure, although exposure to cold and wet, injuries, and syphilis are mentioned by authors in this connection. Hereditary influence is traceable in some cases. It attacks men and women alike, and usually between twenty and thirty-five.

Symptoms.—Tremor on motion, or intention tremor as it is called, especially of the upper extremities, is one of the earliest symptoms. The patient reaches out the hand for something, and the movement is accompanied by jerky tremor. At rest there is no tremor whatever. Mark the difference, therefore, between this and paralysis agitans. Subsequently the head and trunk become involved in this intention tremor.

Nystagmus, or oscillation of the eyeballs, also is present. It is usually a lateral nystagmus, and occurs when the patient intends to look at something.

Owing to the presence of nodules in the pons and medulla, there is motor disturbance of the tongue and muscles of the larynx, with corresponding interference with speech. Tendon reflexes become increased, and first paresis and then paralysis of the affected limbs gradually comes on. The paralyzed muscles, however, are rigid, giving rise to spastic symptoms, and as the lower limbs become involved the patient acquires the spastic-paretic gait.

Cutaneous sensibility is usually unimpaired and the sphincters of the bladder and rectum are not interfered with. Sexual power generally remains normal, for a long time at least, and there is no muscular atrophy or other trophic disturbance. The electrical reaction of degeneration is absent.

Toward the end of the disease and as the brain becomes more and more involved, the mind is accordingly affected. Imbecility gradually increases. Vertigo and headache are common symptoms. Epileptic convulsions sometimes occur, but more frequently there is sudden hemiplegia with loss of consciousness. The temperature suddenly rises to 103° F. or even 105° F. After a few days consciousness returns and the hemiplegia disappears. The cause of these attacks is wholly unknown at present.

As the disease progresses, the patient becomes bedridden. In this condition death finally occurs from exhaustion, apoplexy, or some intercurrent affection.

Diagnosis.—From paralysis agitans the disease is readily distinguished by the fact that in nodular sclerosis the tremor is the intention tremor; that is, it only occurs on voluntary motion and ceases when the part is at rest. In paralysis agitans, as is well known, the tremor is constant except when the patient sleeps. In nodular sclerosis, also, the head shakes, which is not usually the case in paralysis agitans. The latter disease also occurs as a rule at forty or afterward, but nodular sclerosis generally occurs before thirty-five, as we have seen.

From locomotor ataxia the disease is also readily distinguished, unless the posterior columns of the cord are involved. In a typical case of cerebro-spinal nodular sclerosis there are the intention tremor, spastic paralysis, interference with speech, and, later on, cerebral symptoms as described, all of which are wanting in locomotor ataxia. The spastic-paretic gait, the patient putting down the toes first, is altogether different from that in locomotor ataxia, in which the heels are put down first.

From cerebral apoplexy the hemiplegia is told by the rise in temperature and speedy disappearance of the hemiplegia.

Prognosis.—This is always unfavorable. No case of recovery has ever been recorded. The disease lasts from five to ten years.

Treatment.—So far as known at present, little can be done beyond sustaining life as long as possible by means of proper diet and hygiene. Bed-sores should be prevented by means well known. The galvanic current may also be used. Nitrate of silver, one-sixth of a grain ter die, is recommended. Morphine must be resorted to in order to relieve pain sometimes.

Locomotor Ataxia.

Etiology and Pathology.—Locomotor ataxia or tabes dorsalis is a progressive disease of the posterior columns of the spinal cord.

Besides degenerative atrophy of that part of the cord, there is increase in the connective tissue. In the cervical region the columns of Goll are chiefly affected. In the dorsal region the posterior columns are much degenerated, and in the lumbar region the posterior and middle portions of the posterior columns are chiefly involved.

Hereditary predisposition, abuse of alcohol and tobacco, sexual excess, exposure to wet and cold, excessive mental fatigue, injuries, and the like have all been brought forward as causes of this disease, but in the majority of cases no such etiological factors

can be found. It affects men much more frequently than women, and usually from thirty to fifty years of age. When women are affected with the disease, there is not infrequently a syphilitic history. In fact, many eminent physicians regard syphilis as an undoubted cause of this disease. It appears that a syphilitic influence occurs in about ninety per cent of all cases. In many, however, none can be ascertained. It is quite possible that in some cases syphilis might be overlooked, especially as it appears to occur most frequently where syphilis has been of a mild type. The time intervening between the ataxia and the syphilitic affections varies from a few to twenty years.

Symptoms.—Locomotor ataxia may be divided into three stages: (1) sensory irritation, (2) ataxia, and (3) paralysis. The disease begins insidiously as a rule, with shooting pains in the lower

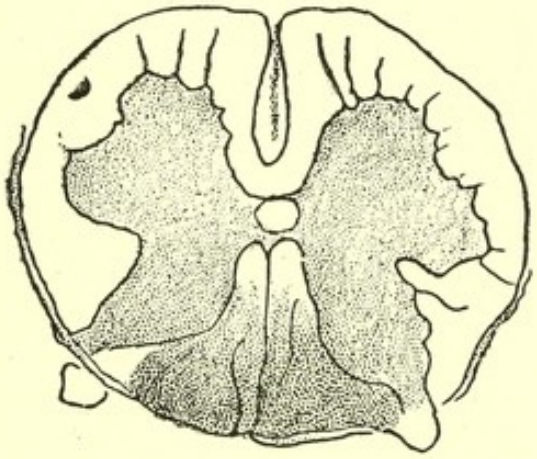


FIG. 46.—SECTION OF THE SPINAL CORD, SHOWING DISEASE OF THE POSTERIOR COLUMNS IN LOCOMOTOR ATAXIA.

extremities, calves of the legs, for instance. Neuralgic pains in the head, the iron-band sensation around the waist, and tingling in the tips of the fingers are also noticed. Nausea and vomiting sometimes occur along with disturbances of micturition, nocturnal seminal emissions, and the like. Sexual desire is often increased, and sometimes there is troublesome priapism. Again, it may be entirely lost.

Besides the lancinating pains, numbness, colics, and the like, the patient feels in walking as if he were treading on felt or cushions.

The patellar tendon reflex is lost early in the disease, and on examination the pupil is often found to be immovable and does not contract on exposure to light. The lancinating pains, absence of tendon reflex, and immobility of the pupil, if they exist together, are said to be diagnostic signs.

Disturbance of vision, even in the early stage, may be due to paralysis of ocular muscles or atrophy of the optic nerve, giving

rise to diplopia or even blindness. The first stage lasts for a variable time, from a few months to many years.

The ataxic or second stage is characterized by the peculiar gait due to lack of co-ordination power. It gradually increases until the patient is unable to walk. The cause of ataxia is a subject of dispute. By some it is thought to be due to spinal reflex disturbance. By others it is considered to be due to sensory disturbance, and the ataxia is really a sensory one. According to others again, it is due to disease of the fibres of co-ordination which are supposed to be in the part affected, but the exact location of these fibres in the posterior columns is also disputed. Meantime the upper extremities become affected. The feeling of walking on felt or cushions increases, so that the patient has to look when he puts his foot to the ground. As Romberg first noticed, the patient sways to and fro when the eyes are closed. Upon attempting to turn suddenly, he has to catch at some object to prevent falling. The heels are put to the ground first, and then the toes, giving rise to the so-called double beat of ataxia. The patient's feet are thrown about, so to speak, and he has to walk by sight and with the aid of a cane. Cystitis gradually develops.

Up to this time the muscles are not paralyzed. On the contrary, upon attempting to bend the knee, great opposition may be experienced if the patient chooses to resist. Otherwise the muscles are perfectly flaccid, thus differing absolutely from spastic paralysis. The electric reaction remains normal, as might be expected, unless the disease is complicated. Duchenne was the first to observe this difference between ataxia and paralysis.

The third and last stage begins with paralysis, and it is therefore called the paralytic stage. The patient does not, however, always live long enough to reach it. Cystitis and pyelitis develop, the sufferer becomes helpless and bedridden, bed-sores are formed, and death from exhaustion follows.

Spasmodic cough, diarrhœa or constipation, vertigo, frequent pulse, deafness, ulcerations of the heels, hemiplegia, and dementia are among the symptoms that may occur in the course of this disease.

Diagnosis.—The lancinating pains, loss of patellar tendon reflex on both sides, and non-reaction of the pupils to light render the diagnosis in the first stage certain. Later on, the ataxic gait is characteristic. It can be mistaken for no form of paralysis until late in the disease after the third stage has occurred, if, indeed, the patient lives that long. In such a case, the previous history would enable one to decide. In alcoholic and nicotine ataxia from abuse of alcohol and tobacco, the tremor incident to these forms of toxic ataxia, together with the habits

and occupation of the patient, would lead to a correct diagnosis.

Prognosis.—Locomotor ataxia is a progressive disease, and recovery is not to be looked for in the present state of our knowledge. Temporary improvement may occur, and the end may be deferred for years by proper care and treatment, but the prognosis as to a final recovery is utterly unfavorable.

Treatment.—From what has been said under prognosis, it is seen at once that treatment is simply palliative. If syphilis is a factor in the etiology, however, the mixed treatment should be persistently tried. (℞ Pulv. potass. iodidi, ʒviij.; hydrarg. bichloridi, gr. i.; aquæ, fl. ʒij. M. Sig. ʒi. ter die after meals.) Peptonized milk, koumyss, matzoon, kephir, cod-liver oil, bitter tonics, and iron, are all serviceable at various periods for sustaining the patient. Morphine or some anodyne must be given at times to relieve the pains if they are severe.

The galvanic current should be applied. In some cases the faradic current is good. Both currents can be used whenever any benefit is derived from them.

Nerve-stretching has been tried, but does no permanent good. Nitrate of silver, gr. $\frac{1}{6}$ ter die, and gradually increased to gr. $\frac{1}{3}$, before meals, is recommended, as well as ergot, ʒi. fld. extr. ter die. Kind and intelligent nursing, with proper food to sustain life, are the chief means of deferring the fatal termination.

Bulbar Paralysis.

Etiology and Pathology.—Bulbar paralysis or glosso-labio-laryngeal paralysis is a progressive disease due to degenerative atrophy of motor and trophic centres in the medulla oblongata. Along with atrophy of these centres, the nerve roots are also involved, and there is an increase in the connective tissue.

The nerve nuclei of the hypoglossus, pneumogastric and spinal accessory, facial, glosso-pharyngeal, trifacial, motor oculi, and even the trigeminus may be affected. It is a motor disease, the sensibility not being at all impaired. The affection is limited to degeneration of the nuclei mentioned, and there is no diffuse inflammation. It is closely allied to amyotrophic lateral sclerosis and progressive muscular atrophy, but is located in the medulla oblongata (bulb) instead of affecting the motor centres and tracts in the spinal cord also.

The disease attacks men more frequently than women, and after thirty years of age. Beyond this nothing is positively known regardng etiology. Exposure to cold and wet, excessive fatigue, venereal excess, injuries, and the like have all had the disease attributed to them in some way, but it is doubtful if they

have much bearing on the causation. Heredity even appears to be excluded. Perhaps syphilis has more to do with its causation than is usually admitted.

Symptoms.—Impairment of innervation of the tongue is usually one of the earliest symptoms. Owing to more or less inability to move that organ, speech becomes imperfect, especially in words in which the linguals, as T, D, and Th, appear. Atrophy of the tongue soon follows. Food remains between the cheeks and teeth; and thus not only is mastication interfered with, but swallowing also.

The lips usually are affected next, so that the mouth remains partly open, and whistling becomes impossible, as well as the pronunciation of labials P, B, F. The lips also become atrophied. These signs are much more observable in the lower portion of the face than the upper.

The muscles of the pharynx, and in some cases of the larynx also, are next affected. Owing to paralysis of the soft palate the posterior nares are not closed in the act of swallowing, and consequently liquids are regurgitated through the nostrils, and the voice has a nasal twang to it. By compressing the nostrils, however, this can in some measure be prevented. Paralysis of laryngeal muscles not only changes the voice, but in some cases swallowing the wrong way takes place, producing violent and distressing fits of coughing. Not only this; food gets into the bronchi, and in this way bronchitis, pneumonia, and even pulmonary gangrene may be caused.

Should the trigeminus be also involved, as sometimes happens, mastication becomes now almost impossible. And if the ocular muscles are affected, strabismus and ptosis follow.

The saliva dribbles from the mouth, as it cannot be swallowed readily. Not only that, but for some unknown reason the amount of saliva is actually increased. When the pneumogastric nerve is affected, attacks of dyspnœa occur and palpitation of the heart, the pulse running up to 140 to 160 per minute.

The reflexes are much diminished or even absent, so that the root of the tongue, the epiglottis, and fauces can be tickled without annoyance to the patient or any disposition on his part to gag.

The electrical reaction of degeneration is observed in the affected muscles when the atrophy becomes marked. As long as some of the muscular fibres remain, however, this test varies.

Emaciation steadily increases, as it becomes impossible to properly nourish the patient, from his inability to masticate and swallow.

The mind remains clear to the end.

The disease is slow in its course and lasts about two years or more.

Acute bulbar paralysis may be due to hemorrhage into the medulla and pons, embolism or thrombosis of the basilar artery, or bulbar myelitis. In some instances it may be caused by compression, as in fracture or dislocation of the axis and atlas. In the latter case instant death is generally the result.

In acute bulbar paralysis from any cause, the onset is usually sudden. Headache, vertigo, and even loss of consciousness are often present. In some cases there is paralysis of an arm on one side and a leg on the opposite side, or crossed hemiplegia. More frequently there is hemiplegia on one side with paralysis of the bulbar nerves on the other. When the basilar artery is occluded, the paralysis, which seems greater on one side, changes over to the other after a few days. This is probably due to changes that arise from collateral circulation. Difficulty in articulation and swallowing from lingual and pharyngeal paralysis is a marked symptom, and sometimes there is deafness also. In some cases there are rapid pulse and palpitation, with dyspnœa, the breathing being of the Cheyne-Stokes type.

Diagnosis.—Chronic bulbar paralysis is a disease that comes on gradually and is progressive in its course. In this way it is readily distinguished from the acute variety, which always has a sudden onset, often associated with a loss of consciousness. In progressive muscular atrophy and amyotrophic lateral sclerosis, the bulbar symptoms appear late, and after other symptoms that are referable to disease of the spinal cord.

In some instances tumors of slow growth cause pressure on the medulla, but in these cases convulsions not infrequently occur, together with disturbances of sensation, as well as of smell and hearing. The ocular muscles and those of the upper part of the face are also more frequently disturbed in the case of compression from tumors. Sometimes these bulbar symptoms are associated with cerebral disease, but in the latter case the onset is usually sudden, and the reaction of degeneration in the paralyzed muscles is absent.

Prognosis.—This is almost invariably unfavorable. In chronic bulbar paralysis the patient dies in about two years, or perhaps five at most, from exhaustion or some intercurrent disease, as already stated. In some cases temporary improvement is noticed, but the symptoms all return in spite of treatment. In acute bulbar paralysis, the prognosis is also generally unfavorable. According to Loomis, it is better when the disease is due to syphilis.

Treatment.—Keeping the patient well nourished is of especial importance. This should be done by means of the stomach tube. In this way also the distressing paroxysms of coughing and pulmonary complications likely to arise from swallowing the wrong way will be avoided. For these reasons, the stomach tube

should be used as soon as difficulty in swallowing is noticed. When mastication cannot be performed, liquid food must be used in the form of peptonized milk and the like, to which alcoholic stimulants may be added in order to sustain life. Electricity might also be applied every day to the affected muscles. By placing the positive pole on the middle cervical vertebra and the negative on one side of the larynx, the act of swallowing can be caused by passing the latter across to the other side. Should the affected muscles respond to the faradic current, this might also be tried.

When the saliva dribbles sufficiently to cause annoyance, belladonna or atropine may be used. The latter may be given in doses of $\frac{1}{120}$ grain ter die. Nitrate of silver, $\frac{1}{6}$ grain ter die, may also be used, as well as ergot and iodide of potassium. (℞ Tr. belladonnæ, ʒ i.; fld. extr. ergot., ℥ ss.; pulv. potass. iodidi, ℈ viij.; aquæ, q.s. ad fl. ℥ ij. M. Sig. ʒ i. ter die.) Anodynes for the relief of acute pain are necessary at times.

In acute bulbar paralysis, perfect rest is necessary at the onset. If the patient recovers from the first effects, iodide of potassium should be pushed.

DISEASES OF THE BRAIN.

Before discussing this subject, a brief summary of symptoms is here given, by which the lesions on which they respectively depend may be localized in the brain according to the most recent investigations. Reference to the accompanying diagram will also be found useful.

1. *Hemiplegia.*—The pyramidal (motor) tract is the seat of lesion, whether the latter be tumor, foreign body, extravasation of blood, or extension of other disease. If the hemiplegia persists, the tract is destroyed. But if improvement occurs, the derangement is purely functional or else is the result of temporary extension of disease from some other part.

2. *Hemiplegia with Convulsions.*—The lesion is situated in the cortex.

3. *Hemiplegia with Crossed Facial Paralysis.*—The lesion is situated in the pons Varolii.

4. *Hemiplegia with Crossed Paralysis of the Oculomotor Nerve.*—The crura cerebri.

5. *Hemianæsthesia of the Skin and Organs of Special Sense.*—Posterior portion of the internal capsule.

6. *Hemiopia.*—The occipital lobe, posterior tubercle of the optic thalamus, optic tracts, anterior corpora quadrigemina, or posterior extremity of the internal capsule. In the latter case it is associated with No. 5.

7. *Posterior Hemorrhagic Chorea.*—The posterior part of the optic thalamus or internal capsule, due to pressure from capillary congestion.

8. *Aphasia.*—Third left frontal (Broca's) convolution.

9. *Inarticulation and Dysphagia.*—Medulla.

10. *Vertigo and Unsteady Gait.*—The cerebellum.

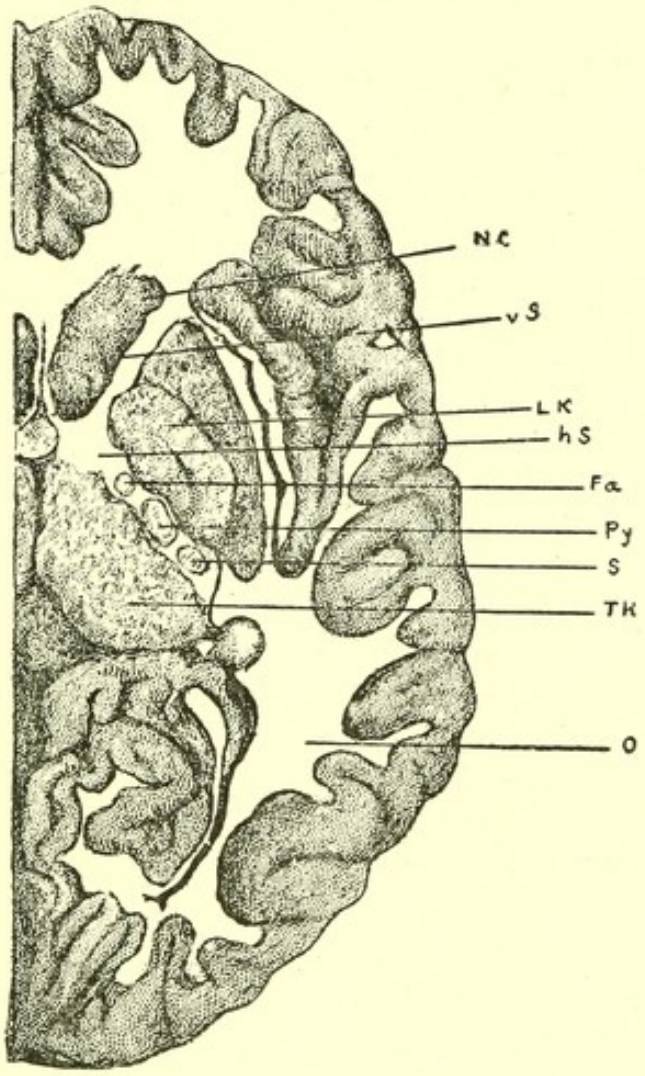


FIG. 47.—HORIZONTAL SECTION THROUGH RIGHT CEREBRAL HEMISPHERE. *Nc*, Caudate nucleus; *Th*, optic thalamus; *Lk*, lenticular nucleus (1st, 2d, and 3d divisions); *Vs*, anterior limb of internal capsule; *Hs*, posterior ditto; *Fa*, fibres belonging to facial nerve; *Py*, pyramidal tract (motor); *S*, sensory tract (probably cutaneous nerves and those of special sense); *O*, occipital lobes. (Strümpell.)

CONGESTION AND ANÆMIA OF THE BRAIN.

Congestion of the brain, or cerebral hyperæmia, is over-distention of the blood-vessels of that organ, and may be active or passive. In neither case, however, is any lesion or trace of the disease found on post-mortem examination.

Active congestion of the brain may be due to excessive heart action, as may occur in fever or under excitement. Hypertrophy of the heart from any cause will lead to more or less chronic

active congestion of the brain. During the cold stage of intermittent fever and exposure to severe cold, the brain may be congested. It also occurs from great exposure to heat, as in sunstroke. Vaso-motor disturbance also produces it, as seen in cases of rush of blood to the head among women at the menopause. Alcohol, opium, and tobacco, and amyl nitrite will also cause it, as well as long-continued and excessive mental exertion. In some cases, no doubt, functional disorder of the nervous elements gives rise to cerebral congestion and resulting symptoms.

Passive congestion may be due to pressure on the jugular veins from enlarged thyroid or lymphatic glands or on the superior vena cava by aortic aneurism. In mitral obstruction and regurgitation without compensation, and in dilatation of the right ventricle from obstruction to the pulmonary circulation as occurs in general vesicular emphysema, also stenosis of the pulmonary orifice, there is passive congestion of the brain and other organs. Finally, in the condition of general plethora there is always more or less fulness about the head.

Vertigo, headache, dizziness, a sense of fulness about the head, throbbing of the arteries about the neck, redness of the face and neck, an unsteady and rather contracted pupil, ringing in the ears, and a full, hard pulse are among the signs of active congestion. In some cases there is great irritability and even maniacal excitement. Slight aphasia or even apoplexy may result. In passive congestion, on the other hand, the face is often cyanotic to a varying degree, the intellect becomes lowered, and the patient has a tendency to be drowsy and even stupid.

Anæmia of the brain may be due to contraction of the minute arteries of that organ and sudden weakness of the heart's action from mental excitement, causing a fainting fit or syncope. Excepting such sudden attacks, however, anæmia of the brain is usually associated with general anæmia. Among local causes of this condition may be mentioned pressure upon arteries due to aneurism and various tumors.

The symptoms of syncope are well known and need not be described. Where the cerebral anæmia is of longer duration and dependent on more permanent causes, the patient suffers in the same way as in syncope, but to a much less degree. The pupils are usually dilated. Insomnia is often a distressing symptom. Headache, nausea, and drowsiness are often present, with a general lowering of vitality and indisposition for work.

In a few cases that have come under my observation, there was hemiplegic anæsthesia of variable duration. Indigestion and derangement of the stomach and liver are frequently associated with disturbances of the circulation in the brain.

Diagnosis.—A positive diagnosis of both congestion and an-

æmia is difficult, especially the former, from the fact that it is never known just how far the symptoms are due to these conditions or functional nervous derangement. Nevertheless, it is fair to infer in many instances, from the history of the case and the symptoms presented, that we have to deal with congestion or anæmia as the case may be.

Treatment.—In congestion of the brain, the cause should be sought for, and removed if possible. The patient should be kept quiet if the case be urgent, and the head and shoulders raised. The cerebral circulation should be relieved at the same time by hot foot-baths, and cold applied to the head by means of the ice-cap. This is one of the most valuable remedies. The bowels should be unloaded by a brisk purgative such as a drop of croton oil on the tongue, or a powder containing ten grains each of calomel and jalap. Two or three compound cathartic pills at bed-time give excellent results in less urgent cases. The diet should be light and non-stimulating; and when a general plethora exists, or the patient is liable to attacks of rush of blood to the head, the diet should be carefully regulated, as well as the bowels. To aid digestion and stimulate the action of the liver, the rhubarb and soda mixture may be given at different times. (℞ Pulv. rhei, pulv. sodii bicarb., āā ʒij.; aquæ, fl. ℥ij. M. Sig. ʒi. ter die.) When acidity of the stomach is not complained of, but dyspeptic symptoms are prominent, the mixture of pepsin and diastase should be taken. (℞ Glycerite of pepsin, diastase, āā ℥ij. M. Sig. Dessertspoonful ter die after meals.) Compressed tablets of pepsin and diastase are highly recommended. Alcoholic stimulants, tobacco, condiments, and heavy meals are to be avoided, and the patient should take plenty of exercise. Violent excitement, however, either mental or bodily, should be avoided, and if the heart be hypertrophied, one-eighth of a grain of extract of aconite or a drop of the tincture of the root should be given ter die.

Should the attack be sudden and severe, leeches may be placed to the temples, but I have never had occasion to use them.

Bromide of potassium in twenty-grain doses three times daily is often beneficial in chronic cases. Its action is, however, too slow in acute forms of the disease.

In treating anæmia of the brain, if the attack be sudden, as in a fainting fit, the patient should have the clothing loosened and be given fresh air and kept in the recumbent posture until the symptoms pass off, which usually occurs in a few moments or half an hour. A moderate amount of stimulation may become necessary. For this purpose a tablespoonful or less of whiskey or brandy in water, according to the habits of the patient, may be given, and the face and temples be sprinkled or bathed with

water. A vial of smelling-salts applied to the nostrils is often sufficient. To prevent future attacks, the cause should be sought for, and removed if possible. In anæmia of the brain dependent upon the general anæmic condition, this has to be treated by means of iron, tonics, nutritious diet, and other means already mentioned under that head.

Pachymeningitis.

Pachymeningitis is inflammation of the dura mater, and it may be external or internal according as the outer or inner layer of the dura mater is chiefly affected.

The disease is nearly always secondary, and usually chronic, though in some cases it may be acute. External pachymeningitis is generally the result of injuries or caries of bone. Inflammation of the cerebral sinuses from extension of internal otitis sometimes gives rise to thrombosis and external pachymeningitis.

Internal pachymeningitis is also called internal hemorrhagic pachymeningitis from the effusion of blood and formation of hæmatoma on the inner surface of the dura mater that always occurs. According to Virchow, the hemorrhage is secondary to the inflammatory process, but other authors maintain that the hemorrhage takes place first, and the connective-tissue formation subsequently.

Hæmatoma is sometimes situated in the posterior or middle fossa at the base of the brain, and is rarely bilateral. It is most frequently unilateral and situated in the parietal region.

Like external pachymeningitis, it may be idiopathic, but it is far more commonly of secondary origin. It may occur in those cases where there is a hemorrhagic diathesis, as in scurvy, hæmophilia, and pernicious anæmia. Chronic alcoholism also gives rise to it, probably by causing degeneration of the walls of the blood-vessels and their subsequent rupture.

It occurs in the course of other chronic cerebral and also infectious diseases as small-pox and typhoid fever. Chronic interstitial nephritis also favors its production from hypertrophy of the left ventricle and fibrosis of the arterioles. Valvular lesion of the heart that interferes with the return circulation, and atheroma from any cause, may also lead to it.

Syphilis in an advanced stage may give rise to hæmatoma as well as gummata of the dura mater.

The disease affects men more frequently than women, and usually those somewhat advanced in years. Either form of the disease, however, may sometimes be produced in children by the use of forceps in very difficult labors.

Symptoms.—The symptoms vary greatly in different cases, and

depend much upon the extent of the lesion. Very often there are none, owing to the tolerance that the brain acquires, or they are so masked by the primary disease as to be entirely overlooked. In either case, symptoms, when noticeable, are chiefly due to pressure on the brain. For this reason, the symptoms of hæmatoma or internal pachymeningitis are usually much more apt to be present than in the case where the disease is external. Not only the extent of the disease has important bearing upon the symptoms, but its locality also.

The symptoms, when noticeable, usually appear suddenly, though the disease may have been in progress for some time. As already stated, they are chiefly those of pressure, such as headache, dizziness, drowsiness, stupor, or even coma. The pulse is slow or irregular, pupils contracted, with more or less tendency to nausea and even vomiting. As the tumor is more frequently located on one side in the parietal region, not infrequently there are twitchings or paresis and even paralysis of the opposite side of the body. Aphasia results if the affection be on the left side at the island of Reil. As absorption progresses, the patient improves; but as fresh attacks occur, so do the symptoms again become aggravated, and in this way the disease may last for years.

Diagnosis.—This is always difficult and often impossible. The cause of the disease should be borne in mind. The symptoms would refer mainly to the cortex of the brain, and the changes from exacerbation to remission would point to the dura mater rather than the brain itself.

Prognosis.—This depends much upon the cause, but it is usually unfavorable. The patient may die suddenly from extravasation of blood, but generally the cause of death is extension of inflammation or some intercurrent disease.

Treatment.—When the pachymeningitis is external, surgical means for relief may be indicated, such as trephining. In either case, but especially in hæmatoma, when the onset is sudden and apoplectic in character, a cathartic should be administered as in congestion, and the ice-cap placed to the head, while the patient is kept at perfect rest for a day or two with the head and shoulders elevated. Leeches may be placed to the temples, but, as in congestion, it is doubtful if they are of any service. To prevent further hemorrhage, ergot is indicated. The best way is to give it hypodermically, as it would act too slowly when taken by the mouth. One to three grains of solution of ergotin should be injected at once, and that is usually sufficient to accomplish all that may be expected of it for the time being. It may be repeated, however, every three or four hours.

After the urgent symptoms are over, and the patient still survives, the future treatment should be directed toward removing

the cause if possible and attending to the general health. Alcoholic and other excesses are to be avoided. The diet should be highly nutritious, but non-stimulating. Indigestion, torpid liver, and constipation should be guarded against by well-known means. Should paralysis of muscles occur, it should be attended to as in other cases. When there is a clear history of syphilis, iodide of potassium, with or without mercury as may be decided, should be given as already mentioned when speaking of that disease. Anodynes are to be sparingly used, and then only when absolutely necessary to relieve excessive pain or enable the patient to sleep should insomnia become a distressing symptom. For this purpose they should be given in the afternoon rather than at bed-time, since in many cases opium aggravates insomnia for the first hours after its administration.

Meningitis (of the Convexity).

Etiology and Pathology.—Meningitis is inflammation of the pia mater of the brain, and it may be acute, subacute, or chronic.

The inflammation is usually on the convexity of the brain and hence is often called meningitis of the convexity, in contradistinction to tubercular meningitis, which is termed basilar meningitis.

In acute meningitis there is more or less sero-fibrinous exudation and sero-pus in the fissure of Sylvius, in the sulci, and along the vessels. The brain itself is always more or less involved. Minute abscesses and ecchymoses are not infrequently found in the brain substance, and sero-pus is nearly always present in the lateral ventricles. From pressure on the brain due to the inflammatory exudation, the convolutions are more or less flattened and the sulci deepened.

Acute meningitis is always a secondary affection unless it be of the epidemic type as already described when speaking of infectious diseases. In all other cases it is secondary, although the primary cause in some few instances may be overlooked.

Caries of the petrous portion of the temporal bone from otitis media is one of the most common causes, the inflammation extending in various ways to the pia mater, along the vessels, sheaths of the facial or otic nerve, the neighboring venous sinuses, especially the transverse and petrosal, and from the mastoid cells.

Abscess of the brain from any cause is certain to give rise to meningitis if it extends to the surface. In like manner, pachymeningitis, wounds, and traumatic causes in general are likely to produce this affection.

In other cases the primary disease is remotely situated, giving rise to the so-called metastatic meningitis, as in lobar pneumonia,

articular rheumatism, typhoid fever, small-pox, scarlet fever, pyæmia, septicæmia, and the like. Empyema and ulcerative endocarditis are likewise among such causes. Alcoholism, excessive mental anxiety, are also mentioned, but idiopathic primary acute meningitis is extremely rare, if indeed it ever occurs, as already stated.

The disease is found chiefly among children and in early adult life. Males are more frequently affected than females.

Symptoms.—In a well-marked case these may be divided into three stages: (1) headache, (2) delirium, and (3) coma.

There may be vague prodromata, such as irritability, pains and aches in the limbs and restlessness, with want of appetite. Or else a distinct chill or, in very young children, a convulsion may usher in the disease.

Generally, however, the first noticeable symptom is intense and persistent headache. This is not confined to any particular locality. Ringing in the ears, photophobia, nausea, and projectile vomiting accompany the headache. The projectile vomiting is characteristic and is highly worthy of attention. The pupils are contracted and respond slowly to light or do not react at all. In some cases they are unequal, the one on the side of the disease being contracted. The face is pale, the countenance anxious, the gait tottering.

Fever comes on early. The temperature rapidly runs up to 103° to 105° F., and is often irregular. Sometimes it exacerbates at night and remits in the morning. In severe cases, however, it continues high. Chills are apt to occur repeatedly. The pulse is rapid, small, and hard. Sometimes, owing to pressure, when the exudation is abundant, the pulse is even slower than normal. The bowels are constipated, or else passages are scant and exceedingly offensive. The abdomen is retracted. After a few hours or two or three days the second stage begins.

Delirium ushers in the second stage. It lasts usually from one to three days. The delirium may be muttering in character among the aged and feeble, but among the strong and robust it is often wild and maniacal. It generally comes on at night along with the evening rise of temperature. At the same time jactitation and restlessness continue. Dyspnœa, dysphagia, and irregular breathing may be noticed. Opisthotonos and rigidity of the muscles of the neck, hemiplegia, and twitchings of the muscles of the face and extremities are more or less observable. The eyeballs roll about without definite object, and in some cases the flexor muscles are powerfully contracted, causing the thumb, for instance, to dig into the palm of the hand. The pupils are uneven or oscillate. Projectile vomiting continues, and the abdomen is retracted. Respiration becomes sighing in character.

The fever continues, the temperature running up to 103° to 105° F., with less disposition to remit toward morning than previously. The pulse becomes more frequent, irregular, and less hard.

The third stage is that of coma. It comes on gradually, as the delirium lessens. The jactitation and restlessness, so noticeable in the first and second stages, now cease. The pupils, before contracted or irregular, are now dilated. The pulse runs up to 150 and is intermittent. The breathing is of the Cheyne-Stokes type. Grinding the teeth, picking at the bedclothes, slipping down in the bed, sometimes one foot or the other getting out from under the bedclothes, puffing expiration, and clammy sweat close the scene.

Subacute meningitis resembles the acute, only the disease is of longer duration and the exudation is sero-fibrinous rather than purulent. The symptoms are not so marked as in the acute form. The headache is never so severe and may be wanting altogether. The patient dies in a comatose state, however, as in the acute form.

Chronic meningitis is an interstitial inflammation of the pia mater, causing it to become thickened and opaque. It occurs among the aged and those who are poor and badly nourished. The symptoms are very obscure and often overlooked entirely. After death from some other disease, the thickened and opaque condition of the pia mater is found on post-mortem examination.

Diagnosis.—From tubercular (basilar) meningitis it is told only by the etiology, since the symptoms are practically identical. From epidemic meningitis it is distinguished only by the fact of several cases occurring at the same time, and absence of spinal complications. In epidemic meningitis, also, herpetic eruptions are common, whereas they are exceptional in other varieties of meningitis.

Acute uræmia might be mistaken for meningitis, but the presence of uræmic convulsions and the character of the urine as ascertained by a careful examination would generally lead to a correct diagnosis.

Typhus and typhoid fever both have a different temperature and pulse from meningitis, and the latter has no characteristic eruption. In typhoid fever there is diarrhœa; in meningitis, constipation. In both fevers there is tympanites, but in meningitis the abdomen is retracted. There is no characteristic vomiting in the fevers; in meningitis, it is projectile. Again this point should be impressed upon the mind: the pulse in meningitis is small and hard. In either typhoid or typhus fever, it is compressible. The pupils are not irregular in the fevers.

In delirium tremens there are absent the fever, irregular pupils, and pulse characteristic of meningitis; moreover, the history of the case is different.

Chronic meningitis might be mistaken for softening of the brain, but in the latter there is no mental excitement, and paralysis becomes much more marked.

Prognosis.—This is uniformly unfavorable in any variety of meningitis. The acute form usually lasts a week or ten days, but the patient often dies before that time. The course is slower in the subacute form, and chronic meningitis may drag on for a year or more, the patient finally dying of exhaustion or some intercurrent disease.

Treatment.—After what has been said under the head of prognosis, it is easy to see that little can be expected from any treatment. Nevertheless, something must be done to render the patient as comfortable as possible and to alleviate suffering.

The patient should be placed in a quiet room, somewhat darkened, so that the light does not hurt the eyes. The diet should be highly nutritious and easily digested, as peptonized milk or Valentine's meat juice or some similar articles of food. Cold applied to the head by means of the ice-cap is one of the best means for lowering the temperature, relieving headache, and lessening the delirium. Many authors recommend shaving the head first. It is a very old practice and certainly does no particular harm. With large rubber ice-caps as now made, of any size that may be wanted, it is doubtful if there is any necessity for shaving the head. Leeches to the temples are also recommended, as well as blisters to the back of the neck; but I cannot help expressing the belief that it must make the patient uncomfortable without a sufficient amount of benefit to justify their use. Small blisters behind the ears, on the contrary, are of benefit, especially if ear disease is the primary cause. I have no hesitation in recommending their use, especially as a prophylactic measure in the first instance. The bladder should be emptied by a catheter when urine is retained; it would certainly be a slovenly oversight to omit such a precaution. For pain and delirium, the hypodermic injection of morphine is the best remedy. Five to ten minims of Magendie's solution may be given according to circumstances and the age of the patient. In chronic meningitis, if syphilitic history be clear, then iodide of potassium, with or without mercury, should be pushed, as already mentioned.

Tubercular Meningitis. Basilar Meningitis.

Etiology and Pathology.—Tubercular meningitis, basilar meningitis, or acute hydrocephalus is tubercular inflammation of the pia mater at the base of the brain.

The disease is always secondary to tuberculosis, and the inflammation is caused by the presence of miliary tubercles. In

some cases the presence of tubercles elsewhere is not so clear, so that it might appear to be a primary tuberculosis of the brain.

Generally, however, the lungs or pleuræ have been the seat of tubercular disease, or there were tuberculous bronchial or mesenteric glands, or the so-called scrofula.

The inflammatory exudation, consisting of serum, fibrin, and pus, extends from the fissure of Sylvius to the inferior surface of the cerebellum. The lateral ventricles are usually filled with serum, from which circumstance is derived the name of acute hydrocephalus.

The disease occurs generally among children from one to five years of age. They are usually of tuberculous parentage, or else have acquired tuberculosis.

Symptoms.—As a rule there are some premonitory symptoms, such as loss of appetite, constipation, furred tongue, and an indisposition to play as is customary. Emaciation is noticeable in some cases. In others the signs of tuberculosis are quite evident. After a week or more the disease begins to manifest itself. It may also be divided into three stages: (1) cerebral irritation, (2) cerebral compression, and (3) the paralytic or comatose stage. During the first the patient suffers with paroxysms of frontal headache. Pressure on the fontanelles increases this pain. The countenance is anxious, the child is irritable, and easily annoyed. During sleep it grinds its teeth and often starts up with a piercing shriek known as the hydrocephalic cry. There are nausea and projectile vomiting, as described in ordinary meningitis. This projectile vomiting is characteristic of meningitis of either type, and should be remembered. The explanation of it is obscure. The abdomen is also hard and retracted. The child frowns on account of photophobia, and the pupils are contracted. The tongue is white. The pulse is somewhat increased in frequency, but often irregular. During the second stage it is slower than normal, owing to pressure on the brain from the exudation that takes place. Toward the end it suddenly becomes very frequent and feeble. The temperature rises to 102° F. to 103° F., and is usually higher at night than in the morning, but often it is irregular. As the end approaches, it may fall below normal. In some cases, however, it rises to 105° F. or more just before death. Respiration is also irregular, and in the later stages it often is of the Cheyne-Stokes type.

The muscles about the neck become rigid, and sometimes there is opisthotonos. The child's head bores into the pillow. The thumb is violently flexed into the palm of the hand. These symptoms are due to coincident spinal meningitis, and are also often noticed in the ordinary meningitis of the convexity.

After a day or more, or a week at most in rare cases, the

second stage of compression sets in, with corresponding symptoms of depression and stupor. The symptoms of irritability, as observed in the first stage, now cease. There is no projectile vomiting or photophobia. The pupils, before contracted, now become irregular and sometimes oscillate. The pulse is slower even than at first, owing to increased pressure on the brain. It is, however, more irregular. The act of swallowing frequently becomes difficult. Respiration is irregular and sighing, and often we notice the Cheyne-Stokes breathing. Twitchings of facial muscles are not uncommon, and even general convulsions occur. Paresis and paralysis of one-half the body or of one limb may be noticed in some cases, with or without aphasia. The tendon reflexes of the lower extremities, exaggerated at first, are diminished later on, and finally disappear altogether.

Ptosis, strabismus, and rolling of the eyeballs are all common signs.

Retention or incontinence of urine and fæces are likely to occur during the progress of the disease.

The third and last stage is one of paralysis and coma. The pupils are now dilated. Paralysis takes the place of paresis. There is incontinence of urine and fæces. The breathing is sighing and irregular, the pulse runs up to 150 or more per minute, and the patient dies in a comatose state. Sometimes coma is absent altogether, and the patient dies from asphyxia, owing to lesion of the respiratory centre and paralysis of muscles of respiration. In still other cases convulsions close the scene. The whole duration of the disease is from three days to three or four weeks; and just before death the temperature often rises to 106° F. or even more. One sign has not been mentioned, because now it is regarded as of little importance, and that is the red mark left by the pressure in rubbing the finger over the skin, or from some other irritation. It is due to increased reflex action, and found in many acute diseases. Trousseau, however, attached great im portance to it, and his *taches cérébrales* or cerebral marks are still referred to by authors as of peculiar importance.

Diagnosis.—Tubercular meningitis is distinguished from the ordinary acute meningitis of the convexity by the prodromata and slower development in the former. The evidence of pre-existing tubercular disease and heredity in a child would be almost conclusive.

The slow and irregular pulse of tubercular meningitis, the hydrocephalic cry, projectile vomiting, and grave cerebral symptoms will often enable one to distinguish the disease from gastric catarrh and similar disturbances. The same catalogue of symptoms usually renders possible the diagnosis of this disease from uræmia, the so-called infantile remittent, and other fevers.

Prognosis.—This disease is uniformly fatal. Death, according to Loomis, may be expected in two or three weeks on the average. But the duration is often much shorter, especially when convulsions occur early and are repeated.

Treatment.—Cold applied to the head by means of the ice-cap to alleviate headache and lessen the fever is one of the best remedies. Opium in some form to relieve pain and restlessness is sometimes necessary. The bowels should be unloaded early, and perhaps calomel is the best remedy for this purpose. (℞ Hydrarg. chlor. mitis, gr. iij.; sodii bicarb., gr. v. M. ft. pulv. Sig. To be taken at bed-time.) A mild saline laxative, like Seidlitz powder, may be given next morning to insure a movement of the bowels. The diet should be nutritious and easily digested, as peptonized milk or some other of its various preparations. Iodoform ointment applied to the shaven scalp for thirty hours or more has recently been advocated, but it is very doubtful if it does any good. The same may be said with regard to mercurial inunction, or the internal administration of iodide of potassium. Leeches to the temples are rarely indicated, but blisters behind the ears may be tried. Still there is no particular plan of treatment, the symptoms for each individual case being met, as they occur, in a manner considered to be the best by the physician. Prophylaxis, by placing the child under the most favorable hygienic surroundings during the first years of life, is most effective. A healthy nurse, cod-liver oil, fresh air, and a suitable climate may be the means of escaping the disease, which becomes less and less frequent after the first five years of life.

Chronic Hydrocephalus.

Chronic hydrocephalus is the effusion of serum into the ventricles of the brain due to chronic inflammation of their ependyma or lining membrane. It thus differs from œdema of the brain, which is merely a symptom of general dropsy.

The ventricles, especially the lateral, become distended with an amount of serum varying from a few ounces to ten or even fifty pounds.

The etiology is obscure, but it is probably of syphilitic or tuberculous origin. It not infrequently is found among several members of the same family. Or one may have chronic hydrocephalus and another be idiotic or deformed. The disease is usually confined to the newly born. In rare instances there is found hydrocephalus in the aged, from cerebral atrophy, the fluid taking the place formerly occupied by the brain, and hence called external hydrocephalus, or *hydrocephalus ex vacuo.*

Symptoms.—In some cases the child is born with the head al-

ready somewhat enlarged from hydrocephalus, so much so as to be a cause of difficult labor. More commonly, however, nothing is observed for several weeks, when the child's head is thought to be very large in comparison with that of other members of the family—a circumstance often remarked with great pride by the parents who imagine a wonderful future for a child with so much brains! Gradually, however, the head enlarges. The sutures and fontanelles remain open. The trunk and limbs are not developed, and the contrast between them and the enormous head is very striking. The child is dull and listless. Should it live long enough to walk and speak, the small limbs and heavy head render the former difficult, while the speech becomes very slow and con-

FIG. 48.—CHRONIC HYDROCEPHALUS.

fined to the simplest words. In some cases convulsions and paralysis occur. In this way the child dies usually by the fifth year. Or the cause of death may be exhaustion from increasing marasmus or some intercurrent disease. In other instances the disease is arrested, and the patient lives to be twenty or thirty years of age, but these are very rare. In all cases, however, even the parents find out at last that there is a difference between water and brains.

Diagnosis.—Congenital hydrocephalus, when well marked, cannot very well be mistaken. In enlargement of the head in rachitis there is not the same mental or motor disturbance that we find in hydrocephalus. In the hydrocephalus of the aged, the head is not enlarged, and a positive diagnosis could not be reached.

Prognosis.—This is always unfavorable, and, as already stated,

a patient suffering with congenital hydrocephalus rarely lives beyond the fifth year.

Treatment.—Drawing off the fluid by means of aspiration would naturally appear to be the best if not the sole means of treatment. And yet not only does this effect no cures, as the fluid returns, but inflammation is likely to result from the operation, with speedy death. Strapping the head does no good whatever, but it does compress the brain. Mercurial ointment, the compound iodine ointment to the head, and iodide of potassium internally have all been tried again and again, but without favorable results. Probably the best remedy is the syr. ferri iodidi and cod-liver oil. (℞ Syr. ferri iodidi, ʒ ij.; diastase, ʒ i.; olei morrhuæ, q.s. ad fl. ʒ viij. M. Sig. Tablespoonful ter die.)

Apoplexy.

Etiology and Pathology.—Apoplexy or stroke is the effusion of blood on the surface or into the substance of the brain independent of traumatism.

It is generally unilateral, and has its seat most frequently in the optic thalamus, corpus striatum, or white substance of the centrum ovale of one side. Less frequently do we find it in the cortical substance, cerebellum, pons, corpora quadrigemina, and medulla oblongata. It is very rare in the corpus callosum and fornix. The blood may force its way into a ventricle, or out on the surface of the brain, according to the locality of the hemorrhage. After blood is effused, the fluid part is absorbed, leaving the clot. This may become encysted, and the contents liquefy, the remaining sac containing fluid. Or else, the fluid contents becoming absorbed, the walls of the cyst collapse, leaving a cicatrix. In other cases inflammation and softening of the adjacent brain substance occur. Or else the contents of the sac may undergo cheesy or even calcareous metamorphosis.

Atheromatous disease of the minute arteries of the brain, due to endarteritis, and giving rise to miliary aneurisms of those vessels, precede the rupture. To the researches of Charcot and Bouchard, of Paris, this knowlege is mainly due, although the condition was long before suspected.

We now understand, therefore, why apopley occurs among those somewhat advanced in life, or after forty years of age, instead of before that period; and also why heredity may have important bearing on the case, and why it occurs preferably among the gouty, syphilitic, rheumatic, and alcoholic, and those suffering with Bright's disease of the kidneys. In chronic interstitial nephritis not only is there fibrosis of the arterioles, but also hypertrophy of the left ventricle, both of which conditions

are favorable for the production of apoplexy. Hence we not infrequently find this mode of death among such patients.

Aortic regurgitation also favors the disease, not only from the great force with which the enlarged left ventricle throws the blood into the arteries, but also from coincident disease of these vessels.

The hemorrhagic diathesis, as seen in scurvy, pernicious anæmia, and the like, favors the production of the disease; but in these cases the bleeding is more apt to be a minute capillary oozing than rupture of a vessel of considerable size.

Of the immediate exciting causes any violent mental or bodily exertion or excitement may be mentioned, as well as vitiated air, a hearty meal, drinking of alcohol, or smoking tobacco.

It is thought by some that a person of full habit and short neck is more liable to apoplexy than the thin and those having long necks. Although the laity fully believe this, yet it appears that facts are wanting to prove it.

Symptoms.—In some slight cases of minute capillary hemorrhage the symptoms are not marked and may be entirely overlooked. At most, they consist of a passing and slight headache, vertigo, and perhaps a little nausea. In these slight attacks there may be no effusion of blood at all, but simply serum. Occurring in the island of Reil or Broca's convolution (the left third frontal), temporary aphasia with hemiparesis of the right side is observed.

But where an apoplectic stroke or shock, as it is called, is pronounced, the symptoms are marked. They will depend, of course, on the extent of the effusion, with corresponding pressure on the adjacent brain substance, as well as the locality.

Not infrequently there are certain prodromata, such as a feeling of fulness about the head, flushing and redness of the face with a sense of heat, more or less headache and vertigo, and sometimes mental depression. In the case of a United States Army officer that recently came under my charge, the patient, aged fifty-seven, had chronic interstitial nephritis with hypertrophy of the left ventricle of the heart. Suddenly he became almost blind, and upon ophthalmoscopic examination by Dr. Webster, of this city, whom I called in consultation, retinal apoplexy in both eyes was very marked. In regard to the general treatment, I had Prof. A. L. Loomis, M.D., in consultation, and, in spite of the retinal apoplexy, the patient steadily improved, so that he contemplated a visit south. Just before the intended departure, I called in the evening and found him smoking a strong cigar. He complained of pain in the head, and was evidently much depressed in spirits. He died suddenly of apoplexy during the night. The night guard gave him a glass of water at 1:30

A.M., and called in half an hour later, when, to his astonishment, he was found to be perfectly motionless, and could not be roused. I was sent for immediately, and found him dead. Post-mortem examination revealed the presence of a large effusion at the base of the brain. The respiratory centre had evidently been compressed, and death came on very suddenly.

Among prodromata or premonitory symptoms may be mentioned a certain amount of nausea and even vomiting. And not infrequently the stroke is preceded by these symptoms.

In other cases there are no premonitory symptoms, and the shock comes on without warning. The patient may have gone to bed after a hearty meal, or have been in a crowded and overheated room, especially when the air is vitiated and close. As soon as rupture of the vessel occurs, injury to and pressure on the brain substance begins. If the rupture be extensive and occur in a large vessel, so that the effusion is considerable, the patient sinks to the floor and becomes unconscious. If, however, the bleeding is gradual, the symptoms come on slowly, and a day or more may elapse before unconsciousness and paralysis occur. The period of coma varies from a few hours to several days. The longer it lasts, the more unfavorable the prognosis. In mild attacks it may be wholly wanting.

During the comatose period the face is flushed, the respirations slow and stertorous and accompanied by peculiar puffing expiration owing to relaxation of the cheeks, especially noticeable on the paralyzed side. The pulse is full and slow, due to pressure on the brain. The pupils vary; in some cases they are contracted, in others they are irregular, but they never furnish any positive evidence. In some instances they do not react on exposure to light. The temperature at first may be below normal, and in rapidly fatal cases it remains so until death. In others it gradually rises somewhat higher than normal.

The patient may die in this period of unconsciousness. Very often, however, after a variable time, a few hours or a day or two, consciousness slowly returns, and the patient begins to recognize his surroundings.

As the motor tracts are most frequently involved in apoplexy, so do we find paralysis resulting from it. This affects the limbs on the opposite side from the lesion, owing to the decussations of the nerve fibres. Not only is paralysis of the limbs noticed, but the shoulder becomes lowered on the same side with the affected limbs owing to more or less paralysis of the trapezius muscle. On protruding the tongue, it is seen to deviate toward the paralyzed side. This indicates that one of the two muscles that protrude the tongue is paralyzed on the same side as the affected limbs and opposite to the cerebral lesion. The lower

facial muscles are also involved on the side opposite the cerebral lesion, so that the corresponding angle of the mouth droops. If the pupil, however, be affected, it is usually on the same side as the seat of the apoplexy.

Tendon reflexes are generally increased on the paralyzed side, while the cutaneous reflexes are diminished. After a time, say six months, in favorable cases, the patient is much improved. All symptoms depending upon pressure on the brain substance have now disappeared, while those remaining and due to laceration will usually be permanent. Paralysis of the lower limbs disappears, or there may be some paresis left. But the arm usually remains paralyzed. The flexor muscles become contracted, as is well observed by the position of the fingers of the affected hand.

The muscles involved do not undergo marked atrophy, and there is no degenerative reaction on application of electricity, but they respond readily to faradization.

Vaso-motor disturbances on the paralyzed side are sometimes observed, the skin becoming cyanotic over the affected hand, and cooler than normal. There is also a tendency to the formation of bed-sores.

Diagnosis.—Apoplexy very closely resembles cerebral embolism. In the latter case, however, the signs are more transient, and it occurs in those who have previous valvular lesion of the heart. Moreover, embolism may and does often occur in young persons, whereas apoplexy invariably occurs in those at middle life or past. The heart should always be examined.

Uræmic coma might be mistaken for apoplexy, but careful examination of the urine would be apt to lead to a correct diagnosis in case of doubt. Moreover, there is the history of renal disease, and absence of paralysis in the former case, whereas paralysis is one of the chief symptoms in apoplexy. Stick a pin into the limbs of a patient in uræmic coma, and reflex movements are alike on both sides. In the hemiplegia of apoplexy, they are much more marked on the unaffected side. In alcoholic coma the same rule holds good; moreover, the patient can often be roused, and there is the odor of alcohol as well as traces of it in the urine and contents of the stomach.

In opium poisoning, also, the patient can often be roused, and there is reflex response to irritation on both sides. The pupils are, as is well known, contracted to a pin's point.

Prognosis.—This depends for the time being on the severity of the symptoms. The longer the period of coma, the more unfavorable is the immediate outlook. Difficult and irregular breathing, indicating that the respiratory centre is affected by pressure, is exceedingly unfavorable. The total loss of reflex excitability, relaxation of sphincters, marked paralysis, and rise in tempera-

ture much above normal, are also unfavorable symptoms. But even if the attack be ever so slight, there is always danger of its return. The same general condition of the arteries remains that induced the first attack, and each year adds to the chances of their being more and more diseased.

Treatment.—The patient should be placed in a comfortable position, with the head and shoulders raised, and the clothing loosened about the waist. There should also be plenty of fresh air in the room. For the purpose of relieving congestion and pressure as far as possible, as well as to aid in stopping hemorrhage, the bowels should at once be unloaded by a drastic cathartic, and especially one that is speedy in its action. A drop of croton oil placed upon the tongue is about the best.

At the same time cold should be applied to the head by means of the ice-cap. A hypodermic injection of one to three grains of ergotin may be given in order to assist in checking the hemorrhage. Leeches are applied to the temples by some, but it is doubtful if they do any good. General blood-letting, however, is abandoned by all at present.

After consciousness returns, the patient should live on a very simple but nutritious diet, and avoid all violent mental or bodily excitement. Alcohol in large quantity, as well as excessive smoking, are to be prohibited.

So far as the paralyzed muscles are concerned, passive movement and massage, together with frictions with any of the various liniments, are recommended in order to counteract the rigidity that follows. Iodide of potassium is generally given for its alleged absorbent powers, but unless the patient is a syphilitic subject the probabilities are that it will do no good. (℞ Pulv. potass. iodidi, ʒviij.; aquæ, ʒij. M. Sig. Teaspoonful ter die after meals.) Electricity should not be tried until several weeks or months have elapsed, according to the severity of the symptoms. All signs of irritation should have disappeared, otherwise harm may be done by it. The galvanic current is to be preferred. It should not be very strong, and may be caused to pass through the brain for about three to five minutes at a time each day. This is said to promote absorption of the clot. The paralyzed muscles may also be treated with electricity; and since they respond to both currents, either one would do, or first one and then the other might be tried at different sittings. With it all, however, the patient will rarely completely recover, but will probably have a recurrence. Strychnine may be used, but preparations of iron, as a rule, are to be avoided, as in many cases they cause a sense of fulness about the head. It is well to bear this point in mind in the treatment of cerebral hemorrhage and congestion.

Cerebral Embolism and Thrombosis.

Cerebral embolism is the sudden obstruction of cerebral arteries by emboli or detached fragments of thrombi. Cerebral thrombosis, on the other hand, is the obstruction of cerebral vessels by the formation of a clot of coagulated fibrin at some point. It is a slower process than embolism, since it takes longer for a clot to form at any given point than it does for a fragment to lodge there. Emboli are detached from thrombi. But it is also evident that an embolus lodging anywhere may become the starting-point of a thrombus by fibrin coagulating around it. Both emboli and thrombi are found in arteries and veins. But while the cerebral arteries may be obstructed by emboli or thrombi, the veins and sinuses are usually obstructed by thrombi only. In any case the obstruction may be incomplete, or the vessel may be wholly occluded.

Emboli of the brain generally come from thrombi situated in the left side of the heart, as may happen in enlargement of the left auricle in mitral obstruction, or enlargement of the left auricle and ventricle in mitral regurgitation. Clots or thrombi form in these enlarged cavities especially upon the trabeculæ and musculi pectinati, from which fragments or emboli are detached and carried along the circulation to the brain, kidneys, and spleen, just as in enlargement of the right ventricle they are carried to the lungs so as to produce pulmonary infarction.

Arterio-sclerosis is probably the next most common cause of the disease. This condition of the arteries follows endarteritis and atheroma, as seen in syphilis, gout, lead poisoning, rheumatism, alcoholism, and the like. Owing to aneurism, or even roughening and dilatation of the aorta, thrombi may be formed from which emboli become detached, or else thrombi may form primarily in the cerebral arteries at points where they have undergone aneurismal dilatation. In certain cachexias, and during severe illness also, as in cancer, typhoid fever, and the like, thrombi form partly from cardiac weakness and in some cases partly from increased tendency of the blood to coagulate. Emboli usually occur on one side, although they may be bilateral, and two or more may be present at the same time.

When an artery is occluded, the parts supplied by it become anæmic, and, unless sufficient collateral circulation is established within forty-eight hours, such portions of brain matter undergo destruction or softening. The left middle cerebral artery is most frequently affected by embolism, the right next. Then come the basilar, internal carotid, and vertebral. In the centrum ovale and cortex, collateral circulation from free anastomosis of vessels prevents serious results usually; and in the corpus cal-

losum, pons, and cerebellum, emboli are very rare. Infarctions are not common in the brain, the compact tissues not allowing diapedesis to the same extent as in the lungs, for instance. But there is sufficient diapedesis or leakage of red globules through the occluded twigs to aid in causing more or less red or yellow discoloration in the softened portion. The left middle cerebral artery is not only most frequently the seat of embolism from its anatomical position, but, as it is a terminal artery, or one without anastomosis, the symptoms are particularly well marked when it is affected. Softening of the parts nourished by it, also, is more certain to follow than in any other region.

From what has been said, the disease may occur in both sexes at any age when due to heart disease. In arterio-sclerosis, however, the patient is usually at middle life or past.

Symptoms.—These depend upon the size of the artery occluded and the locality of the embolus. The obstruction may be so slight as to be scarcely noticed, or at most to give rise to a temporary vertigo or dizziness. In some cases aphasia more or less marked occurs, and there may be corresponding paresis of the right side or right hemiplegic paresis, the clot rarely being sufficient to produce total paralysis.

In some cases, however, the obstruction is sufficient to produce unconsciousness at once, as in true apoplexy. But there are differences to be noted presently in the diagnosis between apoplexy and embolism.

If unconsciousness results, it is usually of short duration, and, owing to the lack of pressure on the brain substance, which occurs in apoplexy, the pulse is never so slow as in the last-named disease, but epileptic convulsions may occur—in fact, they are more common in embolism than in apoplexy. In severe cases the temperature rises to 102° or more, and is then an unfavorable symptom. The patient recovers much sooner from unconsciousness than in apoplexy, and then the after-symptoms will depend upon the damage done to the brain substance nourished by the occluded artery. Unless collateral circulation is sufficiently established in forty-eight hours after the occlusion occurs, softening follows. As a consequence, there will be more or less paralysis of the muscles on the opposite side, just as in apoplexy. Convulsions, hemiopia, deafness, and the like will also result, according to the locality of the embolus and extent of the injury to the brain substance. Occasionally speedy death results.

Diagnosis.—In some cases it may be difficult, if not impossible, to distinguish this disease from apoplexy. But, as before observed, in case of embolism or thrombosis valvular lesion of the heart should be sought for. If the patient be young and have heart disease also, the probabilities are in favor of embolism. But

if the patient be of middle life or past, and there is no coexisting valvular cardiac lesion, the chances are in favor of apoplexy, especially if the shock be severe and persistent, and accompanied by redness of the face, with slow pulse as caused by pressure on the brain. Rapid improvement in any case favors embolism or thrombosis rather than apoplexy.

Prognosis.—The immediate prognosis depends on the size of the artery occluded and the severity of the symptoms. A long period of unconsciousness, marked paralysis, and slowness of recovery are unfavorable signs, as well as marked rise in the temperature. But in any case, however light, there is always danger of a recurrence. The prognosis should therefore be guarded.

Treatment.—This is the same in general as in cerebral apoplexy. To soften the clot, however, and restore the normal circulation I have been in the habit of giving Fowler's solution of arsenic. It promotes fatty degeneration of fibrinous deposits and their consequent liquefaction and absorption. It is probably one of the best remedies in cerebral embolism. Besides attending to the general health, therefore, such as promoting digestion and regulating the bowels, the arsenic and iodide of potassium may be given. (℞ Pulv. potass. iodidi, ʒviij.; liq. potass. arsenitis, ʒ ss.; aquæ, q.s. ad fl. ℥ ij. M. Sig. Shake and take a teaspoonful ter die after meals.) Where the patient is the subject of rheumatism, salol in five-grain tablets should be given ter die during subacute attacks of that disease, as it lessens the chances of valvular lesion.

Softening of the Brain.

Softening of the brain is usually described separately, although it is probably never a primary affection, but always dependent on some pre-existing cause, as embolism, thrombosis, apoplexy, or the presence of tumors of the brain.

It is generally described also as red, yellow, or white softening, according to the color of the affected part. The pathological condition is the same for all, however, the degree of color merely depending on the amount of dissolved pigment of disintegrated blood-globules. Red softening not infrequently ends in yellow softening, and either of these may become white softening. Or the softening may be yellow or white at first, as well as red. The color, therefore, has nothing to do with the true pathological condition, which is the same for all.

Softening of the brain is found more frequently in those of advanced life, as might be expected from the etiology. Where valvular lesion is the cause of embolism, however, it may occur early in life, although even then softening is not so apt to occur as it would at a more advanced age. When the blood supply be-

comes shut off from a certain area of brain substance, the part soon dies and becomes disintegrated, or undergoes softening as it is called. Subsequently fatty degeneration, liquefaction, and absorption take place, or in some cases a cyst is formed as in apoplexy. The treatment is the same as for the primary affection, to which the reader is referred.

Tumors of the Brain.

The etiology of tumors of the brain is no more known than in the case of tumors occurring elsewhere. They are found in men more frequently than in women, and usually about middle life. Tubercle, however, may also occur in children.

Syphilitic gummata, tubercles, gliomata, and cancers are the tumors that most frequently occur in the brain.

Syphilitic gumma or syphiloma is usually found at the circumference or base of the brain, but is very rare in the interior. These tumors vary in size from a pea to an egg.

Tubercles of the brain may be single or multiple, and occupy any portion of the brain. They are, however, chiefly found in the cortex, pons, and cerebellum, and may be as large as a cherry or even larger. They very much resemble syphilomata, and often the history of the disease and discovery of the bacillus has to be relied upon for a positive diagnosis.

Gliomata may be hard or soft, and vary in size from a hazelnut to an orange. They are usually single and are found in the white substance of the hemispheres, central ganglia, and cerebellum. This tumor is vascular and bleeds easily. It originates in the neuroglia or connective tissue of the brain, and has a gray or reddish-gray surface.

Carcinoma or sarcoma rarely originates in the brain substance, but usually commences in the connective tissue or bones of the neighboring parts. It is found chiefly at the base of the skull, and is usually of the encephaloid variety. It varies in color according to its vascularity and the changes produced by its presence. Besides the above-mentioned tumors, there are others, but of rarer occurrence, such as psammoma, or sandy tumor, which usually begins in the meninges; cholesteatoma, lipoma, angioma, myxoma, osteoma, papilloma, fibroma, and hydatids. These are all so rare, however, that they are clinical curiosities rather than of any practical interest, so that mere mention of their names may be sufficient.

Symptoms.—The symptoms of tumor of the brain are usually very gradually developed as the growth is slow. Persistent headache is one of the earliest symptoms, as it is one of the most common. Next to this in order the mind becomes more or less im-

paired. The patient's memory gets worse and worse, especially about events that have happened recently. He takes little interest in those around him and talks slowly as if trying to remember what to say. The countenance becomes apathetic and dull, and the patient has a sleepy look. In some cases there is complete dementia.

The pulse becomes slow, owing to pressure on the brain as the tumor grows. In other cases it is very irregular. Vertigo and epileptic convulsions and vomiting are among the symptoms.

In course of time, disturbance of vision occurs. If compression be sufficient, choked disk results, as ascertained by ophthalmoscopic examination. Sometimes the pupilis dilated and does not react to light. Paresis and paralysis of various muscles gradually appear, and the patient becomes emaciated from the vomiting, insomnia, and obstinate constipation that are usually present. The particular symptoms of any given tumor of the brain not only depend on its size and the extent of the pressure and degenerative changes produced in the brain substance, but also on its locality. Thus, tumors of the cerebral hemispheres generally lead to hemiplegia, attended at various times with convulsions. If the island of Reil is involved, there will also be aphasia; if the occipital lobe is affected, there is hemiopia, and so on.

When the tumor is situated at the base of the brain, we usu ally observe unilateral paralysis of the motores oculi, hemiopia, and choked disk.

When the cerebellum is the seat of the tumor, vertigo is apt to be a prominent symptom, as well as rigidity of the neck, vomiting, and disturbance of vision.

Diagnosis.—The diagnosis of tumor rests chiefly upon the slowness with which the foregoing symptoms are developed. The locality of the tumor is to be judged of by the particular symptoms present in each case. The kind of growth cannot be told positively, however. In a person who undoubtedly has syphilis or tuberculosis, the new growth would probably be syphilitic or tuberculous accordingly. In the absence of any such diseases, glioma is the most common of all other tumors, while cancer usually has its seat at the base of the brain.

Prognosis.—This is uniformly unfavorable unless the tumor be of syphilitic origin, and even then the prognosis is always grave. The duration varies greatly according to the rapidity or slowness with which the new growth is developed and the complications that may arise. Patients rarely live more than a year or two, however, and death may occur at any time.

Treatment.—Symptoms are to be treated as they arise. Ice-bags to the head and anodynes in some form are used to allay intolerable headache. If the patient be in good condition bro-

mide of potassium may be given in twenty-grain doses ter die for a week or two and then omitted for a time. Continued too long, it helps to render the patient anæmic, and interferes with digestion. Should convulsions occur, they may be controlled by the judicious inhalation of chloroform for the time being. The indications for treating such convulsions, however, are totally different from that of puerperal and uræmic convulsions, where a poison has to be eliminated from the blood by veratrum viride or pilocarpine. Bits of ice by the mouth, a blister or mustard paste over the epigastrium, and in some cases a hypodermic injection of morphine may be given. Bed-sores are to be guarded against by cleanliness and the air-cushion. If the tumor is supposed to be of syphilitic origin, the administration of iodide of potassium and mercury will often cause temporary and sometimes permanent improvement. (℞ Pulv. potassii iodidi, ʒviij.; hydrarg. bichloridi, gr. ss.; aquæ, ℥ij. M. Sig. ʒi. ter die.) The dose of potassium iodide may be increased to double or even treble the amount if well borne by the stomach. In some cases mercurial inunction is also added to the treatment. About a drachm of the officinal mercurial ointment may be rubbed on the inside the thighs and arms each day, but the patient should be carefully watched and salivation avoided by keeping the bowels open by means of saline cathartics given in moderate doses and stopping the use of the inunction as soon as the mouth becomes sore.

Inasmuch as it is difficult to tell positively whether or not the tumor is really of syphilitic origin, it is quite evident that the iodide of potassium and mercurial treatment should be pushed if there be the least suspicion of syphilis.

The hygienic conditions and diet should be attended to, so that with careful nursing the patient may at least be rendered as comfortable as possible during the rather brief period he has to live.

Abscess of the Brain.

Etiology and Pathology.—Abscess of the brain is the result of suppurative encephalitis. It occurs most frequently in the white substance of the middle cerebral lobes, or cerebellum, from extension of suppurative inflammation from the ear. The abscess varies in size and is usually more or less rounded in shape. It occurs at all ages, but more frequently in males than females. It is caused by blows on the head or other injuries, the lodgement of foreign bodies, and extension of inflammation from adjacent parts, as suppurative inflammation in the middle ear and caries of the petrous portion of the temporal bone. Suppurative inflammation in the nasal cavities and caries of the ethmoid bone, as occurs in syphilis, may likewise give rise to abscess in the anterior lobes.

Instead of direct injuries or extension of suppurative inflammation, septic emboli coming from a distance and lodging in the brain may give rise to abscess. This occurs sometimes in ulcerative endocarditis, pyæmia, and the like.

It is extremely doubtful if primary or idiopathic abscess of the brain ever occurred, though the true cause in some instances is very obscure. An abscess when once formed may burst into the ventricles, or, extending to the surface of the brain, give rise to meningitis. In other cases it becomes encysted, but it is doubtful if the pus is ever completely absorbed, however changed it may become.

Symptoms.—In some cases cerebral abscess gives rise to no symptoms whatever that would lead one to suspect its presence. Patients have died of other diseases, and upon post-mortem examination abscess of the brain has been found, without its presence ever having been in the least suspected.

In the majority of cases, however, the disease gives rise to certain symptoms, and it may run an acute or chronic course.

In acute cases the abscess enlarges rapidly and the symptoms resemble those of acute meningitis, if indeed that disease is not actually present. There are violent headache and a high fever. The patient may be dull or even delirious. Unconsciousness becomes complete, and finally the patient dies in about two weeks in a comatose state.

In chronic cases the abscess may give rise to no symptoms for some time. Persistent and deep-seated headache is one of the earliest symptoms. Along with this, there are presently noticed vertigo, dizziness, and often nausea or even vomiting. Recurring chills and irregular fever without any apparent cause are also noticed. The patient loses appetite and becomes pale and emaciated. Epileptiform convulsions, paralysis, hemiopia, and deafness may occur according to the location of the abscess. The disease extends over months or years with varying symptoms. Should the abscess become encapsulated, no fever will be observed, and the case may remain stationary for years.

Diagnosis.—Tumor of the brain is likely to be mistaken for abscess; but in the latter disease there is fever, which is not usual in the case of tumor. In the latter, choked disk or dropsy of the optic nerve entrance, with distention of the retinal veins from pressure, is present, as observed by the ophthalmoscope, but not in abscess. The cause of abscess is usually apparent. In tumor, paralysis is of more common occurrence than in abscess, and all the signs are more steadily progressive. Tumors frequently cause paralysis of the motores oculi on account of their presence at the base of the brain; abscess rarely does.

Softening of the brain occurs among those advanced in life, as

a rule, and is attended with the gradual loss of mental power. There is also absent the intense headache of abscess.

Prognosis.—This is nearly always unfavorable. Acute abscess is fatal in two or three weeks. Chronic abscess may last for months and even years, the patient dying finally of some complication or intercurrent disease.

Treatment.—Ice to the head to relieve headache and fever, and opium to relieve the former when it becomes severe and insufferable, are among the few remedies that may be used for symptomatic treatment in this disease. The diet should be nutritious and easily digested. Trephining the skull and evacuating the pus is the only radical treatment. For particulars on this subject the reader is referred to works on surgery.

Sclerosis. Hypertrophy. Atrophy.

Sclerosis of the brain is the result of chronic inflammation of the cerebral interstitial connective tissue or neuroglia. The etiology is obscure.

Hypertrophy of the brain is a misnomer. Not the brain substance, but the neuroglia or interstitial connective tissue is increased. It may be congenital or result from chronic inflammation and increase in the neuroglia without shrinkage, as in hypertrophic cirrhosis of the liver.

Atrophy of the brain may be congenital or it may be senile. In the former case the head may be unnaturally small, so as to prevent the full development of the brain, or else parts of the brain may be absent from arrest of development. It may also follow sclerosis. Senile atrophy is hardly to be called a disease, but is simply a part of old age.

The treatment in such cases is purely symptomatic.

Alcoholism. Morphinism. Delirium Tremens.

Alcoholism is a peculiar nervous condition brought about by the abuse of alcohol, and it may be acute or chronic according to circumstances. In either case there is more or less capillary congestion, which in the chronic form of the disease is generally associated with pathological changes in various organs, especially the liver and kidneys. There is a great tendency to increase of adipose and connective tissue from continued abuse of acohol. This whole subject is rather difficult to classify, and will be briefly alluded to here.

Symptoms.—These vary according as the disease is acute or chronic.

In acute alcoholism the patient may become intoxicated, or

get drunk as it is called; or else the condition known as delirium tremens may occur. Delirium tremens, though usually described as acute alcoholism, yet often occurs in the chronic form upon the sudden withdrawal of stimulants. Perhaps that is the way in which it most frequently happens.

But whether it be the result of continued abuse of alcohol or its sudden withdrawal, the symptoms are about the same. At first the patient becomes much depressed and anxious, as if in dread of some great impending evil. The appetite is lost, the tongue furred, and the bowels are, as a rule, constipated. Muscular tremor is generally observed, and insomnia becomes more and more distressing. The second stage soon begins, varying from a few hours to several days. Its onset is marked by periods of mental aberration and wandering. These periods are soon lost, so that the patient is in a continued state of hallucinations and delusions. It is useless to enlarge upon all the horrible sights described by different unfortunate victims of this terrible affection. Snakes, crawling vermin of every variety, and ferocious wild beasts are most frequently mentioned. In one case a patient informed me that he had the greatest difficulty in dodging fecal matter that was being constantly thrown at him by an old negro woman! Sometimes the patient is mild, at other times dangerous, so that care must be taken in selecting an attendant who should be able to defend himself if necessary. The pulse is rapid, small, and becomes weaker in proportion to exhaustion. The pupils are unsteady; that is, they are contracted or dilated and restless. The whole expression is that of one who is not in his right mind.

After a varying length of time, a day or even several days, the patient, in favorable cases, begins to sleep a little at times—often starting up, however. The appetite returns, the sleep becomes more and more natural and prolonged, and the patient makes a speedy recovery, especially if it be the first attack and no organic change has been produced.

In unfavorable cases, insomnia persists. There is great restlessness, the patient constantly moving about and tossing from one side of the bed to the other. The pulse becomes more rapid and feeble, the surface cool and clammy, there are hiccough and complete anorexia, urine and fæces are passed involuntarily, the mind wanders hopelessly, and death from exhaustion soon follows.

In chronic alcoholism, the symptoms consist of muscular tremor, insomnia, an ataxic gait, and loss of will power. Owing to the gastric catarrh usually present, there are loss of appetite, and vomiting. Headache and vertigo are also prominent symptoms. The patient generally dies of exhaustion or some intercurrent disease. The liver and kidneys usually become affected.

Diagnosis.—This is considered elsewhere. The reader is referred to uræmic coma and apoplexy, regarding diagnosis from those diseases. In any event, careful attention to the temperature and history of the case will usually lead to a correct and easy diagnosis. The lungs should always be examined, as already remarked when speaking of pneumonia.

Prognosis.—Patients who live in the country and take plenty of exercise in open air live much longer than those who reside in crowded tenement-house districts in large cities. Apart from this, the prognosis in acute alcoholism is generally favorable, but in chronic alcoholism it depends on the organic changes that have been produced.

Treatment.—In acute alcoholism, rest and diet are usually sufficient. The patient should be kept in a comfortable room, free from noise, and the diet should consist of peptonized milk, or beef tea, with a tablespoonful of whiskey or brandy in it, every three or four hours according to circumstances. The bowels should be moved by a mild dose of calomel and bicarbonate of soda. After a few days, as soon as the patient begins to sleep, the stimulus may be withdrawn, and some of the vegetable bitters given instead.

The same treatment applies in the main to delirium tremens. Forcible restraint, like the strait jacket for instance, should not be adopted unless absolutely necessary. A kind and sympathetic but firm nurse is indispensable. How is sleep to be obtained? Half-ounce doses of digitalis have been recommended. It is said to strengthen the heart and relieve nervousness, thus producing sleep. I have never seen it succeed. No doubt tinct. digitalis in small doses would help to strengthen the pulse, but large doses are not a specific in delirium tremens. Opium should be administered with great caution. The dose, whatever it be, had better be given in the afternoon, rather than at bed-time, since among many people it keeps them awake rather than causing sleep. If it does not prove useful after a few cautious doses it may as well be dropped. Bromide of potassium in thirty-grain doses and well diluted may be given on an empty stomach four times daily. In some cases it acts well; in others it is useless. The tincture of capsicum added to it, so as to give a few drops at a dose, is often beneficial. In fact, one of the best remedies for rum-stomach, so called, is tinct. capsici added to the rhubarb and soda mixture. (℞ Tr. capsici, ʒ ss.; pulv. rhei, pulv. sodii bicarb., āā ʒ i.; aquæ, q s. ad fl. ℥ ij. M. Sig. ʒ i. ter die before meals.)

Chloral is also recommended, but it should be used with caution, as it is uncertain in its action. Sulphonal acts well in some cases but, being indigestible, causes the tongue to be heavily coated. Twenty grains may be given at 6 P.M. and repeated at

8 P.M. There are many other hypnotics, but in general they are to be avoided, especially those that depress the heart. For vomiting and hiccough, bits of ice given by the mouth, and a small blister or mustard paste applied over the epigastrium, are usually sufficient.

In chronic alcoholism, the cause should be removed as far as may be judicious, the diet should be nutritious, and secondary complications treated according to circumstances.

Morphinism, like alcoholism, may be acute or chronic. The symptoms of acute opium poisoning and treatment are well known. The pupils are contracted to a pin point, the face is turgid, and the breathing is slow and stertorous. In treating this condition, too much reliance is not to be placed on atropine as an antidote. In mild cases of opium poisoning, $\frac{1}{120}$ or even $\frac{1}{60}$ grain of atropine may be given hypodermically with benefit. But, in severe cases, belladonna in any form seems to add to the difficulty. The old plan is better; that is, washing out the stomach, giving black coffee, douching the head, applying a moderate amount of electricity, and shaking the patient occasionally so as to keep up the respirations. After a time the poison is eliminated and the patient recovers—much to the disgust of those who intended to commit suicide.

Chronic opium poisoning, the opium habit, or morphinism, as it is called, is often very difficult to treat outside of hospitals. Many, however, overcome this habit by sheer force of will power. Unless the daily quantity be small (a grain or two of morphine or its equivalent), the sudden withdrawal of the drug is both cruel and unnecessary. The indications for treatment are about the same as in the case of alcoholism. The diet may at first consist of a little hot milk with a tablespoonful of brandy every three hours until the patient can sleep without the drug. Sulphonal may be used here also to procure sleep. If the vomiting cannot be controlled by ordinary means, then a small dose of morphine may be required. But the dose must be steadily diminished, so that in a few days or a week, according to symptoms, the drug may be entirely omitted. Should the patient become feverish, a few doses of antifebrin may be given, say three to five grains ter die. Two years should elapse without taking the drug before the cure can be said to be complete.

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