

**A text-book of the medical treatment of diseases and symptoms / by
Nestor Tirard ; adapted to the United States pharmacopia by E. Quin
Thornton.**

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Tirard, Nestor Isidore Charles, Sir, 1853-
Thornton, E. Quin 1866-
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Publication/Creation

Philadelphia : Lea Brothers, 1900.

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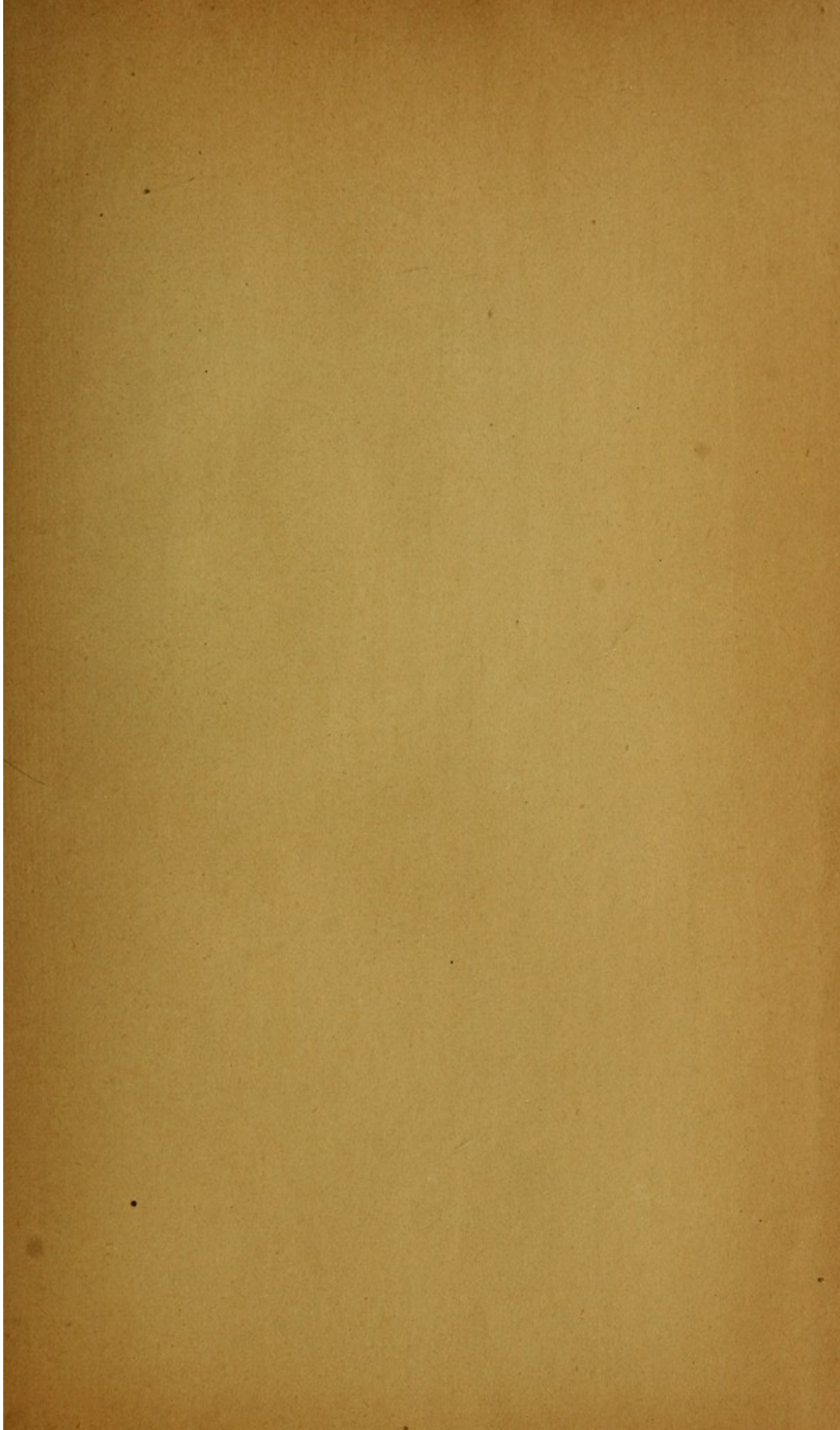
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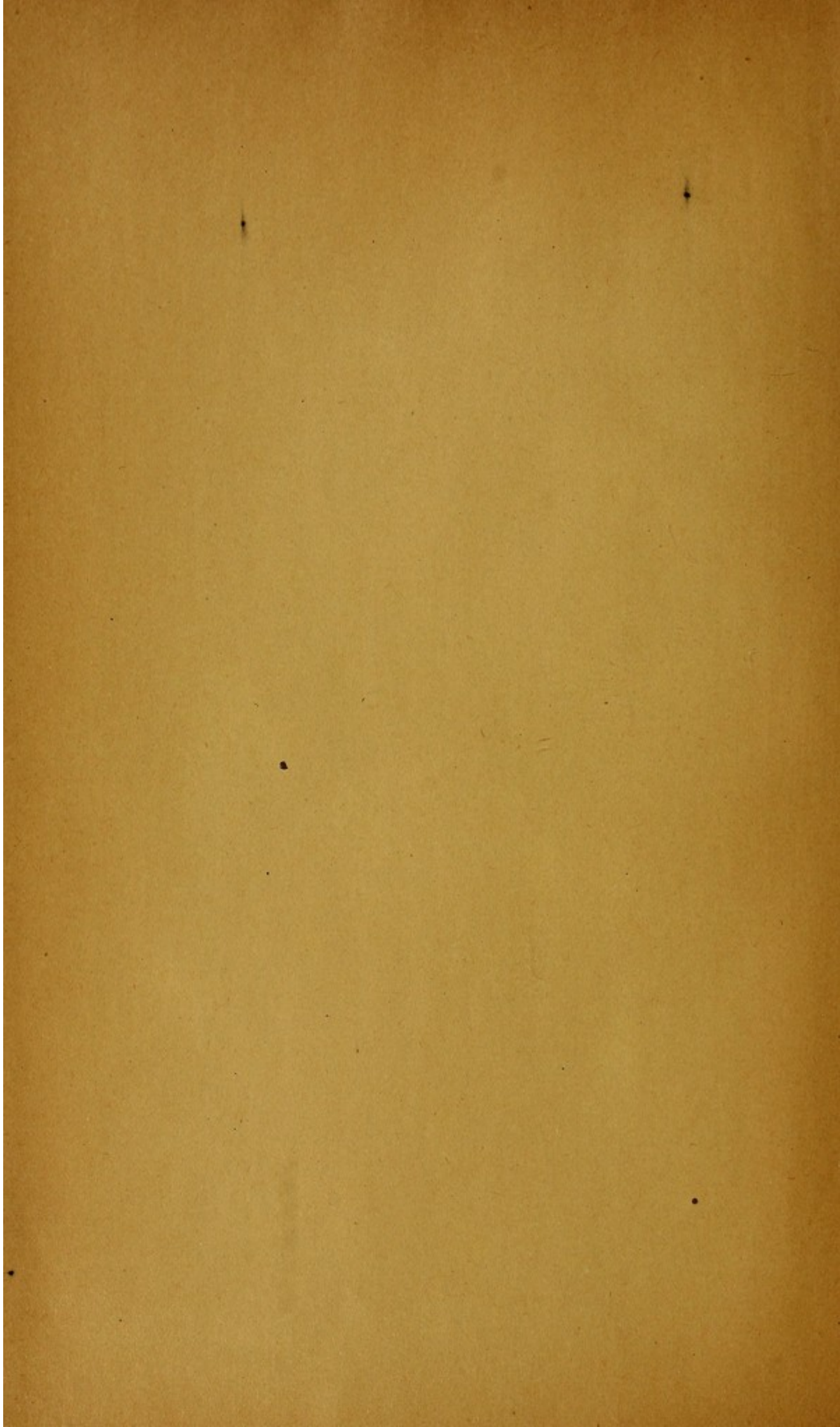


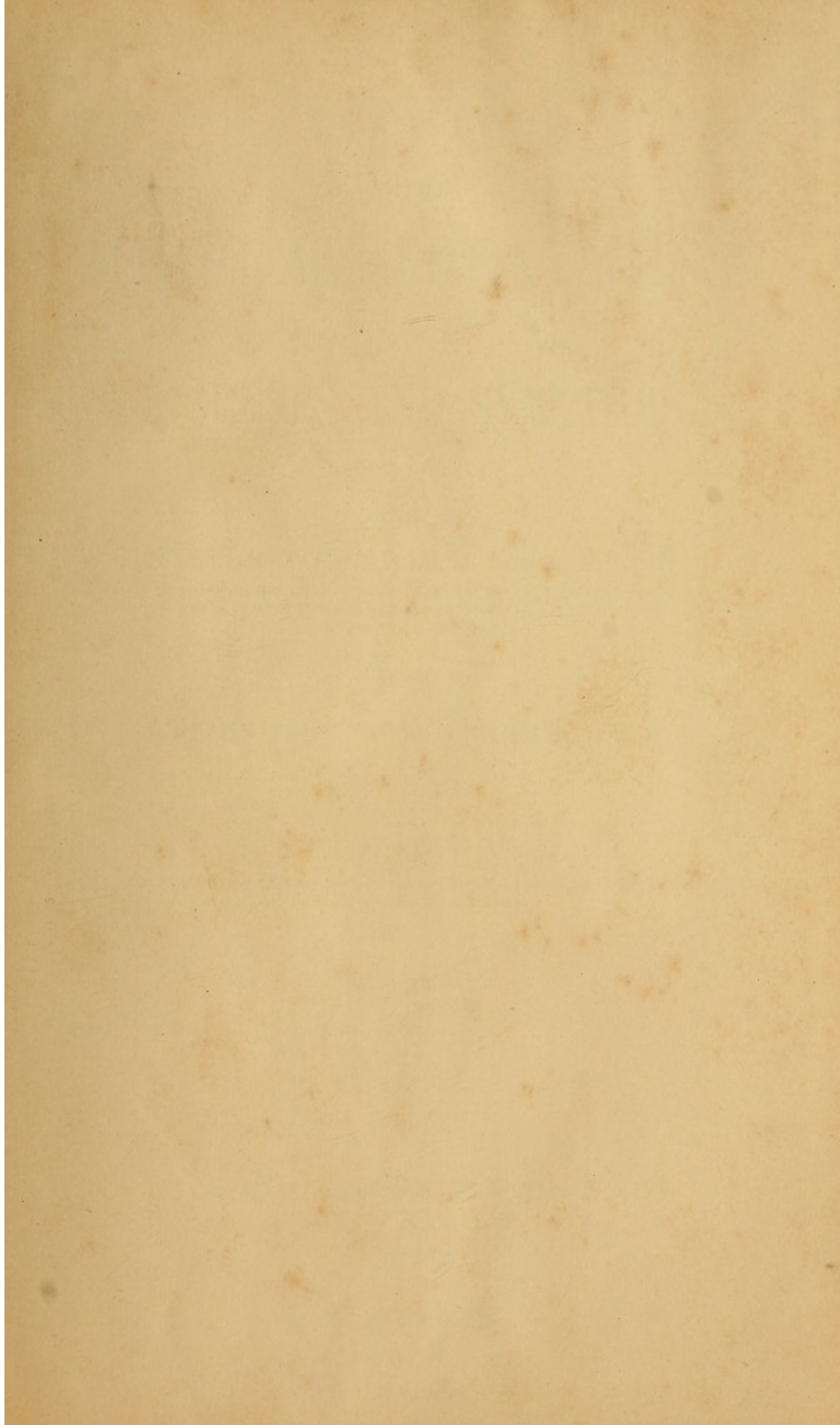
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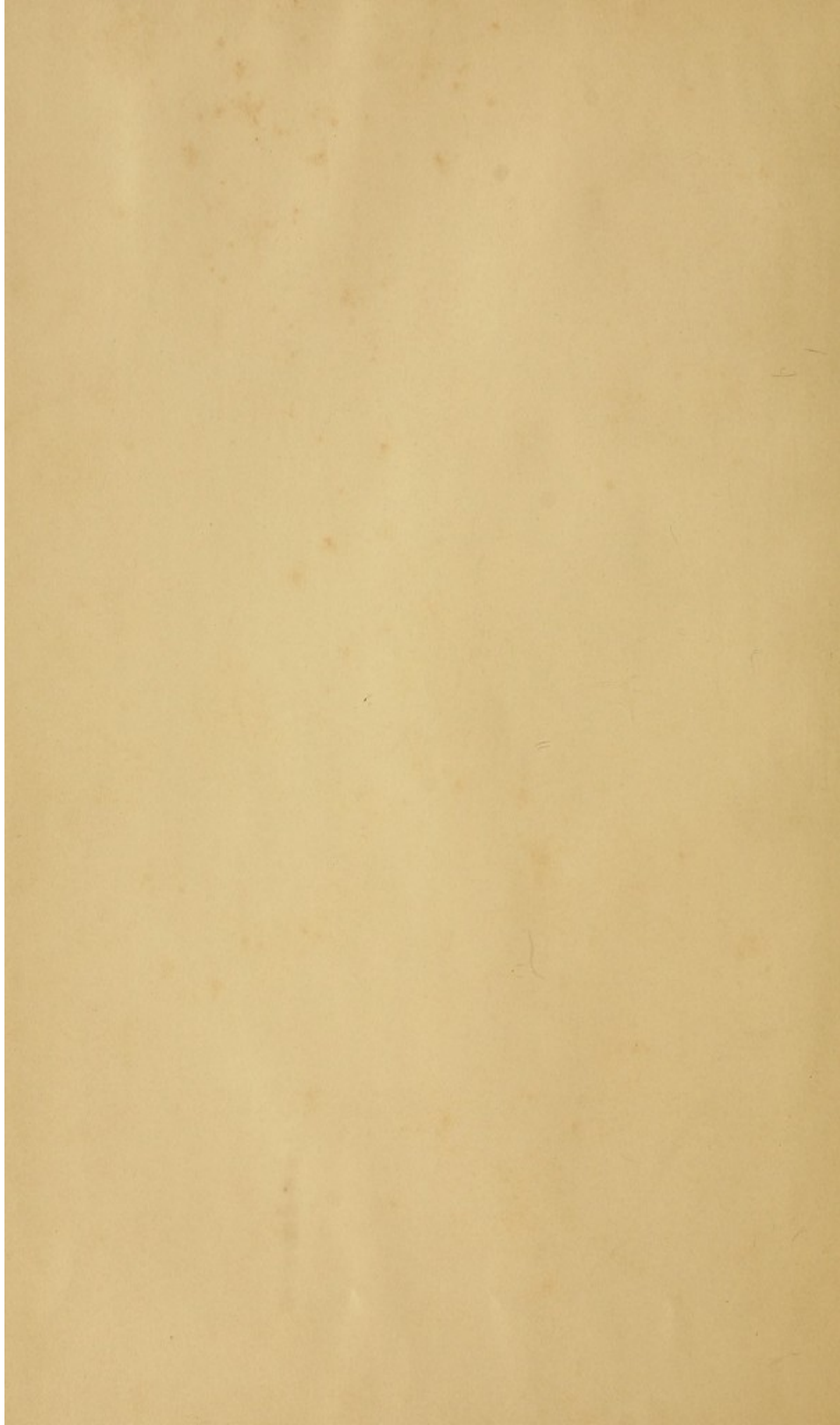


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A TEXT-BOOK
OF THE
MEDICAL TREATMENT
OF
DISEASES AND SYMPTOMS

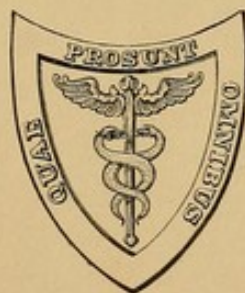
BY
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ADAPTED TO
THE UNITED STATES PHARMACOPŒIA

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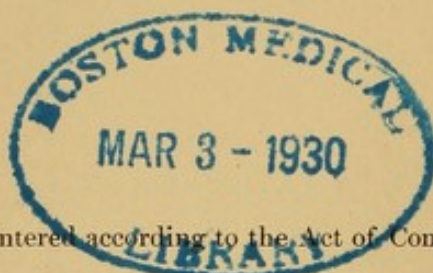


LEA BROTHERS & CO.
PHILADELPHIA AND NEW YORK
1900

DR. L. G. TAYLOR,

Kansas City, Mo.

FEB 9 1901



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22. A. 633

DORNAN, PRINTER.

PREFACE.

IN this book an attempt has been made to supply a want created by the present system of medical education. Students learn Practical Pharmacy at an early stage in their career; they also attend lectures on Pharmacology, which frequently include only the physiological actions of drugs. When they have to apply their knowledge of Therapeutics at the bedside they feel the need of further guidance, since in most of their text-books on Medicine the subject of Treatment is dealt with not only briefly, but in general terms, thus affording little help in practical work. The links between Physiology and Pathology, between Pharmacology and Therapeutics, are not always readily apparent, while some difficulty is often experienced in regarding Treatment from a new point of view. A student may know many diseases and symptoms for which any particular drug, such as digitalis or belladonna, may be employed, and yet scarcely be prepared with the various drugs serviceable in the course of the treatment of any individual disease or symptom.

The sequence of the chapters in this work rests chiefly on an anatomical and physiological basis, but occasionally sections have been inserted dealing with symptoms of frequent occurrence. Under the heading of the different diseases those symptoms only are mentioned which afford indications for treatment. Similarly, with regard to the causes and complications of certain morbid conditions, stress is laid upon those which call for prophylactic or remedial measures. To present a complete account of the various diseases, including questions relating to pathology, diagnosis, and prognosis, would have been beyond the scope and purpose of this book.

I have endeavored to indicate the forms of treatment which have already received general approval, and although, incidentally, newer remedies are frequently mentioned, I have included those only which appear likely to have a permanent place in practice. I hope that to senior students this volume may form a useful supplement to their text-books on Medicine, and that, as a work of reference, practitioners may find in it much that is helpful and suggestive.

NESTOR TIRARD.

AMERICAN PUBLISHERS' NOTE.

IN presenting this eminently practical work to the American Profession the publishers feel that they are rendering a service to both student and practitioner by making available a most useful guide in the actual treatment of the patient at the bedside.

Among the many specialties which to-day constitute the Practice of Medicine, none has actually grown more broadly and beneficently than the chief of all—namely, Treatment; and though this object of all medical science really requires a volume for its adequate presentation, the tendency has been to curtail the space assigned to it in the text-books. A special work on Treatment, such as the present, will therefore be of value to a very wide circle. It will enable the student to bridge the gap between his knowledge of theory and its application at the bedside, always a difficult transition, and it will afford the practitioner suggestions for meeting all symptoms, stages and complications of medical diseases, space being devoted to full details. The numerous prescriptions have been adapted to the *United States Pharmacopœia* by Dr. E. Quin Thornton.

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DR. L. G. TAYLOR,
Kansas City, Mo.



MEDICAL TREATMENT.

CHAPTER I.

CIRCULATION.

Acute Pericarditis—Chronic Pericarditis—Endocarditis, Simple and Ulcerative—
Chronic Valvular Lesions—Dilatation of the Heart—Hypertrophy of the
Heart—Fatty Degeneration—Functional Palpitation—Angina Pectoris—Syn-
cope and Collapse.

Acute Pericarditis. In a book upon Medical Treatment there are obvious advantages in grouping the different diseases and prominent symptoms on an anatomical basis, rather than in dealing with them in the order of their frequency or importance. At the outset, however, this scheme presents certain inconveniences, since while it appears rational to commence with the circulation, and to discuss in turn acute and chronic diseases of the pericardium before approaching the results of valvular lesions, trophic changes, neuroses, and alterations in the blood, pericarditis is ordinarily a complication of some pre-existing disease for which definite hygienic and medicinal measures have already been adopted. The development of this new trouble, while it calls for adequate recognition, will not necessarily interfere with the general course of treatment. Acute pericarditis, as it occurs in connection with rheumatic fever, is so commonly marked by pain that this symptom must be dealt with independently of the measures that have already been taken for the relief of the other symptoms of rheumatism. The pain of pericarditis commonly originates in the præcordial region, but it may extend over a wide area, and may be associated with epigastric tenderness and occasionally with shooting pains similar to those of angina pectoris. Dyspnœa is intimately connected with the pain, and although this symptom is in some cases referable to the short respirations due to the instinctive effort to diminish movement, it nevertheless is frequently the result of accumulations of fluid within the pericardial

cavity, and is then associated with great rapidity of the pulse and with palpitation.

With acute pericarditis with effusion, the patient is necessarily confined to bed on account of the earlier symptoms. Still, it becomes the more important to insist upon absolute repose, and, indeed, all movements should be limited as much as possible.

Pain may often be relieved by the application of three or four leeches over the præcordia, followed by the use of a poultice or fomentation sprinkled with laudanum. As in the treatment of pneumonia, relief is sometimes afforded by placing an ice-bag over the præcordial region ; but it is advisable, when using cold applications, to watch the condition of the pulse and the aspect of the patient, since symptoms of collapse occasionally supervene with great rapidity and call for the immediate use of stimulants. If the fluid in the pericardium increases rapidly in amount, further relief may be obtained by the continuous employment of poultices, or by blistering the surface and subsequently using poultices. Apart from these local measures, it is generally desirable to employ salicylates freely when the condition is associated with acute rheumatism. Relief of pain may also be obtained by the internal use of preparations of opium, which, as in peritonitis, may often be combined with small doses of quinine. On account of the irregularity and weakness of the pulse it is generally necessary to employ stimulants somewhat liberally, and this is particularly the case when sodium salicylate is being administered in large doses. In some forms of pericarditis, notably in the dry form which so often occurs with kidney diseases, it is necessary to avoid the use of opium and also of preparations of cantharides, since when the kidneys are affected both of these remedies may produce undesirable symptoms. In such cases restlessness may be quieted by the use of hyoscyne or hyoscyamine, or sometimes of chloral hydrate, although it is necessary to employ the latter with caution, on account of its depressing influence upon the heart. Strong preparations of iodine may be used as blistering agents, but they require repeated applications.

As pericarditis occurs so often in connection with a pre-existing disease, it is unnecessary to make any material modification of diet on account of this fresh trouble. When the breathing becomes seriously embarrassed and the physical signs indicate great increase in the amount of effusion, the desirability of giving relief by the removal of fluid must be considered, and the small operation this

necessitates does not appear to add materially to the danger of the case. The aspirator is usually introduced obliquely in the fourth or fifth intercostal space, about an inch external to the left margin of the sternum. If the fluid first drawn is found to be clear and colorless, or straw-colored, moderate relief will probably be afforded by the slow withdrawal of a few ounces. It is generally considered to be undesirable to attempt to empty the pericardial sac. Should the fluid be found to be purulent, it should be removed through a small incision, and a drainage tube should be inserted. This treatment may appear somewhat formidable, yet it affords the best chances of recovery, and sufficient successful cases have now been recorded to warrant its employment. In fifteen recorded cases of treatment of purulent pericarditis by incision, eight recovered and seven were fatal.

Chronic Pericarditis. Chronic pericarditis may occur in two forms: the one with but little effusion of fluid constitutes the form which is fairly frequent in the course of kidney diseases, while in the other a large amount of fluid may accumulate as part of a general dropsical effusion. The dry form may require local applications for the relief of pain, but it may be frequently found on physical examination when there has been no complaint of pain. The dropsical effusion may sometimes be relieved by the ordinary measures adopted for the treatment of general dropsy. Great alterations in the area of dulness may follow the employment of diuretics, such as preparations of potassium nitrate, squill, digitalis, or scopolarium; while other cases appear to benefit from the employment of saline and hydragogue purgatives—a form of treatment which will be more fully discussed in connection with chronic renal dropsy. As in acute pericarditis, it may be necessary to afford immediate relief of urgent symptoms by aspiration.

Endocarditis. Endocarditis occurs under two forms: simple and ulcerative. In both it is necessary to treat first the cause of the disease, and secondly the special symptoms which may develop during its progress. Simple endocarditis occurs so commonly in connection with rheumatic fever that the treatment is largely that adapted to this disease. It may, however, also develop in connection with scarlet fever, with phthisis, diabetes, chorea, and occasionally with the late stages of Bright's disease; but in all these cases the onset is much more gradual than when it is due to acute rheumatism, and it is, therefore, more difficult to apply appropriate remedies at

the time when they may be of service. When dealing with a case of endocarditis associated with rheumatic fever, the diet should be strictly regulated so as to contain a relatively large proportion of fluid of a non-irritating character. Thus it is advisable to employ fairly large quantities of milk, of weak beef-tea or broth, as well as of alkaline drinks. In these cases it is also desirable to give alkalies, such as potassium bicarbonate and salicylates or salicin, which frequently diminish the temperature and reduce the frequency of the pulse. With the same objects quinine may be employed in repeated small doses.

These drugs are frequently prescribed in the following forms, the mixtures being taken three times a day or oftener :

R.—Potassii bicarbonatis	.	.	.	.	.	.	gr. x.
Potassii nitratis	.	.	.	.	.	.	gr. v.
Aquæ	.	.	.	.	.	.	℥j.
R.—Potassii bicarbonatis	.	.	.	.	.	.	gr. xx.
Tincturæ hyoscyami	.	.	.	.	.	.	℥xx.
Aquæ camphoræ	.	.	.	.	.	.	℥j.
Aquæ destillatæ	.	.	.	.	.	q. s. ad	℥j.
R.—Potassii bicarbonatis	.	.	.	.	.	.	gr. x.
Tincturæ zingiberis	.	.	.	.	.	.	℥xv.
Infusi rhei	.	.	.	.	.	.	℥j.
Infusi gentianæ compositi	.	.	.	.	.	q. s. ad	℥j.
R.—Quininæ sulphatis	.	.	.	.	.	.	gr. j.
Ammonii carbonatis	.	.	.	.	.	.	gr. ij.
Potassii bicarbonatis	.	.	.	.	.	.	gr. xx.
Tragacanthæ	.	.	.	.	.	.	gr. iv.
Aquæ chloroformi	.	.	.	.	.	.	℥iv.
Aquæ destillatæ	.	.	.	.	.	q. s. ad	℥j.

Caton¹ advocates continuous counter-irritation combined with prolonged rest. When in a case of acute rheumatism a bruit is heard at the mitral or aortic valve, or even when the premonitory *assourdissement* is perceptible, he applies a series of small blisters, each the size of a silver half-dollar, along the course of the third, fourth, fifth, or sixth intercostal nerve, in front and at the sides. Only one blister is applied at a time, but the blistering is repeated at different points. He gives at the same time sodium or potassium iodide in 8 or 10-grain doses thrice daily, and he keeps his patients in bed for about six weeks. He claims for this treatment a very con-

¹ British Medical Journal, January 25, 1896.

siderable reduction of the liability to chronic valvular mischief after acute rheumatism with endocarditis.

The special symptoms likely to arise in connection with endocarditis are those of anæmia, palpitation, and pain. The first may be greatly benefited by the administration of tincture of ferric chloride. Palpitation may be controlled by the employment of digitalis, either the infusion or the tincture, while some cases appear to improve greatly during the administration of stimulants. In endocarditis it is necessary to watch the pulse closely while giving stimulants, and to check their administration if the pulse gains in rapidity and loses in force. For the relief of pain different preparations of opium may be used, and of these the compound ipecacuanha powder is often preferred. When given at night this powder will frequently promote sleep by reducing cardiac discomfort. In some cases of more chronic type, benefit appears to result from the employment of iodide of potassium, or of sodium. During convalescence from rheumatic endocarditis, it is necessary to warn the patient to avoid muscular exertion and cardiac strain. There are good grounds for believing that carelessness at this period is liable to be followed by increased cardiac distress. When the progress of the case is estimated by the sounds of the heart, it is certain that murmurs may disappear during convalescence from rheumatic endocarditis, and may reappear at a later date when the patient has returned to his ordinary occupation.

Ulcerative endocarditis is a form associated with the development of micro-organisms in the blood. It usually occurs in connection with septic processes, and it is frequently characterized by wide oscillations of temperature, which, in all probability, depend upon the passage of emboli from the heart to various parts of the body. These cases were formerly frequently treated by drugs calculated to check the activity of the micro-organisms, and with this idea fairly large doses of quinine, salol, sodium sulphocarbonate, or of corrosive mercuric chloride have been employed. Although the use of these remedies has in certain cases been attended by good results, the disease is frequently fatal. Recently many observers have attempted to deal with this disease by the injection of antistreptococcic serum, which in some cases appears to have given satisfactory results. The usual dose administered is 20 c.c., and the injections are repeated daily. In a case under my own care, the patient improved during the administration of serum, but died shortly after leaving the hospital at his own request.

Chronic Valvular Lesions. The treatment of chronic valvular lesions may be considered from two totally different points of view. The first is the treatment of those cases in which the valvular lesion, whether obstructive or regurgitant, has been sufficiently compensated by hypertrophy and dilatation of the heart. The threatened interference with the course of the circulation may then produce no symptoms, or the patient may only be conscious of a little shortness of breath or of occasional palpitation. A large number of individuals with valvular lesions are wholly unaware of their condition, and it is, therefore, obvious that treatment is scarcely called for in such cases; but sometimes it may seem desirable to warn patients of the weakness of the heart's action, so that they may avoid incurring risks from sudden strain or violent exertion. Wherever it is possible, it is distinctly desirable to change the occupation if it appears likely to be prejudicial. Many such patients are able to undergo severe physical labor without necessarily suffering in any way; while, on the other hand, life may be rendered miserable by learning the truth about their condition. Since the risks in such cases are increased by any degenerative changes of the heart's muscle, nourishing diet should be encouraged and stimulants should be avoided. It is also necessary to employ in moderation, if at all, such articles as have a distinct influence upon the rapidity of the heart's action; hence tea, coffee, and tobacco should be employed only sparingly. It is sometimes desirable to warn patients of possible risks connected with extremes of temperature, and a climate of moderate warmth and dryness may occasionally defer the onset of more serious symptoms. From what has been said of the comparative absence of symptoms it will be seen that medicinal treatment is scarcely necessary. Occasionally benefit results from the use of non-astringent forms of iron when there is a tendency to anæmia; at other times, notably with mitral disease, small doses of bromides may be employed to check slight irritability of the heart's action. Under similar conditions digitalis and strophanthus may reduce the frequency of the pulse, but in many cases of mitral disease some increased rapidity of the pulse is a natural consequence of the lesion, and does not require treatment.

Secondly, with regard to uncompensated cases, or rather to those cases in which the hypertrophy and dilatation are commencing to fail, it will be necessary to speak in detail of the various complications resulting respectively from mitral and aortic disease, but gen-

eral treatment may be adopted which is equally applicable to both conditions. In the first place, it is necessary to treat these cases by rest in a recumbent posture, and frequently this is almost sufficient, in early stages, to restore comfort. When there is much irregularity of the heart's action some cardiac tonic must be used, either the tincture or infusion of digitalis, or the tincture of strophanthus, and it is generally useful to give simultaneously some form of iron, selecting in preference one least likely to produce constipation. Sometimes, when digitalis and strophanthus have long been employed, benefit may result from the substitution of citrated caffeine; but it will be frequently found desirable to use these three drugs in successive weeks.

The list of cardiac tonics is rather lengthy, and at various times one or other has come into an ephemeral use. The salts of barium at one time found favor, but are not much employed at present. Of other drugs, convallaria, adonis vernalis, and sparteine have been employed, but most practitioners find it unnecessary to resort to these remedies, since strophanthus and digitalis, if judiciously employed, usually give relief. Sometimes, especially when there is much sleeplessness or headache, nitrites, which lower the blood-pressure, are preferable to the cardiac tonics, which raise it. With any of these remedies bitter tonics may be conjoined, such as quinine, nux vomica, strychnine, and quassia, or these tonics may be given separately. The following prescriptions for tonic mixtures, to be taken twice or thrice daily, are often used:

R.—Quininæ sulphatis	gr. j.
Acidi hydrobromici diluti	℥ ss.
Aquæ q. s. ad	℥ j.
R.—Quininæ sulphatis	gr. j.
Acidi nitro-hydrochlorici diluti	℥ x.
Aquæ cinnamomi	℥ ij.
Aquæ q. s. ad	℥ j.
R.—Quininæ sulphatis	gr. ij.
Acidi sulphurici diluti	℥ iv.
Tincturæ aurantii dulcis	℥ x.
Syrupi	℥ ss.
Aquæ q. s. ad	℥ j.
R.—Tincturæ nucis vomicæ	℥ x.
Tincturæ gentianæ compositæ	℥ j.
Acidi nitro-hydrochlorici diluti	℥ x.
Syrupi	℥ j.
Aquæ q. s. ad	℥ j.

R.—Tincturæ nucis vomicæ	℥v.
Ammonii carbonatis	gr. iv.
Spiritus chloroformi	℥v.
Infusi quassiae.	q. s. ad ʒj.
R.—Strychninæ hydrochloratis	gr. $\frac{1}{35}$.
Acidi nitro-hydrochlorici diluti	℥xv.
Infusi gentianæ compositi	q. s. ad ʒj.
R.—Acidi nitro-hydrochlorici diluti	℥x.
Spiritus chloroformi	℥x.
Infusi quassiae	q. s. ad ʒj.

The comfort of the patient may also be increased by the occasional administration of preparations of mercury in purgative doses, but these must be used with considerable discretion, since if too often employed they may produce undue weakness.

The special symptoms which arise in connection with chronic valvular disease are somewhat different when the mitral or aortic valves are affected, though one of the earliest indications calling for special treatment generally arises from an interference with the circulation through the lung. This may induce either increasing dyspnoea or frequently recurring attacks of cough, which is sometimes associated with hæmoptysis. The dyspnoea and cough may occasionally be benefited by the administration of simple expectorants, such as mixtures containing ammonium carbonate or sal volatile. More often greater benefit results from the employment of cardiac tonics at the same time that these stimulant remedies are being used. In severe cases, more particularly in hospital practice, it may be necessary to perform venesection, and on several occasions I have seen great improvement from the removal of eight to ten ounces of blood. It must be remembered, however, that such extreme engorgement occurs comparatively rarely in private practice, as advice is sought more early. The hæmoptysis is seldom sufficient to cause anxiety or to call for treatment, and in many cases the distress is greatly relieved by its occurrence, even though the anxiety of the friends is increased. Sometimes the symptoms of lung engorgement may be greatly reduced by the use of purgatives, but, as previously indicated, it is desirable to be somewhat sparing in the use of these drugs.

Many cases of mitral disease at a later stage show indications of interference with the work of the right side of the heart, this interference making itself evident primarily by some degree of cyanosis, owing to the impaired movement through the venous circulation, and at a later stage symptoms indicative of interference with the

rate of blood-flow through the inferior vena cava may be developed ; thus many patients suffer from interference with the work of the liver, which may even lead to the production of transient forms of jaundice. Simultaneously, or even independently, gastro-intestinal catarrh may develop, and albuminuria with reduction in the daily excretion of urine, and dropsy may be noted, the latter commencing ordinarily in the lower extremities and gradually progressing upward. These symptoms respectively call for special treatment. The cyanosis is usually diminished by rest and by the employment of cardiac tonics, which to some extent also give relief from the symptoms of gastro-intestinal catarrh and of jaundice. Congestive albuminuria scarcely requires special treatment, and in the early stages the dropsy of heart disease will be largely under the control of cardiac tonics and of rest. Later, however, it may be necessary to use in addition diuretics or even diaphoretics, though the latter are not so frequently employed as in dropsy the result of kidney disease.

The following diuretic mixtures, to be taken three or four times a day, are frequently prescribed in various London hospitals :

R.—Potassii nitratis	.	.	.	.	.	.	gr. xv.
Spiritus ætheris nitrosi	.	.	.	.	.	.	℥xv.
Syrupi limonis	.	.	.	.	.	.	℥xl.
Aquæ menthæ piperitæ	.	.	.	.	.	q. s. ad	℥j.
R.—Potassii acetatis	.	.	.	.	.	.	gr. xx.
Potassii nitratis	.	.	.	.	.	.	gr. x.
Spiritus ætheris nitrosi	.	.	.	.	.	.	℥ss.
Spiritus juniperi	.	.	.	.	.	.	℥ss.
Decocti scoparii	.	.	.	.	.	q. s. ad	℥j.
R.—Potassii acetatis	.	.	.	.	.	.	gr. xx.
Tincturæ scillæ	.	.	.	.	.	.	℥xx.
Spiritus ætheris nitrosi	.	.	.	.	.	.	℥ss.
Decocti scoparii	.	.	.	.	.	q. s. ad	℥j.

The following mixture possesses both diuretic and diaphoretic properties :

R.—Potassii acetatis	.	.	.	.	.	.	gr. xx.
Potassii nitratis	.	.	.	.	.	.	gr. v.
Spiritus ætheris nitrosi	.	.	.	.	.	.	℥ss.
Aceti scillæ	.	.	.	.	.	.	℥x.
Liquoris ammonii acetatis	.	.	.	.	.	.	℥ij.
Aquæ camphoræ	.	.	.	.	.	.	℥j.
Aquæ destillatæ	.	.	.	.	.	q. s. ad	℥j.

Of diuretic remedies by far the most important is digitalis, and it may be given in increasing doses so long as the patient is kept at

rest and under observation. Preparations of squill, of scopolium, or of potassium nitrate may be given with digitalis. Occasionally, when the benefit from these remedies appears to have ceased, I have found diuretin of service, though sometimes it fails. If in spite of these drugs the œdema increases, it will be necessary to consider the advisability of operative measures. Large quantities of fluid may be removed by making incisions over the ankles. Many prefer to effect the same end by numerous small punctures in the legs, but the discomfort which ensues from the constant moisture is a great disadvantage. As in the treatment of renal dropsy, Southey's tubes are often used with marked benefit. Owing to the dangers of starting inflammatory changes it is always desirable, when dealing with cardiac dropsy, to postpone operations as far as possible. In severe cases, when the accumulation of fluid within the abdominal cavity interferes with the freedom of movement of the diaphragm and so impedes both respiration and circulation, it will often be necessary to perform paracentesis.

The symptoms of aortic regurgitation or aortic obstruction present very marked differences in early and in late conditions. In the latter the symptoms resemble those due to failure of the mitral valve, and this, in all probability, is due to the fact that after aortic regurgitation has existed for a length of time, some degree of mitral regurgitation necessarily follows from over-distention of the mitral orifices; hence, though the disorder may primarily be due to failure of the aortic valves, the symptoms of failure of the mitral valves become superadded, and in the main the lines of treatment are those adapted to mitral regurgitation. Before this stage has been reached, however, the patient will have experienced considerable discomfort from the failure of the aortic valves, or at all events from the failure of compensation of the amount of obstruction or of leakage at the aortic valves. Thus patients constantly suffer from transient attacks of giddiness, especially after undergoing extra exertion or on assuming the erect posture suddenly.

The degree of discomfort in aortic cases essentially depends upon the nutrition of the hypertrophied left ventricle. Very commonly, as age advances, the hypertrophied muscle undergoes gradual degeneration and becomes unable to cope with the increased aortic incompetency. Measures must, therefore, be adopted to retard the degenerative changes so far as possible, and to maintain the nutrition of the ventricle; while, if we have good grounds for believing that

degeneration has already taken place, additional warnings must be given of the risks incurred with any sudden overstrain. When patients complain of symptoms referable to the heart—that is, of sense of fulness within the thorax, or of pain in the cardiac region, or of increasing dyspnœa—relief may frequently be afforded by the employment of stimulant remedies: graduated doses of compound spirits of ether and of aromatic spirits of ammonia, together with avoidance of overstrain, and in some cases with actual rest in bed, will often afford temporary relief. In such cases, also, digitalis may be beneficial, though it is often urged, on the other hand, that by causing prolongation of diastole this drug gives more time for the blood to regurgitate into the dilating ventricle. Still, it must be regarded as a clinical fact that in a large proportion of cases of aortic disease benefit results from the use of digitalis. The cardiac contractions become more regular and more efficient, and the sense of discomfort is diminished. It has also been urged against the employment of digitalis in aortic regurgitation, that by causing contraction of the arterioles it increases the blood-pressure and so further embarrasses the action of the heart. It must be admitted that in certain cases little relief is afforded by the use of this drug; while greater help can be obtained from remedies which diminish the blood-pressure—that is, by vasodilators. Speaking generally, the degree of benefit likely to result from the use of digitalis is to be measured by the extent of failure of compensation; in other words, there is but little scope for the use of this drug in the earlier stages of aortic disease, while it is of extreme service in the later stages. If during its employment the pulse becomes rapid and irregular, it is necessary to discontinue its administration, and under such circumstances *strophanthus* may give better results.

With regard to the use of vasodilators in aortic disease, they are chiefly indicated with spasmodic attacks of pain referable to the heart. These remedies, must, however, be employed in two different ways: first, for the immediate relief of serious spasmodic pain; and, second, for the continuous failure of the blood-pressure. For the first, nitrite of amyl is usually administered, the vapor being inhaled after crushing in a handkerchief a small glass capsule containing from 3 to 5 minims; but the effect of this remedy is apt to pass off quickly, and although it possesses great advantages in emergencies, one of the drugs of slower action is more commonly preferred. Many patients like using nitroglycerin in some form. The *tabellæ*,

which contains the hundredth part of a grain, will often reduce pain, but they are very apt to cause headache, and smaller doses should then be taken. Many patients endeavor to break the tabellæ in half, and this doubtless accounts for the increased size recently recommended in the *British Pharmacopœia*. Others prefer the employment of the liquor trinitrini, and carry about with them small bottles of this solution well diluted.

The headache resulting from the use of nitroglycerin constitutes a great objection to its employment, although its action is more prolonged than that of nitrite of amyl. Numerous researches for a vasodilator of more prolonged action have been made, and for this purpose Dr. Bradbury has recommended erythrol tetranitrate. According to recent observations, this drug produces little effect until half an hour after its administration, and the maximum effect is produced at the end of an hour. After this the arterial tension gradually increases again, but it does not return to its previous condition until about ten hours after the dose has been taken. Erythrol tetranitrate may perhaps, it is claimed, prevent the onset of attacks of pain; although, from the greater rapidity of action, nitrite of amyl and nitroglycerin are more serviceable in cutting short the severity of sudden attacks of cardiac pain. It has been stated that when nitrites are administered continuously for long periods they tend to act as cardiac depressants; but very numerous cases have been recorded where these drugs have been employed for a great length of time with marked relief of urgent symptoms and with no indication of prejudicial effects.

Dilatation of the Heart. Dilatation of the heart, although it is most commonly seen as an accompaniment of valvular lesions, is frequently to be met with where there is no evidence of failure of the valves, and, further, where there is no history to point to the probability of endocarditis. It may occur in its simplest form during convalescence from prolonged febrile attacks, and it is also, to some extent, dependent upon other conditions which weaken the walls of the heart or cause sudden strain to be thrown upon the heart, which is physically unprepared. Various excesses have been credited with the causation of this condition, as, for example, excessive smoking or drinking; it is also a form generally associated with excessive mountaineering at the commencement of a holiday. The symptoms are mainly those referable to irregular action, and they frequently first attract attention by palpitation, which comes on sud-

denly during the night. As the causes are extremely various, the first element in the treatment lies in ascertaining the cause. For those who have been over-exercising it may be sufficient to advocate more rational measures, but in mountainous districts it is often desirable to send to a lower level patients who are troubled in this way. Many people suffer from dilatation and palpitation at altitudes of 4000 to 6000 feet who can breathe with perfect comfort in the valleys. In more extreme cases it may be necessary to insist upon complete rest, but generally the avoidance of strain, together with moderate daily open-air exercise, offer better chances of recovery. Sometimes in intractable cases greater benefit results from a long sea voyage, where the limitation of muscular exercise and the simple conditions of life allow the ventricle to regain its normal dimensions. The employment of cardiac tonics is frequently beneficial, and progress is often more rapid if these are combined with hæmatics.

Since these patients are generally highly neurotic, it is often desirable to employ sedatives in moderate doses, and particularly to check the habit of sleeplessness which is often found in connection with this condition. Some patients prefer to go through a mild course of treatment at a hydropathic establishment, and there is little doubt that the enforced simplicity of life is, as a rule, beneficial. It is scarcely necessary to say that if the condition appears to depend upon the excessive use of tobacco or of tea or coffee, or if it is associated with dyspeptic symptoms, special treatment is required.

Hypertrophy of the Heart. Hypertrophy of the heart, like the last condition, is frequently the result of valvular lesions, and, as a rule, the amount of hypertrophy and of dilatation are indications of the degree of interference with the circulation. Hypertrophy, however, may occasionally be found when there is no evidence of valvular trouble and but little of dilatation of the cavities. This condition may arise in consequence of any conditions provoking over-action of the heart. Some degree of hypertrophy probably always accompanies the muscular strain involved in training for boat races or other forms of athleticism, and in these days there is little doubt that this condition is more frequent owing to the amount of strain due to injudicious exertion in bicycling uphill or in the face of a strong wind. The symptoms referable to the condition are somewhat vague. The most common is palpitation, but complaint

may also be made of giddiness and headache, and sometimes of other indications of interference with the circulation through the central nervous system. It is comparatively rare for this condition to require treatment, since generally after the cessation of the causes the hypertrophy appears to right itself quickly. Sometimes in attacks of palpitation it may be advisable to limit the amount of exercise and to reduce the quantity of animal food. All forms of alcohol should be prohibited, and frequently it is also desirable to interdict the employment of tobacco, tea, and coffee. Benefit occasionally occurs from the graduated reduction of the amount of liquid taken, but the same result may be obtained by the employment of mild saline purgatives. Generally speaking, it is well to avoid the use of cardiac tonics such as digitalis, and of cardiac depressants such as aconite or veratrine; in fact, this condition is one which is better treated by hygienic measures than by the free use of drugs.

During the last few years much has been said of the value of baths and exercises in the treatment of heart failure. At one time cases of failure of compensation were rigidly treated by rest, but there has been a gradual growth of opinion that in properly selected cases various forms of exercise are beneficial. Oertel recommended climbing, and thought that with gradually increasing muscular effort the ventricle might be induced to perform more efficient work. Ling, in Sweden, advocated passive exercises of the limbs, massage of the abdomen and spine, together with movements calculated to expand the thorax. A third form of exercise, recommended by Schott, is a modification of Ling's method, and consists of movements with limited resistance. This method is commonly employed in conjunction with baths in the well-known Nauheim system, and marvellous results have been claimed in the treatment of a variety of forms of cardiac weakness. The Nauheim baths may be imitated by adding to a forty-gallon bath five pounds of sodium chloride and eight ounces of calcium chloride, while effervescence is produced by the addition of Sandow's powders.

The immediate effect of this bath is to cause redness of the surface, while the pulse becomes slow and regular and the heart's action more vigorous. It has been claimed that the area of cardiac dulness is diminished and the position of the apex beat is altered after the use of these baths; but some observers maintain that these observations are fallacious, and that the diminution of the area of cardiac dulness does not correspond to a decrease in the size of the heart,

but that it is due to more complete expansion of the lung. There is little profit to be gained from discussing this point, since there is now general agreement in favor of the treatment, although there is abundant evidence that great care must be exercised in the selection of cases. It is contraindicated with advanced stages of arterial sclerosis, with acute and chronic nephritis, and with aneurism of the aorta; but, on the other hand, the usual indications of cardiac failure—œdema, hydrothorax, or hydropericardium—do not appear to add to the risks of the treatment. The most suitable cases are those of enfeebled heart, with or without marked dilatation, and with or without organic valvular lesion.

Fatty Degeneration. Fatty degeneration frequently occurs as a sequel of many prolonged fevers which are ordinarily marked by wasting; thus it is common after typhus and typhoid fever, and it occurs in addition in connection with phosphorous poisoning. When resulting from such causes it is not likely to have any serious sequelæ, nor does it require any special line of treatment. The indications which are ordinarily followed during convalescence are those which are applicable to this condition. Thus it is advisable to encourage moderate but gradually increasing exercise, and to employ iron and other tonics to improve the general condition of the health. The patient's dietary should also be rendered nourishing and digestible.

A more serious form of fatty degeneration is that which ensues after the prolonged existence of various cardiac lesions; thus in advanced stages of aortic disease, more particularly among the poorer classes, the hypertrophied muscle almost invariably undergoes fatty degeneration, and the treatment of such cases necessarily resolves itself into the treatment of uncompensated disease of the aortic valves. Fatty degeneration also occurs with some frequency as a result of impaired nutrition, owing to atheromatous changes in the coronary arteries; and in such cases the prominent symptoms are dyspnœa, even on slight exertion, and a sense of weight upon the chest, from which the patient endeavors to free himself by taking deep breaths from time to time, so that the respiration is often of a sighing nature. Frequently under these conditions the patients suffer from sleeplessness at night, while they tend to doze off at odd times during the day, drowsiness being more particularly marked after meals. In addition, these patients are subject to true attacks of angina pectoris, the attacks being perhaps rather more common at night. As with other cases of angina, these symptoms are fre-

quently conjoined with those of impaired digestion ; in fact, it is often difficult to differentiate the anginal attacks from similar palpitation and cardiac discomfort primarily due to dyspepsia—that is to say, it may sometimes be a little difficult to decide whether to treat the heart or the digestive system for the relief of the pains. Cases of fatty degeneration due to senile changes always require the utmost care in dieting, both with a view of eliminating those articles which are prone to produce palpitation, and with a view of adopting that form of dietary which is most likely to favor the nutrition of the cardiac muscle. Thus it is almost imperative to discontinue the use of tea, coffee, and tobacco. Sometimes tea in a dilute form may be allowed, especially if careful instructions are given to avoid taking it at too high a temperature ; and occasionally also it may be well to allow a very moderate employment of tobacco, since in some cases this appears to act as a sedative if smoked at night. I have frequently seen moderate indulgence in tobacco at night followed by beneficial results in individuals who were previously not addicted to its use ; but the amount requires to be carefully limited, since, if indulged in too freely, it is apt to increase palpitation and digestive disturbances.

Perhaps in no other class of cases does the use of alcohol require greater discretion. If taken in excess it undoubtedly favors degenerative changes ; but, on the other hand, if taken occasionally when there is much disturbance from palpitation, or when there is some tendency to syncope, pure forms of alcohol will undoubtedly do good ; in other words, in these cases alcohol is to be regarded purely as a drug and not as a drink. From the occasional need of additional cardiac stimulants, some patients find it advisable to carry with them a small pocket flask containing either brandy or whiskey for use in emergencies.

The tendency to shortness of breath on exertion naturally suggests the avoidance of stairs and hills, and further renders it necessary to advise that all undue hurry should be avoided. Warnings should also be given against crowded, ill-ventilated rooms, which frequently increase the sense of weight within the thorax. With sudden attacks of shortness of breath and palpitation it is sometimes desirable to administer diffusible stimulants, as, for example, a mixture of equal parts of aromatic spirit of ammonia and spirit of ether. A teaspoonful of such a mixture given in cold water, followed by a draught of warm water, will frequently relieve discomfort, especially

if the patient is encouraged to assume the recumbent posture. Some benefit may result from the occasional employment of preparations of *nux vomica* or strychnine in conjunction with iron. Thus the following may be given three times a day :

R.—Strychninæ hydrochloratis	. . . . .	gr. $\frac{1}{2}$.
Acidi nitrohydrochlorici diluti	. . . . .	℥x.
Liquoris ferri chloridi	. . . . .	℥x.
Aquæ chloroformi	. . . . .	℥iv.
Aquæ destillatæ	. . . . . q. s. ad	℥j.

On the other hand, *digitalis* and *strophanthus* and other cardiac tonics give very little relief. Attempts have been made occasionally to stimulate nutrition by mild courses of massage, but however beneficial this may be in increasing the nutrition of a neurasthenic, I have not seen any advantage from its employment in cases due to senile changes. Although various hypnotics have been employed in this condition, they seem to give less relief than is obtainable from the administration of small quantities of food or of stimulants at bedtime. The treatment of attacks of angina does not materially differ from that of other forms of angina pectoris.

Functional Palpitation. Although palpitation is frequently associated with mitral disease, it is far more common for complaint of this symptom to be made when there is no obvious disease of the heart. The causes are extremely various, the condition sometimes resulting from a neurasthenic tendency, sometimes from anæmia, and very often from dyspepsia, which may take its origin in some error of diet, the principal errors likely to produce this condition being excessive use, or, rather, abuse, of alcohol, tea, and tobacco. This enumeration of the causes naturally suggests that the treatment necessary is essentially the treatment of the cause, and that the treatment is likely to be a complete failure unless the true cause has been recognized. Thus, among neurotic cases it is occasionally possible to discover an underlying cause of the neurosis and to treat this by judicious advice. When palpitation occurs in connection with anæmia or chlorosis, efforts must be made to correct these conditions by the administration of iron. The frequent employment of iron pills, or of powders of reduced iron, will probably remove the cause and so allay the symptoms. In both of these classes of cases some benefit may occasionally be obtained from the use of bromides, ammonium bromide being perhaps more commonly used than potassium bromide, which has been credited with a depressing action.

When the condition results from dyspepsia, it is obviously desirable to ascertain and remove the cause of the dyspepsia. Functional palpitation is, however, frequently the result of imperfect mastication, and can be cured either by encouraging the patient to spend more time over meals and to eat more slowly, or, if the teeth are imperfect, by adopting suitable dental measures. I have often seen cases of palpitation due to dyspepsia cured by an efficient set of artificial teeth, or by having the teeth judiciously stopped, so that mastication may be properly performed. In dyspeptic cases relief may sometimes be afforded by the use of gastric sedatives or of aperients. Bismuth carbonate, bismuth salicylate, and hydrocyanic acid will sometimes remove symptoms of chronic gastric catarrh.

Angina Pectoris. The treatment of angina pectoris divides itself naturally into two forms: first, the treatment during the attacks of pain, and, second, the treatment during the intervals of pain. Angina is a condition which manifests itself in a variety of different cases, and while it is far more prone to occur with some forms of cardiac lesion, notably with troubles connected with the aortic valve, it is, nevertheless, met with in connection with numerous forms of disordered action of the heart. Further, although this symptom is frequently absent in cases which might be expected to be complicated with angina, yet when once an attack of true angina has occurred it is extremely liable to recur. As the causes are so various, it is always necessary to ascertain the cause or causes in the individual case, and these in turn may be regarded as first predisposing causes, and secondly exciting causes. When the warning note has once been sounded, it is necessary in the interval to guard against and to treat the conditions liable to provoke attacks, while during the attack the treatment must be confined to the relief of pain. This relief is very largely afforded by the use of nitrites; concerning their modes of action there has been some difference of opinion, although they undoubtedly act as vasodilators, and thus reduce the blood-pressure. It has been thought that the beneficial influence exerted in cases of angina is due to their action as analgesics. The idea that the mode of action does not necessarily depend upon vasodilation is to some extent supported by the variations in the pulse in different cases of angina. In some patients the pulse is almost imperceptible, while in others, though regular, it appears to be of high tension. The pain of angina has been likened to a sense of constriction around the heart. Patients have said that they

felt as if their heart were frequently grasped, and the sense of constriction excites pain radiating across the chest and usually shooting down the left arm, sometimes also down the right. During the pain there is a sense of anxiety, and the patient is afraid to take another step, and usually remains grasping a stick or any convenient support, waiting for the relief to occur. During the attack the face is generally pale and the surface may be clammy. Though these symptoms may last but a few seconds before sudden relief is obtained, sometimes the attack is more prolonged.

Of all drugs that have been recommended for the treatment of this condition, amyl nitrite gives the quickest and greatest relief. A glass capsule, containing 3 to 5 minims, is crushed in a handkerchief and the vapor is inhaled, and ordinarily as the vasomotor relaxation becomes marked the pain passes off, frequently with the eructation of flatus from the stomach. Amyl nitrite, however, does not prove efficient in all cases. Some patients prefer to use some preparation of nitroglycerin, and even with this drug individual idiosyncrasies have to be considered. The spirit glonoin of the *United States Pharmacopœia*, in $\frac{1}{2}$ to 2-minim doses, is sometimes preferred; while in other individuals the nitroglycerin tablets, containing one-hundredth of a grain, appear to exert a more lasting and beneficial effect.

Schott, of Nauheim, thinks that nitroglycerin is most active when given in a liquid medium and combined with tincture of capsicum, rectified spirit, and peppermint water.

Bradbury suggests that in many cases of cardiac pain it might be possible to anticipate and prevent anginal seizures by the administration of erythrol tetranitrate or mannitol hexanitrate, which possess the vasodilating properties of the nitrites, but produce their effects upon the blood-pressure more slowly, the action being also less evanescent. Erythrol tetranitrate may be given in doses of 1 grain, in the form of pills or tablets, or in alcoholic solution. Bradbury suggests that a solution of erythrol tetranitrate of the strength of one in sixty may be made, and that 1 drachm may be given in an ounce of water every four or six hours.

Another drug which is frequently employed is sodium nitrite, given in doses of from 1 to 2 grains. Whichever remedy is preferred it should be at hand for immediate use when previous attacks have warned the patient of the possibility of a recurrence. Failing this, relief may sometimes be afforded by diffusible stimulants; a

half-drachm or drachm dose of spirit of ether with water, or an equivalent dose of ammonium carbonate or even of brandy, will occasionally reduce pain. In some cases pain is more prolonged and defies the action of these remedies, and some observers recommend the use of inhalations of chloroform or ether—a plan of treatment which has hitherto found but few adherents. Hypodermic injections of morphine are occasionally of service in attacks of long duration, but it is advisable when using this drug to administer also cardiac stimulants, such as a mixture of equal parts of spirit of ether and of aromatic spirit of ammonia. When no drugs are available, relief may sometimes be afforded by hot applications over the heart, and by immersing the feet and hands in hot water.

With regard to the treatment during the interval between the attacks, with care the exciting causes may sometimes be avoided; thus it is well known that attacks of angina very often occur in connection with flatulent distention of the stomach—a condition likely to result from dyspepsia or from errors in diet. To a large extent, also, these attacks frequently follow severe mental agitation or over-exertion. Among the other predisposing causes may be enumerated conditions likely to favor degenerative changes of the heart, especially in connection with aortic disease; conditions tending to produce cardiac irregularity, such as the injudicious employment of tea, coffee, tobacco, or alcohol, which may in addition favor dyspeptic troubles; and in some instances attacks of angina appear to be frequent with a gouty diathesis. These predisposing and exciting causes are, to a large extent, within the reach of treatment. It is accordingly necessary to advise the avoidance of habits calculated to favor such attacks, and, further, to treat the dyspeptic symptoms when present. Attention must always be paid to the diet, which must be rendered nutritious and easily assimilable. Advantage sometimes results from the employment of pepsin or pancreatin, and in general some relief may be afforded by the administration of moderate doses of well-diluted alkalies, an hour or more before the chief meals of the day.

The treatment of flatulent dyspepsia is dealt with in detail in another place. It may here be sufficient to enjoin the daily employment of aloetic dinner pills or of small doses of saline purgatives. Occasionally great advantage results from the use of small doses of podophyllin, or of some mercurial preparation, such as blue mass.

Patients subject to angina pectoris frequently suffer from anæmia

and general weakness, and for the relief of these symptoms iron and digitalis may be employed as in other cases of heart disease. The following mixture may be given three times a day :

R.—Tincturæ digitalis	.	.	.	.	.	.	℥v.
Liquoris ferri chloridi	.	.	.	.	.	.	℥xv.
Spiritus chloroformi	.	.	.	.	.	.	℥x.
Infusi quassiae	.	.	.	.	.	q. s. ad	℥j.

The hæmatinic effect of iron may even be increased by the simultaneous administration of arsenic, and in some cases arsenic appears to be preferable to preparations of iron. In using arsenic, however, it is advisable to watch closely for any symptoms of disturbance of digestion, which are likely to be produced if the drug is given in overdose or for too great a length of time. The weakness may sometimes be counteracted by the administration of preparations of quinine or of strychnine, the latter in particular acting as a cardiac tonic :

R.—Quininæ sulphatis	.	.	.	.	.	.	gr. ij.
Acidi sulphurici diluti	.	.	.	.	.	.	℥ij.
Tincturæ cardamomi compositæ	.	.	.	.	.	.	℥x.
Aquæ	.	.	.	.	.	q. s. ad	℥j.

R.—Strychninæ hydrochloratis	.	.	.	.	.	.	gr. $\frac{1}{20}$.
Acidi nitrici diluti	.	.	.	.	.	.	℥x.
Acaciæ	.	.	.	.	.	.	gr. xl.
Aquæ	.	.	.	.	.	q. s. ad	℥j.

When there is reason to suspect the existence of much arterial degeneration, potassium iodide occasionally gives great relief if employed continuously in fairly large doses, from 10 to 15 grains three times a day. The beneficial effects of potassium iodide are most marked in gouty cases ; and when the symptom appears to be associated with aneurismal dilatations, potassium iodide may also often prove more beneficial than any other drug.

Syncope and Collapse. These symptoms are frequently linked in severe cases, though the former, syncope or fainting, may occur as a passing weakness under many relatively unimportant conditions, where the removal of the cause generally suffices to effect recovery. A bad atmosphere or an overcrowded, heated room, especially if associated with emotional surroundings, may favor syncope, and indicate the advisability of removal to fresh air, the recumbent posture, and the loosening of any constrictions about the neck or chest, which impede freedom of respiration and of circulation. For slight attacks little more will be needed. It is necessary to emphasize the impor-

tance of keeping the head low, and of promoting respiration and circulation by cold affusion, and, if available, by the stimulant action of aromatic spirit of ammonia or of water of ammonia cautiously held a reasonable distance from the nostrils. When, however, unconsciousness continues in spite of these measures, it will be necessary to promote respiration and circulation by the hypodermic injection of some stimulant, such as alcohol, ether, or ammonium carbonate, while artificial respiration may be performed gently and slowly. Circulation may also be favored by rubbing the hands and arms, or the feet and legs, the frictions being directed along the course of the veins toward the heart. An electric current or a series of mild shocks may be passed along the phrenic nerve or over the heart, while stimulation of the diaphragm is frequently of some service. When syncope results from severe pain, from hemorrhage, or from perforation of one of the abdominal viscera, warmth of the extremities must be maintained by hot water bottles and hot blankets; while shock is to be counteracted by the hypodermic use of morphine, in full dose.

With severe hemorrhage it may be advisable to perform transfusion, but this operation does not give very satisfactory results, in spite of the numerous modifications which have been recommended, such as the use of defibrinated blood, etc.; upon the whole, greater benefit has been derived from the intravenous injection of from twenty to thirty ounces of warm weak saline solution consisting of 0.6 per cent. of sodium chloride. This saline solution has given excellent results, and it is free from the risk of causing the entrance of coagula into the circulation. In injecting saline solution into the veins great care must be taken to avoid the introduction of air, which would be followed by disastrous consequences. Fortunately, it has been found that benefit follows the subcutaneous injection of a saline solution, which is far less hazardous, though its beneficial results are not so immediately apparent, owing to the time required for its absorption. When, as the consequence of hemorrhage or other source of shock, the heart continues to beat feebly, benefit may follow the subcutaneous injection of strychnine and of digitalin, especially if ether is simultaneously employed.

The performance of operations during collapse must be determined by the nature of the cause. In collapse due to perforation of a typhoid or gastric ulcer it is desirable to operate as soon as possible, since delay must involve serious damage to the peritoneum by

contamination with the contents of the intestine or the stomach ; and, although the operation is necessarily severe, it is often found that the character of the pulse will improve, even during the administration of the anæsthetic. In most other cases of collapse it is well to postpone operation until the circulatory system has more fully recovered its natural tone. With shock due to hemorrhage, recovery may be hastened by the application of an Esmarch's bandage to the lower extremities.

It remains to mention the treatment of arrested circulation and respiration during the administration of an anæsthetic. This may sometimes result from a paralytic condition of the tongue, which falls back in the pharynx and prevents the entrance of air to the glottis ; with the first indication of danger the tongue therefore should be drawn forward forcibly, and respiratory movements should be stimulated by compressing the thorax momentarily and by raising the arms above the head so soon as the compression of the lower costal margin is relaxed. No time should be lost in inverting the patient if respiration does not ensue, while stimulants, such as ammonia or ammonium carbonate, should be held near the mouth and nostrils, so that they may be inhaled with the first returning movements of respiration, and thus influence the circulatory system. Benefit is sometimes obtained from the similar use of capsules of amyl nitrite, and after the heart has resumed work its contractions may be further stimulated by the subcutaneous injection of brandy or ether. Even when it is not necessary to perform inversion, it is desirable to remove all pillows and to place the head of the patient on the level, or even a little below the level of the body, so as to favor the circulation through the brain, which is essential for the due stimulation of the respiratory and circulatory centres.

CHAPTER II.

CIRCULATION—*Continued.*

Aneurism—Anæmia—Chlorosis—Pernicious Anæmia—Leucocythæmia—Lymphadenoma—Diseases of the Thyroid Gland: Goitre, Exophthalmic Goitre, Myxœdema—Addison's Disease.

Aneurism. Aneurisms of the aorta, either within the thorax or in the abdomen, or aneurisms of the large arteries starting from the aorta within these regions, are the only forms of aneurisms which come almost entirely under the care of the physician. Aneurism appears always to result from the overstrain, either accidental or continuous, of a vessel which has already been weakened by some chronic disease. The disease which is most prone to give rise to aneurism is syphilis, which originates a special form of arteritis. The symptoms referable to aortic aneurism are of two classes: those which result directly from pressure upon adjacent structures, and those dependent upon alterations within the sac of the aneurism during its growth. The progress of both form of symptoms may be arrested or retarded by any change which influences the rapidity of the ventricular contractions and simultaneously diminishes the force of the ventricular contractions. If, at the same time, the tendency of the blood to coagulate can be increased, the resulting benefit is likely to be more permanent. The method which gives the best results is the limitation or regulation of the mode of life, more particularly with regard to exercise, combined with the administration of comparatively large doses of potassium iodide. This drug may be given in cases free from any suspicion of syphilitic origin, and it relieves pain partly by lowering the blood tension and partly by reducing the rapidity of the cardiac contractions. It may be given in full doses, from 10 to 20 or even 30 grains, three times a day. The dose, however, is largely dependent upon the production of symptoms of iodism. It is well known that some patients bear large doses more easily than small doses, but the discomfort which may result from employing this drug may be so great as to prohibit its use. In some cases it has appeared to me that moderate doses prove more beneficial than large doses, and when once

pain has been relieved I have hesitated to increase the amount of potassium iodide.

The influence of iodide is somewhat difficult to explain. It has been suggested that by exerting a stimulant effect upon the kidneys it causes increased tendency to coagulation of the blood, and thus favors the formation of a solid clot within the sac of the aneurism. It has also been suggested that it may stimulate the wall of the sac and cause its contraction; but inasmuch as the aneurismal wall is devoid of muscular tissue, this explanation is unsatisfying. In place of potassium iodide the sodium salt has been recommended as being less liable to produce symptoms of iodism, and being also less depressant. In some cases the combination of bromide with iodide has appeared to give greater relief of pain. One of my patients has been, for the last eighteen months, taking ammonium bromide with potassium iodide, and during that time many of the more urgent symptoms—the dysphagia, cough, and pain in the upper part of the thorax—have undergone marked improvement. From time to time I have employed in addition small doses of opium. The camphorated tincture of opium is well tolerated, and will often give continuous relief when the aneurism is not rapidly increasing in size.

It is necessary in every case of aneurism to limit the amount of exercise. In some cases rest in bed appears to be essential, while in others, in the early stages at least, degenerative changes seem to be less marked if the patient can pursue his ordinary occupation without undergoing any undue strain or exertion. It is often preferable to allow the patient to retain some interest in life rather than to reduce him to the hopeless condition of regarding himself as incurable. At the same time, it is advisable to pay strict attention to the nature of the food, which should be rendered as nutritious as possible, while the amount of liquid taken is reduced in amount. The treatment of aneurism recommended by Valsalva consisted in reducing the blood-pressure by frequent venesection. Tufnell's method of rest and starvation aimed at reducing the quantity of blood and increasing its coagulability; he recommended that patients should be kept in bed for three months or more, and that the amount of liquid taken should be reduced to eight ounces in the twenty-four hours. This interference with the ordinary habits is apt to cause depression of spirits and to lead to rapid, irregular action of the heart, while at the same time the general

nutrition appears to suffer from the strict limitation of the quantity of fluids ; and the only cases in which Tufnell's treatment is likely to prove beneficial are those in which the aneurism is sacculated instead of fusiform.

Not many years ago electrolysis was introduced in the treatment of aneurism, it being well known that currents of electricity can cause coagulation of the blood. The method employed consisted in passing two or more needles into the sac of the aneurism and connecting them with the positive pole of the battery, while the negative pole was applied upon the adjacent surface. The current used was comparatively weak, and it was only employed for ten or fifteen minutes at a time. The needles were always connected with the positive pole, as the coagulum thus produced was found firmer and more coherent than when the negative pole was connected with the needles. Another precaution which was deemed advisable was to prevent the damage of cutaneous structures of the walls of the sac by coating the needles, except at the extremities, with some non-conducting material. Under the use of electrolysis, aneurismal dilatations of the aorta have occasionally been seen to become less pulsatile, and have then caused less pain ; but the improvement in both these directions has appeared to be of a temporary nature, and the process is not altogether devoid of risk. The needles are always passed toward the sides of the sac rather than into its centre, in the hope of favoring the deposition of a laminated clot on the wall of the sac. If introduced freely into the centre, there is considerable risk of the detachment of portions of clot, and of their passage into the general circulation. Another method, that at one time attracted considerable attention and that has now been almost entirely discarded, consisted in favoring the formation of clot within the sac of the aneurism by introducing a large amount of some foreign body which, by causing obstruction to the onward flow of blood, would favor the deposition of clot. Large quantities of fine iron or steel wire have been employed ; watch-springs and horsehair have also been introduced, but the clot that has formed around these has been found to be of somewhat loose consistency, and therefore has constituted a source of danger from the risk of producing embolism.

Surgical assistance has sometimes been invoked in these cases of thoracic or abdominal aneurism, but this treatment is less satisfactory than when applied to branches of smaller vessels. Sometimes

large branches of vessels leading from the aorta have been ligatured with a view of reducing the force of the blood current through the sac of the aneurism. When the aneurism is situated near the commencement of the aorta, ligature of the common carotid, or of the innominate, or of one of the subclavian arteries has been performed, but the results cannot be said to have been encouraging; and in ligaturing vessels of such size there is always some risk of serious new symptoms, due to the interference of circulation in important organs. It has been laid down as a rule that distal ligature should not be performed when there is evidence of general atheroma, since under such circumstances there will be great risk of causing rupture of important vessels by interfering with the normal distribution of pressure. The logical result of such ruling would be to prevent all surgical treatment, because the existence of aneurism is in itself an evidence of considerable arterial degenerative change.

For the relief of pain various local applications in the vicinity of the aneurism have been recommended, and of these the most useful are preparations containing morphine or atropine. These may either be injected subcutaneously near the aneurism, or liniments or plasters of opium or belladonna may be applied over the seat of pulsation. It is at least an open question whether the relief from the application of a plaster is not to a large extent due to restrained movement. Ice bags have occasionally been used with the objects of relieving pain, of lowering blood-pressure, and of favoring coagulation. The force and frequency of the heart are both reduced during the application of cold, and in this way, as well as by its numbing influence, pain may be greatly relieved; but this measure is only palliative and not curative, since coagulation is in no way hastened by cold. It is worth bearing in mind that under the influence of the local application of cold the heart's action may be so far reduced in force as to occasion symptoms of collapse, and should such symptoms arise it is necessary to treat them with cardiac stimulants, such as hot alcoholic liquids. Similar symptoms are often produced when treating pericarditis or pneumonia with ice bags placed over the cardiac area.

In many cases of thoracic aneurism special symptoms may arise and require special treatment; thus in some cases the patient may be tormented by frequency of cough, which is evidently due to the pressure of the aneurismal growth upon the trachea or upon one of the bronchi. Although in such cases there may be some expector-

ation of tenacious mucus, the formation of this mucus appears to be entirely due to the frequency of the straining efforts of coughing and to the irritation upon the wall of the trachea or bronchus. It is not likely, therefore, to be amenable to the ordinary forms of treatment of bronchitis. The greatest chance of relief is afforded by measures which cause diminution in the size of the aneurismal sac, and therefore reduction of the pressure it exerts upon the air passages. Hence potassium iodide will often cause diminution of this troublesome symptom. To some extent, however, the irritability of the air passages may be controlled by the internal administration of small doses of opium or of bromides, preferably the former, which has the further beneficial action of reducing the secretion from the mucous membrane. The dysphagia due to aneurismal enlargements may similarly be to some extent influenced by the use of potassium iodide and of opium. In all probability the dysphagia is frequently due to irritation of the vagus rather than to direct pressure upon the œsophagus, since in some cases of aneurism the difficulty of swallowing is experienced with liquids rather than with solids. Sometimes patients are obliged to drink by swallowing only small quantities of liquid at a time, so as to avoid troublesome spasm; but, on the other hand, spasm may occasionally be favored by sipping, while it may be avoided by drinking copious draughts. These uncertainties of the forms of dysphagia appear to indicate the nervous origin of the symptom, and therefore readily explain the extreme benefit sometimes experienced from the administration of sedatives.

The aphonia due to unilateral paralysis of the abductor muscles is scarcely within reach of treatment; but in exceptional cases, although pressure is only exerted upon one recurrent laryngeal nerve, abductor paralysis may affect the muscles of both sides, so that the vocal cords fall together and reduce the aperture of the glottis. This reduction in the size of the glottis is occasionally so great that tracheotomy must be performed for its relief. It is scarcely necessary to say that when the dyspnœa connected with aneurism is due to pressure on the trachea, instead of to paralysis of the abductor muscles, the operation of tracheotomy is not to be considered. As in other forms of dilatation of the ventricle, paroxysms of pain amounting to true angina may be experienced, and are to be treated like angina pectoris, with amyl nitrite, nitroglycerin, or spirit of nitrous ether, remedies which, by dilating the

peripheral vessels, reduce the blood-pressure, and thus diminish strain upon the walls of the ventricle.

Bradbury thinks that the use of potassium iodide in aneurism, as in other cases of cardiac pain, might often be replaced by erythrol tetranitrate, which would more effectually dilate the peripheral arteries, and thus contribute to keeping the circulatory system as far as possible in a state of physiological rest.

Anæmia. Anæmia occurs in various forms, either as a secondary result of some previous disease, or as the most prominent symptom of a special disease. The former is frequently termed symptomatic or secondary anæmia, while the latter includes forms of anæmia seen in chlorosis, in pernicious anæmia, in leucocythæmia, and in lymphadenoma. To some extent, also, this symptom occurs in connection with Addison's disease, with exophthalmic goitre, and with myxœdema. Although the reduction in the number of red corpuscles or the proportion of hæmoglobin present in the blood varies considerably in these different diseases, they are all characterized by some degree of pallor, by breathlessness on exertion, palpitation, and tendency to slight œdema of the lower extremities, the tendency to œdema being most marked in connection with chlorosis, in which the œdema disappears from the ankles and feet during the night and is found as slight puffiness below the eyelids in the early morning.

Symptomatic or secondary anæmia is the form which is seen after wasting diseases or after surgical operations involving great loss of blood, or after hemorrhages from other causes. The treatment of this form of anæmia is largely dependent upon the cause. The dieting generally must be rendered as nutritious as possible, and the amount of nitrogenous food must be gradually increased. It is necessary to observe some caution in the dieting of these patients, since if nitrogenous food is given in excess it may readily disturb the digestion, which is generally feeble. The dieting of symptomatic anæmia occurring after conditions like typhoid fever necessarily requires considerable judgment. It is customary to progress gradually from liquid to solid food, commencing with easily digested articles like fish and boiled chicken, and only passing onward to meat when the system appears to have become accustomed to the increased dietary. In these cases improvement also results from careful attention to the hygienic surroundings of the individual. The patient frequently benefits by a change of air, especially by a

resort to the sea ; but even before such a change is possible, great improvement may be obtained from gradually increasing exercise in the open air.

Inasmuch as these patients with secondary anæmia suffer from alterations of temperature, they should be warmly clad, and their rooms should be well ventilated and as spacious as possible. With regard to medicinal treatment, the various preparations of iron are commonly employed. The non-astringent forms are preferred, as constipation is so frequently a prominent symptom. The compound of iron to be employed in any particular case may require frequent change according to the idiosyncrasy of the patient. Some patients do well with increasing quantities of ferrous sulphate, or of sulphate given with potassium carbonate, as in Blaud's pills. Enormous numbers of these pills can be consumed without causing any material interference with the digestive powers, but it is essential that the pills should be freshly prepared, since otherwise they may pass through the alimentary canal unchanged ; to obviate this danger the ingredients of Blaud's pills are sometimes given in a form which is readily soluble, as in small gelatine capsules. Other patients prefer to take reduced iron, but although this is tasteless, it is somewhat repulsive in appearance, and it may cause unpleasant eructations. The compound iron mixture of the *Pharmacopœia* may occasionally be employed as well as the saccharated iron carbonate. In anæmia during convalescence the chloride frequently gives the best results, although there is some prejudice against this drug on account of its unpleasant taste, and also because it sometimes, if given in too large doses or for too long, causes disturbance of digestion. It has also been credited with producing discoloration of the teeth, but this objection can be overcome either by taking the drug through a glass mouth-piece or by rinsing the mouth with water immediately after it has been taken. When it is desirable to continue the use of small doses of iron for a length of time, the iron and ammonium citrate may be employed. This compound is, on account of its comparatively pleasant taste—comparatively only—peculiarly adapted to children.

The efficiency of Blaud's pills can to some extent be increased by the addition of a small quantity of iron arsenate ; but when this compound is employed the number of pills that can be given must be regulated by the amount of iron arsenate, since dyspeptic symptoms are readily produced by overdoses. Some practitioners prefer

to administer iron in the form of chalybeate water, and anæmic patients are often sent to various spas and springs to drink the waters. The principal chalybeate springs in England are at Tunbridge Wells, Strathpeffer, and Harrogate ; on the Continent those most in vogue are Schwalbach, Orezza, Marienbad, Pyrmont, Spa, and Homburg, and in the United States the Jordan Alum Springs and Rockbridge Alum Springs. The benefit of the continental spas are to some extent increased by the employment of the chalybeate waters as baths. Most of the waters so used contain free carbonic acid, which is credited with stimulating the cutaneous surface.

Chlorosis. Reference has already been made to the pallor, shortness of breath, palpitation, and tendency to œdema which occur in connection with chlorosis ; but, in addition to these discomforts, patients frequently complain of obstinate constipation and of considerable dyspeptic trouble. Chlorosis is most common among young girls from the ages of fifteen or sixteen to twenty-one or twenty-two. Frequently the most troublesome symptoms are those connected with indigestion, and sometimes, if these symptoms are treated sufficiently early, the subsequent course of the disease is very much curtailed ; broadly speaking, it is generally useless to attempt to treat chlorosis with hæmatinics, without at the same time paying attention to the functions of the digestive organs. Many observers consider that the disease has its origin in defective action of the digestive system, by means of which the iron salts administered in an organic state in the food fail to enter the circulatory system, and therefore cause no increase of hæmoglobin. This idea forms the basis of Bunge's theory of the absorption of iron in chlorosis. It is well known that in these cases very large amounts of iron have to be given to produce a relatively small amount of hæmoglobin, or, in other words, that the iron administered medicinally is largely excreted through the digestive system without ever having been thoroughly absorbed into the blood. Some writers have gone so far as to assert that inorganic compounds are not absorbed from the alimentary canal. Very many experiments have been made with a view to determine this point. In an able review of recent investigations, Leech¹ discusses the question as to whether iron possesses the power of preventing changes in the food, or whether it acts by exerting a stimulating influence on the mucous membrane ; and he

¹ Medical Chronicle, September, 1896.

concludes that the balance of evidence tends to show that iron in its various compounds is absorbed by the small intestine, or at least by the duodenum, and that it is stored up in various organs, chiefly in the liver and spleen, and thence is utilized in the formation of hæmoglobin.

It is perhaps to be regretted that so much attention has been devoted to the theoretical and pharmacological aspect of the absorption of iron, since it is doubtless owing to this uncertainty of absorption from the alimentary canal that some observers have recommended the hypodermic use of iron; thus Da Costa¹ advises that ferrous manganese citrate should be given hypodermically in 3-grain doses, while Lépine² advocates the hypodermic injection of a 4 per cent. solution of citrate of iron, and asserts that injections of 3 c.c. or 4 c.c. of this solution produced very marked improvement in a woman in whom treatment with bone-marrow had practically failed. These modes of administration appear to be entirely dictated by theoretical considerations, and in practice they are found to be wholly unnecessary. In the ordinary treatment of chlorosis it is well to commence by dealing with any dyspeptic trouble, to relieve flatulence by the administration of small doses of ammonium carbonate and rhubarb, and if there is much complaint of heartburn to use one or other of the insoluble forms of bismuth. Simultaneously with this remedy, however, it will be necessary to employ some mild laxative, and preference is generally given to the pill of aloes and myrrh, or of aloes and iron, and it is possible that in some of these cases the aloetic pill may assist in restoring the menstrual function. So soon as the patient is able to digest an ordinary light meal without trouble, the treatment with iron may be commenced to a certain extent. The form of iron to be employed for any lengthened period must be determined by the results of experiment. Reduced iron is often given in a powder, which the patient is directed to take between two slices of bread and butter. In this form, however, iron is somewhat repulsive in appearance, and it sometimes gives rise to unpleasant eructations. The iron and ammonium citrate is more pleasant, it can be continued for a greater length of time, and can also always be given in solution. It has the disadvantage, however, of not allowing the dose to be appreciably increased, and it requires to be administered

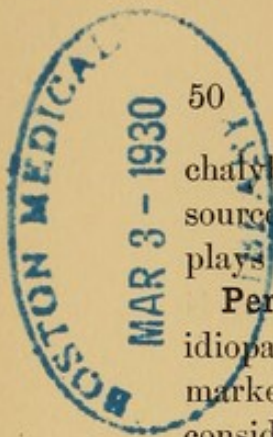
¹ Therapeutic Gazette, May 15, 1896.

² Semaine Médicale, May 26, 1897.

for a lengthy period. Ferrous sulphate has perhaps given more general satisfaction, and in the form of Blaud's pills enormous quantities have been administered daily. In this pill the sulphate is converted into the carbonate during the time that the pill is undergoing solution within the stomach. As already indicated, these pills should be freshly prepared, as they tend to become hard and insoluble. In the new *British Pharmacopœia* an attempt has been made to meet this objection to the iron pill, and it is now directed to be prepared with exsiccated ferrous sulphate and exsiccated sodium carbonate; the pill mass is then incorporated with gum acacia, with a relatively small proportion of tragacanth. The amount of ferrous carbonate in each pill remains, however, the same as formerly. I have frequently found that the efficacy of this pill is increased by the addition of a small amount of iron arsenate; but, as I have already said, when the latter drug is administered, the number of pills which can be given at any one time is greatly reduced, since the arsenate tends to disorder digestion if employed in large quantity. Many other drugs have been recommended in the treatment of chlorosis; thus compounds of manganese and compounds of arsenic have been used, but the results obtained are not equal to those which follow the administration of iron. Other more stringent forms of iron are sometimes used; thus the solution of dialyzed iron was at one time employed in the form of drops, or mixed with glycerin. The saccharated iron carbonate is often given, and the compound mixture of iron still finds favor with many practitioners. Of non-official remedies, red bone-marrow is perhaps the one which has been most used; it is stated to have given good results in some cases of chlorosis, although it has been used more particularly in cases of pernicious anæmia.

Patients with chlorosis generally require to be encouraged to take out-door exercise, to struggle against the natural tendency to inactivity, and to engage in some cheerful continuous occupation which leaves little time for morbid fancies. When they complain of excessive cardiac pain on slight exertion, benefit may sometimes be derived from the administration of small doses of strophanthus or of digitalis; but these remedies require to be employed with considerable discretion.

Improvement often ensues with change of air and scene; while a course of iron waters may effect a marvellous change in inveterate cases; but in many of these patients it is probable that a course of



chalybeate springs is more likely to do good when taken at the source instead of at home. In all probability the change of scene plays a large element in the curative results.

Pernicious Anæmia. Pernicious anæmia has also been termed idiopathic or progressive pernicious anæmia, and presents many marked differences from the forms of anæmia which have been considered. It has been said to be somewhat more common in males than in females, but the cases which have been collected show that the numbers affected are almost identical. In this respect, however, it forms a marked contrast to chlorosis, which is essentially a disease of females. The symptoms strongly resemble those of chlorosis, but the skin is more usually yellowish in tint, and sometimes jaundice may be present; and these cases further differ in tending gradually to death from asthenia, even though there is but little indication of wasting. The number of corpuscles is very considerably reduced, although the amount of hæmoglobin in the individual corpuscles may be increased. The red corpuscles present great variations in size, and nucleated red corpuscles may often be found. Indications of disturbance of digestive functions are frequent, and occasionally diarrhœa may be present. The urine is sometimes highly colored and contains an excess of urobilin, but occasionally it is of low specific gravity and pale.

It has been stated that this disease is fatal in the majority of cases, yet a few have been recorded in which the symptoms were arrested, although in some patients there was a marked tendency to relapse. Pernicious anæmia appears to be entirely uninfluenced by the administration of iron, but benefit has been reported from the use of increasing doses of liquor potassii arsenitis, of which drug these patients exhibit a marked tolerance; so that 20 or even 30 minims of Fowler's solution may be taken three times a day for weeks or even months. Fraser¹ has stated that he obtained striking results from the use of uncooked red bone-marrow, and Baus has recorded a case of recovery with the use of red bone-marrow when arsenic had not only failed to do good, but had even increased the severity of the symptoms. Red bone-marrow may be obtained from the ribs or from the cancellous ends of the long bones, and it is also now obtainable either in the form of tabloids or as a glycerin extract. When suffering from pernicious anæmia it is always desirable,

¹ British Medical Journal, June 2, 1894.

on account of the increasing weakness, to keep the patient in bed, and to encourage nutrition by means of gentle massage.

Leucocythæmia. Leucocythæmia is a form of anæmia associated with great enlargement of the spleen, and the anæmic appearance results from the greatly increased number of white corpuscles. To some extent, also, the absolute number of red corpuscles is reduced. Although in many cases a history of ague may be wanting, yet in a certain proportion there seems to be some etiological connection with ague. When this history can be obtained, the treatment necessarily includes the administration of quinine, which may be used in large doses twice or three times a day. Sometimes, during the administration of quinine, the splenic tumor materially diminishes in size; but frequently, especially in cases without definite history, quinine is of little avail, and the disorder must be treated with other forms of tonics. Large doses of arsenic have been given in some cases with remarkable success, but to be of any service this treatment must be long continued, and care must be taken that it does not disturb the digestive functions. Benefit may frequently be obtained from improved hygienic conditions; occasionally a sea voyage may be of service, and when the patient's home is in a malarial district it is essential that he should move either to the seaside or to a hilly district. With the view of increasing the formation of red corpuscles oxygen inhalations have been given, but these do not appear to have produced any permanent benefit. The splenic enlargement has sometimes been attacked directly either by currents of electricity or by surgical methods; but operative measures have not, so far, given encouraging results, owing to the extreme liability to fatal hemorrhage. Various compounds of iodine have been used both internally and externally: thus potassium iodide has been given in 10-grain doses, and the liniment of potassium iodide has been applied over the abdomen. An ointment of red iodide of mercury has also been used, and for all these forms of treatment some benefit has been claimed. As a whole, however, it is well to remember that improvement is likely to be but temporary, and that these cases usually pass on gradually to a fatal termination; indeed, it has been doubted whether, except in the very early stages, any form of treatment is to be credited with much success. The disease may be complicated by numerous symptoms, such as those of hemorrhage, pleurisy, or peritonitis, which must be treated upon general principles.

Lymphadenoma, or Hodgkin's Disease. This disease in many of its symptoms resembles leucocythæmia, but it is associated with great enlargement of the lymphatic glands, while the splenic enlargement does not form such a prominent feature. Although increasing anæmia is associated with enlargement of the lymphatic glands, the symptoms vary greatly with the site of the glands chiefly affected. So long as these are superficial the symptoms are chiefly those of progressive anæmia; but when the glands within the thorax are involved, serious symptoms may sometimes result from their pressure upon the bronchi or upon the intrathoracic vessels. This disease has been treated in the same way as the preceding, with arsenic, with tonics, and with iodides, but the results of treatment are not sufficiently satisfactory to call for further detail. The greatest benefit appears to have resulted from hygienic measures, but these do not afford any prospect of materially retarding the fatal ending of the disease.

Diseases of the Thyroid Gland: Goitre. Goitre consists in enlargement or hypertrophy of the thyroid gland; it commonly occurs endemically, and is rarely associated with any marked symptoms, unless the thyroid enlargement is sufficient to compress the trachea, or to interfere with the circulation by the growth extending partially below the sternum and causing pressure upon the veins. The enlargement is sometimes uniform, affecting the whole of the thyroid gland; but one lobe may be much more affected than the other; and sometimes the isthmus only is involved. When of moderate size, little inconvenience results from the thyroid enlargement; hence many cases do not present themselves for treatment. When, however, the disease has developed somewhat rapidly, it is advisable to remove the patient from the district in which it has originated.

The common form of treatment of mild cases involves the free use of iodine and of iodides. Iodine may be applied locally either as the ointment or as the tincture. It is rarely necessary to apply the strong solution of iodine, since it produces undesirable blistering, especially if frequently applied. Some practitioners advocate the introduction of iodine into the substance of the thyroid; but although this treatment is credited with having produced beneficial results, it not uncommonly fails, more particularly in the cystic form of the disease, and it is associated with certain dangers, of which the chief are the possible injury of a large vein, and the admission of air.

The tincture of iodine is frequently administered internally in doses of from 2 to 5 minims; but potassium iodide is somewhat more manageable, and does not produce so much discomfort and gastric irritation if employed over a length of time. The dose must, to some extent, be regulated by the effect upon the goitre, and also upon the appetite, since when taking potassium iodide complaint is frequently made of the unpleasant bitter or metallic taste which results from the elimination of the drug by the salivary glands; and, on the other hand, if the dose is greatly increased, symptoms of iodism may be produced.

If the goitre increases in size in spite of the above measures, more energetic treatment may be adopted, such as the application of the strong solution of iodine, or the more certain vesication by a blistering liquid. Occasionally goitre is associated with much anæmia, and iron preparations may be of some service; but their value is likely to be much increased by their combination with arsenic, which may also be sometimes employed alone as an alterative tonic in the form of the liquor potassii arsenitis.

When symptoms of obstruction occur, operative measures must be adopted. It is unnecessary here to discuss the operation that should be performed, but in general there is considerable reluctance to deal with cases of uniform enlargement by total extirpation of the gland, since the result of the removal of the whole gland is to favor the development of myxœdema. Hence, in general, the portion of the gland which is causing compression on the trachea or the veins is the only part removed, and at all times an effort is made to leave a considerable portion of gland tissue. The surgical treatment of cystic forms of goitre is a great deal more hopeful, since it is infrequently possible to drain the cyst and to excite sufficient inflammatory action to cause the destruction of the cyst wall. For details concerning these operative measures, and also for arguments relating to the excision of the cyst, the reader is referred to surgical manuals.

Exophthalmic Goitre. The enlargement of the thyroid in this disease is associated with protrusion of the eyeballs and with a varying degree of disturbance of the vascular system, which is marked commonly by an increased rapidity of the pulse, even during periods of repose, with very great increase in the pulse-rate on slight emotional excitement. This condition is frequently accompanied by much anæmia and emaciation, and sometimes by

distinct alteration in the mental condition of the patient, who becomes low-spirited and irritable.

The most prominent symptoms for which the patient seeks relief are those connected with the circulatory system, and in early days it is not uncommon for the nature of the disease to be overlooked and for the symptoms to be attributed mainly to anæmia.

Many remedies have been recommended for this condition, but in my hands the best results have been afforded by the conjunction of arsenic with digitalis, or strophanthus, to check the rapidity of the heart's action. The amount of anæmia frequently necessitates the use of iron. The success of the treatment is, however, extremely uncertain; and the remedies above-mentioned must be continued for long periods, both with the view of curing the anæmia, and of maintaining a steady control over the rapidity of cardiac action. It is not advisable to increase the dose of digitalis or of strophanthus, in the hope of obtaining a pulse of physiological rate, since an increase in the amount of these remedies may produce irregularity of action and perhaps dangerous syncope. It is better to employ only moderate doses, and to be satisfied with general reduction in the rapidity of the pulse-rate. Occasionally I have used with some satisfaction ammonium or potassium bromide, with the view of controlling the nervous symptoms which are frequently so distressing in this disease; but with these drugs also it is desirable to employ only moderate doses, since, although the irritability of temper may be diminished, the depression is certainly sometimes increased.

Bromide and iodide of strontium have been employed for exophthalmic goitre in children by Gillespie¹ with exceedingly favorable results. He recommends that the bromide, on account of its deliquescence, should be given in solution rather than in powder. For adults he employs 10 to 30 grains of the bromide, or 3 to 5 grains and upward of the iodide.

Since anæmia is such a prominent symptom, the patient should be encouraged to live mainly in the open air, to indulge in moderate exercise so long as this does not materially increase the rapidity of the heart's action, and to avoid as far as possible all sources of excitement or irritation. Many observers speak highly in favor of belladonna, and recommend that the dose should be gradually increased until some dryness of the throat is produced. Although

¹ British Medical Journal, October 8, 1898.

I have frequently used this remedy, it has in my hands scarcely justified the extreme laudations sometimes lavished upon it. Osler recommends rest in bed, with an ice bag or Leiter's tube applied occasionally over the heart or over the lower part of the neck and manubrium sterni.

There is distinct evidence in favor of the use of galvanic currents for this condition, the galvanism of the sympathetic and pneumogastric giving temporary, if not permanent, improvement. Whitla recommends that, in applying galvanism to the sympathetic, a weak continuous current, not exceeding ten or twelve Leclanché cells, should be used. The negative electrode should be placed upon the lower cervical spines, while the positive is moved about upon the skin in front of the sternomastoid muscles upon each side. The positive electrode may also be placed over the region of the heart.

Operative measures, such as ligature of the arteries of the thyroid, or the removal of some portion of the gland, have occasionally been recommended, but they have not hitherto been generally adopted.

Myxœdema. Myxœdema is referred anatomically to atrophy of the thyroid gland, but the symptoms are marked by mental failure, by localized increase in the thickness of the skin, which causes an increased bulk of the part affected, and by slight general fall of temperature. Three forms of atrophy of the thyroid have been recognized: a congenital form, an operative form, and the so-called myxœdema, which develops most frequently in females.

Although some improvement may follow measures calculated to improve digestion or appetite, the treatment of this disease was extremely unsatisfactory prior to the introduction of the medicinal use of the various preparations of the thyroid gland. It was at one time recommended that the functions of the skin should be encouraged by diaphoretic measures, such as the use of warm baths, or the employment of jaborandi; while alteratives, like arsenic, were used internally. When it had been shown by experiment that the extirpation of the thyroid gland produced symptoms of this disease, and that, in animals, these symptoms could be prevented by transplanting the thyroid gland from another animal, the thyroid treatment was within measurable distance of accomplishment, and investigations were undertaken to ascertain whether the active principles of the gland which controlled the development of this disease could be isolated for medical purposes.

The hypodermic injection of glycerin extracts of the thyroid glands of the sheep was followed by much improvement, and it was soon ascertained that similar improvement resulted from the administration of the thyroid gland by the mouth, either in the raw or in the cooked condition, or in the form of an extract. The improvement has been so marked that in the *British Pharmacopœia* two preparations of thyroid have been introduced—the dry thyroid (*Thyroideum Siccum*), which is used in doses of from 3 to 10 grains, and the thyroid solution (*Liquor Thyroidei*), which is administered in doses of from 5 to 15 minims. The dry thyroid readily deteriorates on exposure to the air, and the thyroid solution is also extremely apt to undergo decomposition. Several manufacturing firms prepare thyroid in the form of tablets, and it is perhaps in this way that the thyroid is most commonly administered.

Dr. J. S. Meltzer, in the *New York Medical Journal*, May 25, 1895, states that, in his hands, the desiccated powder has given better results than the tablets, which he frequently finds will not dissolve. He further advocates the use of the powder, as it is more easy to prescribe different quantities at will, while fractions of small tablets cannot be measured exactly.

In the treatment of myxœdema the administration of thyroid must be continued for a length of time. One of the first signs of improvement is the rise of temperature to the normal point. This is quickly followed by diminution of the thickening of the affected portions of the skin, and by loss of weight, and, if the treatment is continued, the mental powers are gradually restored. Occasionally symptoms of intolerance develop in the course of the treatment, such as an increased rapidity of the pulse, a slight rise of temperature, or signs of gastro-intestinal irritation. These symptoms indicate the need of reducing the amount of thyroid given, or of entirely arresting its employment.

Addison's Disease. Addison's disease is marked by pigmentation of the skin, by asthenia, by functional disturbance of the circulation, and sometimes also by digestive disturbance. There is practically no doubt that the disease is, in some way, dependent upon alterations of the suprarenal bodies—alterations which involve some interference with their secretory functions, and may perhaps also cause some irritation of the sympathetic system.

The treatment of this condition must, to a great extent, be symptomatic, but of late years frequent efforts have been made to

supply the deficiency of the suprarenal secretion by measures comparable to those adopted in the treatment of myxœdema.

With regard to the symptomatic treatment, the question of keeping the patient in bed must be determined by the degree of weakness and the tendency to syncope. With marked asthenia, or with frequent fainting fits, there is no doubt about this point, and all forms of excitement or of exertion, as well as exposure to cold, must be prevented. The disturbances of the digestive system indicate the necessity for a nutritious and easily digested form of dietary, and this is of the highest importance when vomiting occurs. This symptom indicates a liquid diet, given in small quantities at short intervals, the use of ice, and of effervescent draughts of an alkaline character.

The vomiting of Addison's disease is sometimes beneficially influenced by champagne, the stimulant action of which is frequently of great service in improving the character of the pulse. Medicinal remedies employed in ordinary forms of vomiting, such as salts of bismuth, or small doses of opium, may be of service, but it is better to avoid the use of diluted hydrocyanic acid on account of its marked action upon the circulation.

Diarrhœa occasionally occurs, with or without vomiting, and must be controlled by modifications of diet and by the use of astringent remedies.

It is sometimes found that the necessary limitation of bodily movements leads to chronic constipation, a condition which cannot with safety be left unchecked, although the remedies for this symptom may themselves form a source of danger. Strong purgatives should not be used, as they may produce serious symptoms of collapse; but the action of the bowel must be stimulated partly by the use of enemata, and partly by the administration of mild purgatives in moderate doses.

The asthenia calls for tonic remedies, and foremost among these are to be placed arsenic, iron, quinine, and strychnine. Iron is especially indicated in the not infrequent cases where anæmia is a prominent symptom. The following mixtures are often used:

R.—Quininæ sulphatis	gr. ij.
Acidi sulphurici diluti	℥v.
Aquæ chloroformi	ʒiv.
Aquæ destillatæ	q. s. ad ʒj.

R.—Strychninæ hydrochloratis	.	.	.	.	.	gr. $\frac{1}{3}$.
Acidi phosphorici diluti	.	.	.	.	.	℥x.
Syrupi zingiberis	.	.	.	.	.	℥ss.
Aquæ	.	.	.	.	q. s. ad	℥j.
R.—Quininæ sulphatis	.	.	.	.	.	gr. ij.
Acidi sulphurici diluti	.	.	.	.	.	℥ij.
Ferri sulphatis	.	.	.	.	.	gr. xx.
Aquæ	.	.	.	.	q. s. ad	℥j.

Digitalis, or strophanthus, may be given when there is much palpitation and weakness of the circulation, such as is shown by a soft, rapid, feeble pulse ; but in using these remedies small doses only can be given, since vomiting occasionally follows their employment.

With regard to the special treatment of the disease, the raw suprarenal bodies of the sheep have been given, but the dried extract appears to be more convenient. The extract is given in 1-grain doses three times daily, and the quantity administered is increased gradually. The cases published give somewhat uncertain results : one has been mentioned where death occurred, with delirium and collapse, on the ninth day of treatment ; but, in general, the treatment appears to have led to some improvement in strength and appetite. This improvement, however, seems to be limited to the time of administration of the suprarenal gland substance, or of the dried or glycerin extract, and the utmost that can at present be said in its favor is that the progress of the disease may possibly have been retarded.

CHAPTER III.

RESPIRATION.

Acute Coryza, or Nasal Catarrh—Chronic Nasal Catarrh—Hay Fever, or Summer Catarrh—Epistaxis—Acute Laryngitis—Chronic Laryngitis—Tubercular Laryngitis—Syphilitic Laryngitis—Hoarseness and Aphonia—Laryngismus Stridulus—False Croup—Diphtheritic Croup.

Acute Coryza, or Nasal Catarrh. This condition is so extremely common, and, apart from its inconvenience, of such very little importance, that it does not often come under the hands of a medical man for treatment. Domestic remedies are employed with a certain degree of success, but in many instances the trouble is so slight that it is tolerated until the condition passes away of itself. On the other hand, however, it is frequently very tiresome and painful; and notwithstanding the fact that it does not as a rule call for special treatment, still, on account of the discomfort it causes, advice may sometimes be sought in the early stages, but more often only when the acute coryza has almost developed into a chronic condition. There can be no doubt that in certain persons there is some predisposition to attacks of acute nasal catarrh, and that when this predisposition exists the immediate exciting cause is not always the same. Acute nasal catarrh may result from local irritation of an unduly sensitive portion of the mucous membrane. Such irritation may perhaps be sometimes due to solid particles of inert character; but there is strong reason for believing that frequently coryza spreads sporadically, and that the attack is due to local irritation produced by some specific organism. This contention is not weakened by the fact that nasal catarrh, in many respects, strongly resembles attacks of so-called hay fever, or rose fever, where the sense of irritation, followed by severe sneezing, and perhaps by running at the eyes and nose, results apparently from the development of pollen grains upon a moist surface. Nor is the notion of irritation by living organisms materially affected by the prevalence of attacks of nasal catarrh at special times of the year and with special directions of the wind, since, although in windy weather inert particles of dust may cause irritation, it is then equally possible for organisms to be set in motion and to produce the same result.

Irritation may sometimes be reflex instead of direct, and it is a matter of common experience that attacks of nasal catarrh may arise after the temporary exposure of some unprotected part to a draught. Whether, however, the immediate exciting cause is reflex or direct, the predisposition is the factor which is to be recognized in the individual, and, once recognized, may lead to prophylactic treatment which renders attacks less frequent. The best prophylactic treatment is that calculated to increase the cutaneous circulation and to restore tone to the vessels, so that slight exposures shall be less prejudicial. This form of tonic treatment is best commenced during the summer months, and it consists partly in encouraging the individual to take daily exercise in comparatively light clothing, and partly also in encouraging him to accustom himself to the use of cold baths daily.

Many persons prone to nasal catarrh dread exposure to cold, and complain that a cold shower bath or sponge bath leaves them with their extremities cold and blue. Although doubtless true in the majority of cases, this tendency to capillary stasis may often be overcome with a little patience and practice. It may result from the bath being too prolonged, and sometimes it may ensue from undue exposure after the bath. The cold bath should be followed by friction with a large rough towel, by means of which the cutaneous circulation is greatly stimulated and the surface rapidly dried. Hardening efforts with a small quantity of cold water and with a small thin towel are almost doomed to failure. When there is some difficulty in commencing the use of a cold bath, it may often be overcome by advising the patient to stand in tepid water while sponging the body with cold water. The use of the shower bath, when it can be arranged, will often overcome the objection to cold bathing. Broadly speaking, these measures will, in general, be sufficient to reduce the troublesome predisposition to nasal catarrh. When, however, the nasal catarrh takes the form of hay fever, or hay asthma, or of autumnal catarrh, it is often necessary to change the residence of the patient to the seaside, or even to advise him to take a sea voyage.

With regard to medicinal treatment, with the onset of nasal catarrh diaphoretic measures are frequently successful; warm drinks at bedtime, a warm bath, and perhaps extra covering may suffice to induce perspiration. Diaphoresis may also be encouraged by the use of small doses of opium or of morphine. Dover's

powder may be given at bedtime ; or, if the patient is experiencing much discomfort during the afternoon, the acetate, tartrate, or hydrochlorate of morphine may be given during the evening in doses of about $\frac{1}{8}$ grain, and a second dose of the same amount may be given at bedtime. When employed in this way, diaphoresis is more likely to follow than when the drug is given in larger quantity, and given after food. Although it is unnecessary to keep the patient in bed for nasal catarrh, the duration of an attack may often be curtailed by remaining in one room for twenty-four or forty-eight hours. During this time diaphoresis should be encouraged by the use of the solution of ammonium acetate, which may be given in moderate doses—a drachm or two drachms three or four times a day—and its efficacy may be increased by adding some ipecacuanha wine, spirit of chloroform, or spirit of ether, the mixture being made up with camphor water. Some patients prefer the use of quinine throughout the treatment of acute nasal catarrh, and think that attacks have often been aborted by this remedy. It will lower the temperature, and it may increase the appetite and strength, which are often reduced in these cases. It is, however, a drug which must be used with some moderation, since, if given in overdoses, it may produce headache and buzzing in the ears. If prescribed in doses of 1 or 2 grains three times a day, and, moreover, if given in an effervescent form, quinine is frequently beneficial, particularly if it is employed after the nasal catarrh has been fully established. It then seems to shorten the attack, even though powerless to arrest it.

Another remedy, which is perhaps more popular, is the spirit of camphor ; but in employing this drug care must be taken not to use the homœopathic spirit in pharmacopœial doses, many cases having been recorded where serious results have followed this error. This caution is the more necessary, since this preparation is commonly used without medical advice, a few drops upon sugar or mixed with water being taken at short intervals until the feeling of discomfort is reduced.

Another remedy which is in popular use is the tincture of aconite, and this is taken in much the same manner—1 or 2 minims every two hours until the sense of feverishness has passed away. Here also considerable caution is required, and in fact it should not be used at all as a domestic remedy. If employed during the initial stages it may give relief after the second or third dose ; but when

nasal catarrh has become fully established, there is great risk in permitting it to be used too frequently.

When the early stages of nasal catarrh are associated with much fever, salicin and sodium salicylate often serve to reduce the temperature and to relieve the aching pains, of which complaint is so commonly made. At the beginning of an ordinary cold, relief is frequently obtained by taking

R.—Sodii salicylatis	. . . . .	ʒij.
Spiritus ammoniæ aromatici	. . . . .	ʒj.
Syrupi aurantii	. . . . . q. s. ad	ʒij.
S.—One teaspoonful in water every four hours.		

Belladonna has been recommended, with the view of relieving the sense of irritation about the fauces and the pain during swallowing. When it gives beneficial results, it probably does so by diminishing the pharyngeal irritation. It is, however, a drug which may itself cause dryness of the fauces and pain in swallowing, and it is only in exceptional cases that its employment is of any particular value. Local applications have frequently been employed, and may to some extent reduce discomfort. Solution of cocaine applied directly to any unduly sensitive spot within the nasal cavities will sometimes check an incipient nasal catarrh; the solution may also be employed in the form of a spray, to deaden the sensibility and to reduce the fulness of the vessels in the nasal mucous membrane. This remedy demands some caution, however, as it may produce great cardiac depression if used too frequently or in too concentrated a form, some patients being peculiarly susceptible to its action. The local application of morphine, together with some astringent, will often allay pain and reduce secretion. A favorite form of snuff has been recommended, consisting of 6 drachms of bismuth subnitrate, 2 drachms of powdered gum acacia, and 2 grains of morphine hydrochlorate. This will often serve to reduce the frequency of sneezing, but it has the disadvantage of tending to plug the nasal chamber if used too freely. Like many other local applications, it is of little service except in the early acute stage. During the first two or three days of a coryza H. B. Whitney recommends a snuff the principal ingredients of which are cocaine and menthol:

R.—Cocaine hydrochlorate	. . . . .	gr. ijss.
Menthol	. . . . .	gr. iv.
Boric acid	. . . . .	ʒss.
Powdered coffee	. . . . .	gr. viij.—M.

Of this powder a small pinch is directed to be taken in each nostril every two or three hours. It gives great temporary relief. This snuff may also be used with benefit after there is an abundant catarrhal secretion. It may with advantage be combined with the internal use of gelsemium, or later with atropine.

Alkaline sprays of sodium bicarbonate, or a spray of sodium chloride, will sometimes reduce the sense of obstruction; and similar benefit is frequently experienced from various inhalations, those of menthol and of camphor being most in favor. A convenient form of inhaler has been introduced, consisting of a glass tube lined with menthol, and with an oval orifice adapted to the shape of the nostril.

Inhalations of carbolic acid have often been recommended, and to some extent they appear to have the power to check an attack. Inhalations of ammonia, of compound tincture of benzoin, of iodine, and of eucalyptus have also frequently been employed.

If the attack becomes unduly protracted, tonic measures are indicated. The use of quinine has already been mentioned; arsenic may also be given as a tonic, but the best results of all follow change of air, preferably a short stay at the seaside. (*See Influenza.*)

Chronic Nasal Catarrh. Chronic nasal catarrh is to be treated partly by hygienic and constitutional remedies and partly by local measures. In the majority of cases, improvement results from the use of tonics, of which preparations of iron and of arsenic are perhaps most serviceable. Syrup of iodide of iron will often prove beneficial, more particularly in cases of syphilitic origin, and arsenical preparations are frequently used where the etiology is more doubtful. Chronic nasal catarrh sometimes depends upon diseased bone, leading to the retention of secretion, which assumes an offensive character, constituting ozæna. The secretion often dries upon the nasal mucous membrane, forming hard offensive crusts, and treatment is of little service without their careful removal. This may be effected by the application of the galvano-cautery, which, at a moderate temperature, adheres to the crusts and permits of their removal. This treatment, however, must be frequently repeated, only a small portion of the nasal mucous membrane being dealt with at a time. When there is much secretion, astringent injections will be beneficial, and lead acetate is perhaps most commonly used, though the tincture of hamamelis has been recommended. For the relief of ozæna numerous local applications have been used. The majority

depend upon cleanliness by the injection of various solutions through the nasal chamber ; a solution of common salt or of sodium bicarbonate may be thus employed. Numerous other local applications have been recommended, as, for example, sodium salicylate, iodoform, iodine, zinc chloride, and potassium chlorate ; tar water with sodium chloride has also been advocated. When there is much pain, applications of cocaine have been made ; and after the sensitiveness of the mucous membrane has been thus reduced, powerful remedies have been applied, such as iodine or silver nitrate. Solutions of mercuric chloride are sometimes very beneficial, both in removing fetor and in preventing further secretion. These solutions are best applied in the form of spray, so as to distribute the action more perfectly. The inhalation of camphor, or the insufflation of camphor and boric acid, will sometimes be attended with benefit. When the condition depends upon the presence of diseased bone, measures for its removal must be adopted ; though, since these cases are frequently of syphilitic origin, the usual constitutional treatment for this disease should be employed simultaneously.

Hay Fever. Hay fever is the term applied to a condition marked by abnormal sensitiveness of the upper air passages, which renders the patient liable to distinct asthmatic attacks, or to severe attacks of sneezing. This condition has also been termed autumnal catarrh, summer catarrh, or rose cold.

Although the symptoms of hay fever are primarily those characteristic of the onset of severe nasal catarrh, the severity of the attack is so great, and the interference with the ordinary work of life so extreme, that every effort should be made to secure relief without waiting—as is so often done with nasal catarrh—for the disease to run its natural course.

Frequently the paroxysmal sneezing requires the existence of three factors : (1) A predisposing neurasthenic state ; (2) an external irritant ; (3) some abnormality of the nasal passages. The predisposing neurasthenic state is inferred from the class mainly attacked by this condition. The external irritant is frequently maintained to be various kinds of pollen, but, although pollen is the most common exciting cause, any form of dust may suffice to induce hay fever in those who have already suffered from this condition ; while some unfortunate individuals are similarly affected by various odors, as, for example, those connected with different animals, as cats, horses, or dogs, or even the scent of various flowers.

The third condition, the existence of some abnormality in the nasal passages, may be found to consist either of areas of hyperæsthesia or of the development of bony projections from the turbinated bones or from the septum, or from deviations of the septum, or the existence of nasal polypi.

The symptoms ordinarily commence in the early morning with severe irritation in the nose, the throat, and the eyes, and this is accompanied by violent sneezing in paroxysms of twenty, thirty, or forty sneezes. At the same time there is commonly much lachrymation, and the condition is frequently associated with a thin watery secretion from the nose. This may persist for many days or weeks, but it usually gives place to a thicker and more purulent discharge toward the end of the attack.

The treatment of hay fever may be divided into three distinct groups: the treatment of the neurasthenic condition, the avoidance of the sources of irritation, and the correction of nasal abnormalities. Very little relief is likely to attend a plan of treatment that does not include these three objects. With regard to the first, nervine tonics are usually of some service, and with this object arsenic and strychnine have been largely used internally. Phosphorus has been sometimes recommended, but we know so little pharmacologically of the action of phosphorus that the benefits to be derived from it are somewhat uncertain.

Should the individual be of an anæmic type, preparations of iron may be given, together with arsenic or phosphorus. Occasionally also quinine may be used, either alone or in conjunction with any of the foregoing; and when the nasal catarrh is very profuse, belladonna is sometimes of service. Potassium iodide is often administered for hay fever, but with somewhat doubtful advantage. Better results, however, are generally to be obtained from the use of ammonium bromide or potassium bromide.

Secondly, with regard to the avoidance of sources of irritation, this may sometimes be effected by residence in a large town or at the seaside during the season at which the patient is most likely to suffer from these attacks. If, however, they recur in spite of change of residence, it may be desirable to recommend a long sea voyage; or if this is difficult, on other grounds, some advantage may accrue from dry mountain air.

It is generally found that every case of hay fever has to be treated on its own merits, and that the course of treatment which succeeds

in one case will often fail in others. The local treatment must depend largely upon the form of abnormality that has been detected. Any source of obstruction, any outgrowth of polypus should be removed; and when, in the absence of obstruction, the nasal mucous membrane shows some spot of hyperæsthesia, the sensitive spot should be destroyed by the galvano-cautery after the application of cocaine. If the condition persists after the use of the galvano-cautery, other local forms of treatment must be adopted; thus, for instance, a spray of quinine may be employed. This is most readily applied in a solution of one part of quinine sulphate in 875 parts of water, dissolved by heat, and used either to wash out the nose by gentle irrigation, or drawn up into the nostril by mild inspiratory efforts. It may perhaps be more convenient to dissolve the quinine in oleic acid, in the proportion of one part of alkaloid to three of the acid, thus forming an oleate which may be either directly applied, or perhaps preferably mixed with liquid paraffin and used as a spray.

Salicylic acid is also sometimes used in the form of a fine powder. This, however, will frequently excite sneezing, even though it may later tend to cure the condition. A spray of a solution of carbolic acid is also occasionally employed, with the object of destroying the vitality of any vegetable cells which may have reached the nasal mucous membrane.

Sometimes a spray of cocaine is recommended; but although this gives temporary relief, its effects are usually so transient that the application must be frequently repeated, and there is extreme danger of forming a cocaine habit, or even of giving rise to immediate toxic symptoms if the solution is abnormally strong, or if it is applied for too great a length of time. So far as hay fever is concerned, cocaine is serviceable in facilitating the application of caustics or of the galvano-cautery, and at the height of an attack it may be used on one or two occasions to relieve the discomfort pending the use of other remedies, but it should not be employed as a matter of routine.

Different inhalations are sometimes used, as, for example, inhalations of camphor, of menthol, or of menthol and camphor, or of eucalyptus oil, and occasionally stramonium fumes give considerable relief.

Dr. Watson Williams, in Allbutt's *System of Medicine*, vol. iv. p. 700, says that he has found the most gratifying results from

spraying the nasal passages cautiously with an aqueous solution of "iodic. hydrarg." (a combination of the iodides of mercury and potassium, of the strength of 1 part in 100). He recommends that a cocaine spray be used beforehand; but he adds that, as the cocaine is destroyed by the mercurial salt, it is necessary to relieve the pain which very rapidly ensues by hypodermatic injections of morphine. This solution is intensely irritating and causes much congestion of the mucous membrane of the nose, but in three hours the pain subsides and is followed by simple nasal catarrh, lasting two or three days. He claims for this mode of treatment that if used at the commencement of the hay fever season it affords immunity for the time being, though it may require to be repeated the following year.

Some patients declare that they obtain relief from the use of smelling-salts, either those which simply evolve ammonia, or from a smelling-bottle containing a mixture of ammonia, iodine, and carbolic acid, made into a paste with wood charcoal and compound tincture of benzoin.

Epistaxis. Epistaxis may be a trifling condition, or it may lead to great weakness and call for energetic measures for its arrest. When it occurs in children or in plethoric persons, the loss of blood frequently gives relief, and beyond the application of cold compresses to the occiput or to the forehead, no treatment is commonly required. When, however, the bleeding is continuous and the loss is extreme, more energetic measures must be adopted. In the majority of cases it is best to attempt to arrest hemorrhage by the local application of astringents, such as turpentine, tincture of ferric chloride, or the liquid solutions of tannin or of alum. These may be applied either upon cotton-wool or upon lint, so as temporarily to block the nasal chamber of the affected side, or they may be used in the form of a nasal douche in more dilute solutions. The local application of tannic acid, or of gallic acid, by insufflation, will sometimes arrest hemorrhage, or the nasal chamber may be washed out with warm water. When epistaxis continues even after these measures, it may be advisable to plug the nostril. Generally it is sufficient to plug the anterior nares, though in severe cases plugging of the posterior nares in addition may be necessary. Plugging of the posterior nares is not, however, easy, and happily this measure is but rarely called for. By means of Bellocq's canula, a ligature is passed through the nostril and one end is brought out

through the mouth, and to this end is fastened a roll of lint of sufficient size to plug the posterior nares. Traction on the other end through the nostril will pull the plug into position, and the end which projects from the nostril may then be fastened to another plug for the anterior nares. Whitla recommends that the cavity of the nostril should be dried with plugs of absorbent wool, and that small masses of puff-ball should be well inserted until the nostril is comfortably distended. This measure will check hemorrhage, though there is the possibility of recurrence after the removal of the plug. MacDonald recommends that hemorrhage should be arrested by the application of the galvano-cautery, or by plugging the anterior nares only, since he finds that the site of hemorrhage is mostly near the anterior portion of the septum, and is, therefore, within easy reach of this procedure, or of pressure applied by a small anterior plug. In cases of hæmophilia the hemorrhage may be very great, and although local measures must be adopted, it is often advisable to employ astringents internally, preparations of iron and of ergot being most commonly used. With severe epistaxis, ergot may be injected hypodermatically.

Acute Laryngitis. Acute laryngitis may arise independently, or it may be part of a general catarrhal process which, commencing perhaps with acute nasal catarrh, passes on to pharyngitis, laryngitis, and possibly terminates with tracheitis; or, again, acute laryngitis may occur in connection with acute tonsillitis. The ordinary symptoms of acute laryngitis are liable to modifications, which will be described in the ensuing pages. These various forms of laryngitis have received special names, such as membranous, oedematous, and phlegmonous, while similar modifications are to be met with in connection with chronic laryngitis. On the other hand, acute inflammation of the larynx may be associated with spasm, giving rise to the so-called false croup, which, together with true croup (a form of diphtheria), will be considered separately. In connection with acute affections of the larynx it will also be found necessary to describe and treat special symptoms, which, as in laryngismus stridulus, may be the expression of neuroses, or, as with aphonia and hoarseness, may be dependent upon diseased processes affecting the larynx in an indirect way.

The treatment of acute laryngitis, when uncomplicated, does not differ very greatly from that of acute nasal catarrh. It is advisable to begin with the administration of opium to relieve pain and to

reduce the frequency of cough, these symptoms being most troublesome in the initial stages. From the commencement warm applications may be made over the larynx ; warm fomentations or warm poultices appearing sometimes to reduce the frequency of cough, while even a warm, moist sponge placed over the larynx will often reduce the sense of soreness. Should pain persist, however, in spite of these measures, relief may be afforded by employing a spray of cocaine. This remedy must be used sparingly and only in emergencies, since its influence upon the circulation cannot be disregarded. It has the advantage not only of relieving pain, but, by the contraction of the vessels, it causes temporary diminution of the inflammatory process.

Another spray that is frequently employed is that of ammonium chloride ; but the use of this remedy is perhaps more conveniently effected by the inhalation of the fumes of ammonium chloride which result from the combination of vapors of ammonia and of hydrochloric acid. There are many convenient inhalers for the use of ammonium chloride ; perhaps the most suitable is that devised by Godfrey. Ammonium chloride, whether used in inhalation or as a spray, finds its greatest sphere of utility when the dry, irritable condition of the commencement of acute laryngitis has been succeeded by the stage of exudation. During the acute stage, relief is often given by inhalations of steam, or of steam impregnated with conium juice, or with compound tincture of benzoin or other aromatic volatile substances.

When acute laryngitis resists milder remedies, or when the distress is very great, a bronchitis kettle should be used, so as to warm and moisten the air, and thus to allay irritation. The pain over the larynx and trachea, which is so much aggravated by coughing, may to some extent be controlled by the use of ice compresses or of ice bags ; but cold applications are, as a rule, rather difficult to enforce, since there is a wide-spread belief that the disease takes its origin in cold, and that it will, therefore, be made worse by further chill of the surface. A saline aperient is often beneficial, even though the action of the bowels has previously been regular ; this will tend to lower the temperature and to relieve headache. On the second day of acute laryngitis it is advisable to employ remedies which will facilitate the removal of expectoration, such as ipecacuanha or tartar emetic. Both of these may be employed in ordinary expectorant dose, and sometimes benefit results from the

addition of ammonium carbonate, or of ammonium chloride ; while the sensitive character of the larynx may be further alleviated by continuing the administration of small doses of opium with the expectorant mixture. Camphorated tincture of opium is especially valuable for this purpose, and as a rule it is readily taken.

R.—Tincturæ opii camphoratæ	3 ss.
Aceti scillæ	gtt. v.
Mellis despumati	3j.
Emulsui ammoniaci q. s. ad	3j.
R.—Tincturæ opii camphoratæ	3 ss.
Spiritus chloroformi	℥v.
Mucilaginis acaciæ	3ij.
Aquæ q. s. ad	3j.

The sense of rawness may often be relieved by the administration of warm drinks ; and benefit may result from moderate doses of sodium carbonate, or of sodium chloride, in a solution which is to be sipped frequently. The same remedies are sometimes given in a mixture in a rather larger dose, or ammonium chloride may be substituted for them.

When acute laryngitis affects children the prognosis is commonly more grave, and the younger the child the more serious is the condition likely to become. In addition to the use of warm drinks, of warm compresses, of the steam kettle, and of hot sponges, further relief may be afforded by withdrawing a small quantity of blood by placing a leech over the upper part of the sternum. Frequently, after the removal of a very moderate amount of blood, the obvious signs of laryngeal distress are much diminished, the child ceases fighting for breath, and its respiration becomes less noisy. With children it is often advisable to employ an emetic at an early stage, as this not only renders the movements of the diaphragm more free, but also tends to diminish laryngeal irritation, by removing any secretion which may be irritating the cords and causing spasm. There is very little, perhaps, that need be said of the selection of an emetic ; ordinarily these cases occur so suddenly, and the need for an emetic is so urgent, that the emetic which is nearest to hand is the one most likely to be employed. Vomiting may be induced by the administration of mustard and warm water, and after this mixture has been given it may be favored by irritation of the fauces ; or, should time allow, tartar emetic or ipecacuanha may be given, though the depressing influence of the former must not be

forgotten ; zinc sulphate or copper sulphate may also be used. The administration of apomorphine hypodermatically is not to be recommended for acute laryngitis in children, since it promotes very free secretion, not only within the larynx, but also within the trachea and bronchi, and this may increase the need of coughing, and every cough produces pain.

Should the breathing remain stridulous, and should there be signs of obstruction to the entrance of air, as shown by recession of the chest wall in inspiration, some further measures must be taken to give relief. Small pieces of ice sucked slowly may reduce the inflammatory swelling about the larynx, and they certainly relieve pain ; but if the child is fighting for breath it is necessary to increase the size of the laryngeal orifice by some more active treatment. Formerly, in cases of so-called œdema of the glottis, free scarification of the mucous membrane or of the epiglottis was recommended. If this failed to reduce the swelling, and thus to facilitate the entrance of air, it was held necessary to perform tracheotomy. Without a doubt the lives of many children have been saved by early resort to this operation ; but tracheotomy is in itself somewhat difficult to perform while the child is fighting for breath, owing to the rapidity of movement of the trachea, and happily in these days it is frequently replaced by the operation of intubation, which will be more fully described in connection with diphtheria. The administration of Dover's powder is sometimes recommended, both on account of its power of promoting diaphoresis and on account of its sedative action upon the laryngeal mucous membrane. This remedy, however, must be sparingly employed, and my own experience is strongly against its indiscriminate use ; for, notwithstanding the benefit that results from free perspiration, the amount of opium may constitute a source of danger when this powder is employed for young children. Since, however, the comfort of the patient is usually increased by free action of the skin, I prefer employing warm baths and warm alkaline drinks, and following these by the administration of solution of ammonium acetate whenever it appears desirable to promote diaphoresis.

Chronic Laryngitis. The consideration of the treatment of some special symptoms often connected with acute laryngitis may be more conveniently dealt with after chronic laryngitis, since some of these symptoms, notably the alteration in the character of the voice, may more commonly occur in connection with chronic forms

of disease. Chronic laryngitis may arise from a variety of causes, and the treatment is likely to be unsatisfactory or even useless unless the cause in the individual case has been ascertained and treated. The determination of the cause is the more necessary, as chronic laryngitis often occurs in connection with constitutional affections; thus, for example, it would be absurd to attempt to treat chronic laryngitis of tubercular or syphilitic origin solely by means of local applications. The treatment suitable to the special disease must be adopted simultaneously. Some general indications may, however, be laid down which will be applicable to every case; foremost among these is the necessity of resting the larynx—that is, of discontinuing any occupation which necessitates the constant employment of the voice. Chronic laryngitis is peculiarly prone to occur among actors, singers, clergymen, and others who have frequently to make an excessive tax upon their vocal cords. But chronic laryngitis may also arise from other occupations, particularly those which entail the inhalation of much dust. MacDonald describes a form of Board School laryngitis, in which the condition was probably aggravated by the attempt to be audible above the hubbub in the school, as well as by the irritation produced by the continual use of a black-board. Ragpickers and bakers who work in an atmosphere impregnated with dust frequently suffer from chronic laryngitis.

In all such cases temporary change of occupation is essential. For those in better circumstances this is most beneficially carried out by recommending some health resort, where the temptation to vocalize is diminished to a minimum. Many patients do well with the avoidance of exposure to the rapid alterations of temperature of this country. Many also appear to improve with a warm and perhaps fairly moist climate, such as may be found in many of the Swiss valleys, while they do not show as much amelioration when sent to high mountain air. In some foreign health resorts—as, for example, Aix-les-Bains—the patients may take one of the mineral waters, which will counteract the constitutional cause of the chronic laryngitis. At Aix-les-Bains the eau de Challes is often employed, and here the brightness of the surroundings and the warmth of the climate combine to facilitate a cure. In England, at suitable seasons, patients may be sent either to Buxton or Bath, to Torquay or Bournemouth, the two latter being preferred during the late autumn and winter. Much may be done to help these patients by careful attention to their general hygienic surroundings. Fre-

quently they require tonic treatment and generous dieting ; it is also often desirable that they should not take malt liquors nor indulge in strong forms of alcohol. Further, patients with chronic laryngitis should be encouraged to give up smoking, since, although this habit may occasionally appear to soothe, it far more frequently causes increased irritation and cough.

Local treatment may be applied in a variety of ways—that is, medicaments may be employed, first, by the laryngeal brush ; secondly, by inhalations ; thirdly, by insufflation ; and, fourthly, by sprays.

The applications which are usually most preferred for local use commonly consist of astringents. Of these perhaps the most manageable and most generally employed is silver nitrate. The strength of the solution depends upon the frequency of its application ; a solution consisting of 16 grains to the ounce may be applied once a week or once a fortnight, and this serves to diminish the local fulness of vessels and to allay the sense of irritation. Preference has sometimes been expressed for the employment of much stronger solutions, but before using these it is necessary to accustom the larynx to the moderate irritation which results from the use of silver nitrate ; thus, before using a strong solution the larynx may be painted for a week or more with a solution of the strength of 10 grains to the ounce, and when this can be tolerated without material discomfort, a solution of 14 to 16 grains to the ounce may be applied once a week. Some practitioners prefer to employ solutions of alum or of tannin (10 grains to the ounce), which may be continued daily if necessary. Ferric chloride (20 grains to the ounce) and zinc chloride (also 20 grains to the ounce) are sometimes employed when other remedies have failed to give relief.

It will be observed that in the applications of local astringents it is almost essential to use a laryngeal mirror, and to apply the solutions as nearly as possible over the orifice of the larynx ; in other words, these applications should be made by the medical man. It is not advisable to intrust the patient with one of these solutions, since it is almost impossible for them to be used satisfactorily. This objection does not hold with regard to inhalations, which often give considerable relief, even though they may not do much toward curing the condition. Nearly every form of volatile oil has been essayed in the treatment of chronic laryngitis. Those which perhaps give the greatest satisfaction are the oil of turpentine, or the

use of pinol with camphor. The compound tincture of benzoin is frequently used and appears to be very soothing, although some patients object strongly to the unpleasant after-taste, which seems to result from the presence of a small proportion of aloes.

The employment of powders for insufflation again requires the intervention of the medical man, although many convenient forms of insufflators have now been devised. Bismuth subnitrate is frequently used for insufflation, but it gives far better results when mixed with a small proportion of morphine hydrochlorate. Patients generally feel remarkably better after using these insufflations, but the relief is merely temporary and can only be maintained by repetition of the local sedative. Some astringents, as, for example, alum or tannic acid, are occasionally used for insufflation, and boric acid has also been thus employed.

With regard to sprays, they present a convenient form of applying drugs to the larynx and adjacent parts, but it is obviously impossible to limit their action to the larynx or to prevent some of the drug reaching the stomach, and therefore the list of drugs which can be used in this way is considerably curtailed. When well diluted some of the astringents above mentioned may be used thus, while many speak highly of the value of alkaline solutions, the amount of alkali which thus reaches the stomach being so small that it is certain to do no harm.

Tubercular Laryngitis. Tubercular laryngitis demands somewhat more energetic treatment, since it is necessary to adopt measures which will destroy or remove the local deposits, and it is further necessary to employ almost continuously remedies to relieve pain and cough, and to facilitate the act of swallowing. The removal or destruction of ulcerated surfaces may be effected by lactic acid, commencing with a solution of the strength of 30 per cent., and gradually increasing the percentage even up to 75 per cent. This solution is applied by brushing the affected surfaces, and before its employment it is essential to anæsthetize the larynx by cocaine.

Dr. R. Botey, of Barcelona, makes use of the following mixture in the local treatment :

R.—Carbolic acid.	.	.	.	.	.	gr. xv to lx.
Lactic acid .	.	.	.	.	.	gr. xxx to 3iv.
Neutral glycerin	.	.	.	.	.	3v.

The laryngeal mucous membrane is first anæsthetized with a 10

per cent. cocaine solution, after which the above mixture is applied to the affected parts. At first only a small amount of carbolic and lactic acid is used, the proportion being gradually increased up to the maximum indicated.

When, however, a case of tubercular laryngitis comes under treatment at an earlier stage, and the larynx is found to be red and inflamed, the treatment must somewhat resemble that of chronic laryngitis. If there is no exudation Oertel has recommended the inhalation of cold, dry air, with the view of reducing the inflammatory condition. More often the catarrhal condition has been reached before complaint has been made of laryngeal symptoms, or at all events before the affection of the larynx has been recognized; and accordingly it is necessary to cleanse the surface from the secretion which so readily accumulates about the larynx, as the secretion may be in part of local origin or in part derived from an affection of the bronchi or deeper parts of the lung. The removal of this secretion is essential before any local curative measures can be employed, and it can generally be affected by means of alkaline inhalations or sprays, solutions of sodium bicarbonate or of sodium chloride or of Ems water being often used. Sometimes a combination of these with carbolic acid gives good results; thus Burney Yeo recommends an inhalation of the following:

R.—Sodii carbonatis	.	.	.	.	.	.	.	gr. x.
Sodii chloridi	.	.	.	.	.	.	.	gr. v.
Glyceriti acidi carbolici	.	.	.	.	.	.	.	℥j.
Aquæ	.	.	.	.	.	.	q. s. ad	℥j.

After the cleansing of the surface, when there is much engorgement and much effusion, astringents may be used either by inhalation or by local application. The drugs employed for this purpose do not, however, differ from those already recommended for the treatment of chronic laryngitis. When there is much ulceration it is the more necessary to remove all mucus, since its constant presence on the inflamed surface not only greatly increases the irritation, but also hinders the action of any topical remedies which may be applied. After the employment of alkaline solvent inhalations, the surface of the ulcer may be treated with carbolic acid or with silver nitrate: the former may be employed in the strength of from 2 to 3 per cent.; the strength of the latter, however, will depend upon the frequency of its application.

When there is much pain, this may not only be reduced to some

extent, but the frequency of the cough may be diminished by employing inhalations of vapor of sodium benzoate, ammonium benzoate, or of balsam of Peru or tolu ; and if the pain persists in spite of these measures, relief may be obtained by the use of insufflations of morphine. It is essential in cases of tubercular laryngitis to remember that the health of the patient is liable to great deterioration as a consequence of incessant pain, since it not only exhausts the patient by disturbing sleep and by the frequent irritable cough which it provokes, but it may also tend greatly to interfere with the amount of food which can be taken. In addition to morphine, iodoform may occasionally be used, either alone or preferably in conjunction with morphine.

For the relief of dysphagia a spray of cocaine may sometimes be employed shortly before the administration of food ; but although this undoubtedly facilitates the act of swallowing, it may also, by the local anæsthesia which it produces, favor the entrance of small particles of food into the larynx, and thus the irritation, after the effect of the cocaine has passed away, will perhaps be rendered worse. This is an argument for the sparing use of cocaine, and indeed the full local anæsthetic effect of this drug is certainly not to be desired. Dilute solutions in the form of spray will generally suffice to slightly deaden sensibility and to cause local contraction of bloodvessels, which, by thus diminishing inflammatory thickening, will enable food to be swallowed with less discomfort.

The application of dilute solutions of silver nitrate (2 to 3 per cent.) will also occasionally attain the same end ; while Solis-Cohen recommends a teaspoonful of sweet almond oil immediately before taking food, and considers that this affords a protective covering to the irritated surfaces and diminishes friction. When dysphagia persists in spite of this form of treatment, it may be necessary to feed the patients by means of a soft œsophageal tube ; but this obviously need only be resorted to in extreme cases, when feeding by solids is impossible. The solution of menthol in olive oil, in the strength of one in ten—or even in stronger form, one in five—may be applied directly to the irritable surfaces, or may be given dissolved in sweet almond oil. When it has been decided to use lactic acid to act directly upon the ulcerated surface, the strength, as already indicated, will vary according to the frequency of its application. Two per cent. solutions may be applied frequently, and it is generally

advisable to follow the use of lactic acid by a spray of corrosive mercuric chloride.

Syphilitic Laryngitis. The treatment of syphilitic laryngitis to a certain extent depends upon the stage at which the laryngitis occurs. When it appears as a late manifestation of secondary syphilis, it is advisable to employ mercury somewhat freely. Inunctions with mercurial ointment may be continued until constitutional symptoms from its absorption are developed. When, on the other hand, it occurs in the course of tertiary syphilis, it is advisable to use potassium iodide, commencing perhaps with 10 to 15 grains three times a day, and rapidly increasing the dose until 25 or even 30 grains are given three times a day. It will often be found that, during the administration of these larger doses, symptoms of iodism are less marked. Should the laryngitis show no improvement from the use of iodide, it will be desirable to employ mercurial ointment together with iodide, or, if this method of administration proves inconvenient, the solution of corrosive mercuric chloride may be given internally. Local measures must be adopted in addition to this constitutional treatment, and, as in other forms of laryngitis, astringents and anodynes are often called for, though perhaps the use of anodynes is scarcely so imperative as in cases of tubercular laryngitis.

When the ulcerated surface shows but little sign of improvement, recourse may be had to caustics; silver nitrate and copper sulphate give the best results. Insufflations of iodoform, or of iodoform with morphine, may be employed whenever there is much exudation and irritation; while, as in tubercular laryngitis, insufflation or spray of cocaine may be used as a palliative measure. Occasionally in connection with syphilitic laryngitis there is considerable œdema which interferes with swallowing. Should this resist the action of astringents, it may be necessary to relieve tension by free scarification of the affected parts. Syphilitic laryngitis is not to be considered cured when the inflammatory stage has completely subsided, since the ulcerative process is often followed by the formation of cicatricial bands and adhesions which require surgical treatment, or by warty growths about the larynx, which must be removed, as they are apt to lead to aphonia or to troublesome cough.

Hoarseness and Aphonia. These symptoms occur in the course of many of the foregoing conditions, but, as they are met with in other diseases, and as they frequently form the chief reason of the

patient seeking advice, it is perhaps desirable to deal with them more fully in a separate section. Hoarseness can only be treated by the discovery of the cause of the symptom. When it arises in connection with acute or chronic laryngitis, more particularly when the false cords are involved and press upon and limit the movements of the vocal cords, the treatment of hoarseness in no way differs from the treatment of acute and chronic laryngitis, as already detailed. Rest of the voice is essential, and relief may be obtained by the employment of astringent gargles, or by the use of various sedative inhalations, insufflations, or sprays.

When the symptom arises in connection with tumors about the larynx, the removal of the tumor commonly suffices to restore the clearness of the voice. In every case, therefore, of hoarseness the employment of the laryngoscope is an essential before any treatment can be satisfactorily commenced. The syphilitic and tubercular forms of laryngitis are constantly associated with this symptom, and the degree to which the voice is interfered with serves, to some extent, as an indication of the laryngeal affection. Although in general terms this is true, it must be remembered, however, that a very considerable amount of laryngeal affection of syphilitic or tubercular origin may sometimes occur before there is much alteration in the voice. In diphtheria the symptom is one which is regarded with anxiety, inasmuch as alterations in the voice or in the character of the cough indicate the extension of the diphtheritic membrane to the larynx, and therefore serve as danger signals. Laryngeal diphtheria, as will be seen later, demands the employment of antitoxin; as a rule it is always advisable to intubate as early as possible, or, if intubation is impracticable, to perform early tracheotomy.

A form of hoarseness which is less amenable to treatment than any of the foregoing, with the exception, perhaps, of syphilitic and tubercular forms, occurs in connection with nerve lesions involving paralysis of some of the laryngeal muscles; thus, with aneurisms pressing upon the recurrent laryngeal nerve, hoarseness is frequently experienced, and, in spite of treatment with iodides, and of local sedatives which are usually demanded by the patient, but little improvement results. Complete aphonia may arise under similar conditions, but complete loss of voice is far more commonly seen in connection with hysteria. Aphonia may, however, result from severe ulceration of the cords or from ankylosis of cartilages which

prevents the approximation of the cords ; or, again, it may ensue from paralysis of both adductors from nerve lesions, as in rare cases of aneurism. The most hopeful cases for treatment are those in which complete aphonia develops suddenly, since in the vast majority this is an indication that we are dealing merely with a symptom of hysteria. Under these circumstances the ordinary treatment of acute or chronic laryngitis is practically useless, and when once the diagnosis has been made, it is well to treat the case speedily by the application of a strong induced current. A weak induced current or a continuous current, employed under notions of mistaken humanity, is absolutely useless. The success of treatment depends largely upon the sudden shock and pain, which cause the patient to cry out loudly. One pole is placed over the larynx in the neck, the other is passed into the larynx from within, and a single shock is given, proving nearly always sufficient. This method is preferable, although sometimes the application of the electricity from without is essayed, the poles being placed on either side of the neck, so as to send the shock of a strong current across the larynx. Should the aphonia return after the use of a strong induced current, local treatment may be adopted ; for instance, silver nitrate may be applied directly to the larynx, or atropine or belladonna may be used both locally and internally.

Laryngismus Stridulus. Laryngismus stridulus is an affection of childhood. Although the main symptom of this disease appears to be of laryngeal origin, there is no doubt that it is purely a spasmodic affection in which the laryngeal spasm is a reflex act, and that so soon as the spasm can be overcome, or so soon as it relaxes naturally, the child is to all intents and purposes free from laryngeal symptoms. With laryngismus stridulus the attacks of spasm and of urgent dyspnoea occur suddenly during the night. The child wakes with fright and is seen to be struggling for breath, and the air which passes into the chest enters with indications of considerable laryngeal obstruction. The breathing is noisy and stridulous, and the face is expressive of anxiety. This condition most commonly attacks children at the time of primary dentition, and it most frequently occurs in connection with delayed dentition owing to rickets. It has been described in connection with infantile convulsions, but, as is well known, these also are frequently dependent upon rachitic changes, or at least upon those errors of diet which form the foundation of rickets. The attacks of spasm are perhaps

most common during the actual passage of a new tooth through the gum, and often, therefore, the gums are found to be enlarged and tender at the time of laryngeal spasm. The condition always appears alarming, inasmuch as considerable cyanosis may occur during the arrested respiration ; but in the large majority of cases, after a few seconds the glottis relaxes sufficiently to enable the child to resume breathing.

Although laryngismus stridulus, being reflex, is to be treated most efficiently by the removal of the cause—that is, by constitutional treatment during the intervals of spasm—yet the attacks are in themselves so alarming that immediate treatment must be adopted during the spasm. In order to promote relaxation of the glottis and to facilitate respiratory movements a warm bath should be used, the child being completely immersed as quickly as possible and kept in the bath until the breathing becomes more easy. Sometimes an attack is shortened by the application of cold over the larynx or over the upper part of the thorax. In obstinate cases it may be beneficial to conjoin these methods, and to apply cold over the larynx while the child is in the hot bath. In severe cases it may be necessary to perform artificial respiration, but so long as the laryngeal spasm continues the efforts to draw air into the chest must be unavailing. When the respiration remains stridulous, some relief may be afforded by the careful administration of chloroform, or occasionally the respiratory efforts may be rendered more deep from the use of ammonium carbonate, or even of ammonia as an inhalation. The latter, however, must be employed with care, as, if given too suddenly, or in too concentrated a form, it may excite laryngeal spasm instead of only causing deeper inspirations. When stridor continues but is less severe, other remedies may be employed. An emetic will sometimes cause relaxation, at the same time that it may remove additional causes for reflex spasm ; but emetics are scarcely as beneficial in this condition as in acute laryngitis or croupous laryngitis, or even in capillary bronchitis or bronchopneumonia.

Nitrites are sometimes employed, either by inhalation or internally. Amyl nitrite, from the ease of its administration, is the one which is perhaps most commonly used ; but other nitrites, notably the spirit of nitrous ether, have been recommended internally. Reflex irritability has also been allayed by the employment of one or other preparation of belladonna, the most convenient perhaps being

the tincture, given in conjunction with spirit of chloroform and solution of ammonium acetate, so as to form a draught which is readily taken. With the same object, morphine has been used ; but I must confess that, as these cases so commonly occur in weakly children at an early age, I have felt that this treatment was not only unnecessary but even dangerous. The same reason, to a less extent, has influenced me in not using chloral hydrate in the treatment of laryngismus stridulus, although it has been employed in small doses as a means of procuring sleep and allaying reflex excitability.

During the time that I had charge of the out-patients at the Evelina Hospital, I saw a large number of cases of laryngeal spasm, and the majority improved greatly with the administration of potassium bromide, the last dose being given shortly before putting the child to bed at night, while the simultaneous employment of cod-liver oil improved the general condition and counteracted the rhachitic tendency. Treatment, however, by drugs during the intervals of the attacks should not lead us to dispense with an inquiry into the nature of the food ; and errors, more particularly the excessive employment of starchy food and sometimes even of meat, must be rectified and a milk diet adopted, with perhaps the administration of beef tea or of light custards, according to the age of the child. I regard the treatment of laryngismus stridulus by drugs alone as being doomed to failure. The use of cod-liver oil tends, however, to oppose the constipation from which many of these children suffer, and should there be marked indications of irritation of the gums it may be advisable to give relief by lancing the gum deeply over the advancing tooth ; frequently, however, this measure seems to be of very little service.

False Croup. False croup is an unsatisfactory term which has been used for cases of acute laryngitis associated with spasm of the laryngeal muscles and comparative closure of the glottis ; it differs from diphtheritic croup or true croup in the absence of membrane, while it differs from simple acute laryngitis in the frequency of spasm, and also in the great improvement that may occur within a few hours or even a few minutes.

The common history of a case of false croup is that the child, having gone to bed apparently well, wakes suddenly with hoarse cries, and its respiration is then found to be noisy, and interrupted frequently by a hoarse, ringing cough. After some hours of stridor the condition gradually passes away, and the child falls asleep again

and wakes the next morning apparently well ; but the occurrence of one attack is likely to be followed by another, or by several on successive nights. The treatment to be adopted at the time of the croupous breathing consists in the administration of emetics, and as the condition appears very urgent the emetic which is most ready to hand will probably be the one selected. Vomiting may be induced by the administration of mustard and water, or of salt and water ; or if the condition defies these simple measures, it may be promoted by ipecacuanha wine, or by tartar emetic, although zinc sulphate or copper sulphate is sometimes preferred. The hypodermatic injection of apomorphine is so commonly followed by prolonged vomiting and by depression, that it is an unsuitable remedy to employ in this condition. The child generally falls asleep shortly after vomiting, but should its breathing continue to be distressed, some relief may be afforded by using simple expectorant remedies. Ammonium carbonate, ipecacuanha wine, syrup of tolu, with perhaps some liquid extract of liquorice, may facilitate expectoration, and thus promote sleep. Apart from the immediate treatment of the laryngeal spasm, the case is to be treated on the principles already laid down in connection with acute laryngitis occurring in children.

Diphtheritic Croup. Diphtheritic croup is an extremely unsatisfactory term which has been used for cases of laryngeal diphtheria, and the treatment will be more fully detailed in connection with diphtheria. It may suffice for the present to say that the essence of the treatment lies in the employment of antitoxin and in the performance of intubation, if respiration is sufficiently interfered with. Should intubation instruments not be available, the question of performing tracheotomy must arise ; and notwithstanding the high mortality after tracheotomy for diphtheria, my experience is that the risks of a fatal termination are greatest when the operation has been unduly delayed. If deferred until the child has become cyanosed, the prospects of recovery are extremely gloomy. (*See Diphtheria.*)

CHAPTER IV.

RESPIRATION.—*Continued.*

Acute Bronchitis—Chronic Bronchitis—Bronchorrhœa—Bronchiectasis—Asthma
—Emphysema—Hæmoptysis.

Acute Bronchitis. The treatment of acute bronchitis depends upon the age of the patient, upon the extent of the bronchial affection, and upon the time that has elapsed from the onset of the attack. With infants and old people the disease is likely to assume a severe type. In the former the severity usually arises from the affection of the smaller bronchi, which may considerably impede oxygenation; in the latter the danger is more commonly due to the weakness of advancing years and the readiness with which such patients succumb to any acute malady. Acute bronchitis, even in adults, may either be a trifling ailment or it may prove serious when extending along the course of the smaller bronchi. Some patients may be able to continue their ordinary vocations with but little disturbance when suffering from this condition, while others must stay in bed almost from the first. It will be convenient to describe the treatment of both mild and severe types.

Even with mild cases, patients should not only remain in bed from the onset of the attack, but they should also be kept in an atmosphere of even temperature so far as possible; a temperature of from 65° to 70° is that which usually is most tolerated. The air may sometimes be moistened by the employment of an ordinary bronchitis kettle, but this should be placed over a fire, or else over a lamp placed in the fireplace, so that the products of combustion readily pass away from the room. Although there is distinct advantage in thus moistening the atmosphere, there is no need to surround the patient with a tent which shall unduly confine the steam. Sometimes patients experience relief if some volatile substance is added to the steam. Compound tincture of benzoin is frequently employed, while creosote and turpentine are occasionally used. These measures, however, are not necessities in ordinary cases.

At the onset of an attack of acute bronchitis it is frequently desirable to favor diaphoresis and to reduce temperature by employing hot baths, followed by copious draughts of hot barley water, hot milk, or any other hot drink. Should the feverish condition resist such treatment, it may be advisable to administer small doses of tincture of aconite; doses of from $\frac{1}{4}$ to $\frac{1}{2}$ minim of this drug may be given every hour until the temperature falls. When there is much fever, smaller doses more frequently administered are sometimes preferable, for example, $\frac{1}{8}$ minim every half-hour. Diaphoresis may often be favored by small doses of the powder of ipecacuanha and opium, and the liquor ammonii acetatis in full doses has often given good results. Quite at the commencement of the treatment simple purgatives are generally needed, the selection of the purgatives being controlled by the age and general condition of the patient. Frequently small doses of aloes may be given, but this drug has the disadvantage of acting somewhat slowly; and calomel or gray powder, followed by a saline purge, will often prove more satisfactory. The sense of weight and oppression on the chest may be relieved by the use of light poultices; but these should be of relatively small size, and are best applied over the bases of the lungs, instead of over the front of the chest, where, particularly in children, the weight of the poultice may tend to impede respiration.

With the onset of acute bronchitis the cough is often painful and ineffectual, since the bronchial mucous membrane, although inflamed, is comparatively dry. This painful cough may be relieved by the use of general sedatives; small doses of one of the preparations of opium may be given except in the case of young children, who are intolerant of opium in any form. Relief may also be obtained from preparations of morphine or codeine; but all these sedatives should be employed with great circumspection, and should be discontinued so soon as the bronchial mucus increases in quantity and looseness. Antimony and potassium tartrate may also be used for the same purpose, and this drug has the further advantage of increasing the action of the skin simultaneously with its effect on the bronchial mucous membrane. The same result may sometimes follow the administration of from 5 to 10 grains of the powder of ipecacuanha and opium; but on account of the opium which this contains, it is often desirable, in treating children, to employ instead the wine of ipecacuanha. It must be remembered, however, that

this acts mainly as an expectorant, without inducing any diaphoretic action. In the treatment of acute bronchitis in children this may be given together with syrup of tolu, which, from its mucilaginous character, allays a good deal of the irritable cough.

As the expectoration becomes more free, it is desirable to use remedies which favor its removal and reduce its viscous character. Such remedies include preparations of ammonium, more particularly the ammonium carbonate, which is administered with ipecacuanha wine, with syrup of tolu, and perhaps with small quantities of spirit of chloroform. Other alkaline preparations may be given, such as sodium bicarbonate or sodium chloride. The tincture of senega and infusion of senega may also be administered when the expectoration is not very large in amount ; but it is advisable to use these remedies cautiously, since during their use the quantity of fluid expectoration may be very greatly increased, and in old people such increase may cause considerable discomfort. The syrup of squill is a favorite preparation for the treatment of acute bronchitis in children, but its acid nature must be remembered, since this prohibits its employment when alkaline carbonates are being given. In mild cases it is rarely necessary to employ other remedies until the patient is convalescing, when tonics and acids may, with advantage, replace alkaline carbonates and expectorants.

Next, with regard to cases of greater severity in which the disease is more extensive, it affects the finer bronchi, and is probably attended by a higher degree of fever. The initial treatment must be similar to that previously recommended in connection with mild cases, so far, at least, as concerns the importance of keeping the patient in bed in a room of even temperature and of promoting the action of the skin. Pain is more often complained of, and it is accordingly desirable to give relief by the application either of poultices or of fomentations which may be sprinkled with laudanum ; instead of laudanum, other remedies which will promote local fulness of vessels may be sprinkled over the fomentations or poultices, such as turpentine or oil of cajuput ; and both of these, from their volatile nature, may also be absorbed during respiration, and thus produce beneficial effects. In very severe cases, a few leeches may be applied over the upper part of the sternum before employing the poultice. The abstraction of a relatively small quantity of blood will frequently diminish the sense of weight and constriction. In acute bronchitis it is rarely necessary to bleed more extensively,

although this procedure is often advisable in the treatment of selected cases of chronic bronchitis. As in mild cases, antimony and potassium tartrate will prove serviceable in favoring diaphoresis and expectoration, and it is also necessary to employ saline purgatives at the commencement of the attack. The dose of both of these classes of remedies must be regulated by the age and strength of the patient, since, when the smaller bronchi are largely involved, there is risk in using depressant remedies. For the same reason it is desirable to avoid the use of opium either as a diaphoretic or as a sedative. Cases of severe acute bronchitis are perhaps more common in children, who bear opium badly ; but even in adults opium tends so greatly to diminish reflex excitability that there is risk of its favoring the accumulation of fluid within the bronchi. Should the patient at any stage be troubled with sleeplessness, it is better to employ moderate doses of chloral hydrate, of potassium bromide, or of sulphonal, since these scarcely affect the reflex excitability of the larynx.

With severe bronchitis much difficulty is often experienced in the removal of expectoration after deep sleep, since the mucus which accumulates during sleep tends to become more viscid and tenacious. On this account, the administration of hot diffusible stimulants on waking will frequently be found beneficial. Even warm weak tea will often materially aid in the efforts to clear the air passages. In the early stages some relief may be experienced from the use of inhalations, either of steam by itself, or of steam impregnated with sodium bicarbonate or with ammonium chloride. During the employment of these inhalations the expectoration will often become more loose. The after-treatment, when the expectoration is fairly abundant and is removed with comparative freedom, calls for the administration of expectorants, and those most commonly employed are combinations of ammonium carbonate, senega, and tolu, in the usual medicinal doses. Syrup of squill can be given with senega, but with this remedy ammonium chloride should be used in preference to the carbonate. When the cough is very frequent and troublesome, small quantities of camphorated tincture of opium, which contains opium, may be administered. The amount of opium contained is so small that it rarely causes any anxiety, but this tincture should not be given to children, nor should it be employed when the physical signs indicate that there is a great quantity of fluid within the air passages.

The following prescriptions containing sodium and ammonium salicylate, as suggested in the *Semaine Médicale*, January 9, 1895, are sometimes of great service :

R.—Sodii salicylatis	3j.
Ammonii carbonatis	3j.
Tincturæ opii camphoratæ	3j.
Syrupi aurantii	3ss.
Syrupi tolutani	3ss.
Aquæ q. s. ad	3iv.

Ft. mist. S.—A dessertspoonful every three hours.

R.—Ammonii salicylatis	gr. xl.
Ammonii carbonatis	gr. xxiv.
Ammoni chloridi	gr. lxxx.
Extracti cocæ fluidi	3iv.
Glycerini	3ss.
Aquæ q. s. ad	3iv.

Ft. mist. S.—A tablespoonful every three or four hours.

In most hospital pharmacopœias a mixture is to be found containing spirit of ether and aromatic spirit of ammonia; in this mixture $\frac{1}{4}$ -drachm doses of each are commonly given, and sometimes 10 to 20 minims of spirit of chloroform are added. This compound is used more particularly in cases of acute bronchitis accompanied by bronchial spasm or by weakness of the circulation.

When cardiac failure threatens, it may be necessary to administer other cardiac remedies in addition to the ether and ammonia, such as pharmacopœial doses of tincture of digitalis or tincture of strophanthus, or small quantities of strychnine. When there is much cyanosis the inhalation of oxygen is often beneficial, but it appears to act mainly as a palliative, enabling the patient to overcome temporary difficulties by removing accumulations of fluid in the air passages. For the same purpose emetics are frequently employed, since, during the act of vomiting, large quantities of mucus may be removed from the bronchi. In selecting an emetic, the age and the general condition of the patient must be considered. In elderly weak individuals ammonium carbonate is generally preferred; but for ordinary use zinc sulphate is commonly sufficient. Care must be taken in promoting vomiting after the administration of emetics, since, if reflex excitability is impaired, relatively large doses may be given without producing this effect. Small doses of apomorphine given by the mouth will often facilitate the expulsion of mucus; larger doses given by subcutaneous injections are sometimes em-

ployed with the view of causing vomiting. This drug, however, is often attended by great cardiac depression, and therefore its range of applicability is comparatively limited. Potassium iodide in relatively large doses often increases the fluid character of the expectoration, and thus gives relief; but this remedy is perhaps most useful when an acute attack shows signs of running on indefinitely. Under the same conditions preparations of cinchona bark or of quinine may be given, and their tonic astringent effect is often increased by the addition of aromatic sulphuric acid.

It is not uncommon to find the course of acute bronchitis interrupted by attacks of spasmodic dyspnoea, and in such attacks, which probably depend upon bronchial spasm, relief as a rule may be afforded by the use of ether and ammonium carbonate. Occasionally the spasmodic difficulty of breathing is so severe as to call for the administration of chloroform, which relaxes the bronchial spasm; in fact these cases may be treated like those of spasmodic asthma (*vide* Spasmodic Asthma), with various inhalations or with preparations of stramonium or lobelia. The spasmodic dyspnoea is perhaps most prone to arise when the bronchi are relatively dry, and when, therefore, there is but little objection to the use of morphine hypodermatically.

Although acute bronchitis of severe type is ordinarily marked by high temperature, the fever is rarely of long duration, and it is, therefore, unnecessary to administer antipyretics, especially as the fever ordinarily declines so soon as active diaphoresis is established.

The diet of acute bronchitis, whether of mild or of severe type, must be as light and nutritious as possible. Liquid forms of diet, such as milk, beef tea, chicken broth, and the like, are commonly preferred, the temperature contraindicating a more full diet. When the fever has abated a more generous diet may be given, commencing with fish and chicken, and gradually resuming the usual diet. Stimulants are only called for when there are signs of cardiac failure; under ordinary circumstances, unless with the view of promoting diaphoresis, there is no need for their administration.

Chronic Bronchitis. In the treatment of chronic bronchitis, when there is but little fever, and when there is only a history of winter cough recurring year by year, hygienic measures should be adopted to check the disease or to diminish its tendency to advance. Of such measures, change of air and change of occupation are probably those most likely to be beneficial, though when such radical

changes cannot, from the circumstances of the patient, be effected, much may be done by suitable clothing which shall render the patient less sensitive to sudden alterations of temperature, and during the summer months much may also be done in the way of hardening the patient, by the use of cold baths and open-air exercise, so that his respiratory organs and his cutaneous system are affected less readily by cold air or damp. This hardening process is of considerable importance, since patients prone to chronic bronchitis are in the habit of clothing themselves too warmly all through the year, and by thus promoting diaphoresis they increase the risks of exposure.

The judicious employment of laxatives or purgatives will also be found to diminish the tendency to chronic bronchitis, and even during an attack it is always necessary to administer saline purgatives from time to time. When the winter cough has commenced it will be advisable to check its violence and to increase the facility of expectoration by the administration of alkaline draughts. Large doses of sodium bicarbonate can be taken with advantage, and the results of its use are sometimes very striking. Lauder Brunton recommends that half a teaspoonful or a teaspoonful of sodium bicarbonate should be put into a tumbler of water, and the patient should be directed to sip this until the whole is gone, or until the cough stops. These alkaline draughts will frequently relieve the severity of the morning cough. Alkaline mineral waters may be administered in this way, or they may be given with a draught of warm milk on first rising. In chronic bronchitis it is often found that the greatest difficulty is experienced with the morning expectoration, while as the day goes on the expectoration becomes more loose and more fluid. Benefit often follows the use of fairly large doses of potassium iodide, a drug which is perhaps of greatest service in cases associated with a gouty tendency.

When expectoration is difficult, remedies similar to those used in acute bronchitis may be given, such as ammonium carbonate, senega, ether, and spirit of chloroform. Ammonium chloride also is often of considerable service. Frequently, however, recourse must be had to balsamic remedies, such as benzoin, storax, tolu, Peru, or ammoniacum. The compound tincture of benzoin is frequently employed, either internally or as an inhalation, while the balsams of Peru and of tolu may be given in capsules or as an emulsion.

Respirators are of service in many cases of chronic bronchitis, and they form a convenient method of employing such remedies as pinol, phenol, or terebene. The respirator used should be one which covers the nose as well as the mouth, so that the patient is obliged to inhale air which passes through the sponge upon which the volatile medicament is dropped. A very simple and inexpensive form of respirator has been advised by my colleague, Dr. Burney Yeo, and consists of light plates of perforated zinc, which inclose a sponge. In these cases, as in acute bronchitis, advantage often results from the use of inhalations, and to those already mentioned menthol and creosote may be added. Many observers are in favor of the employment of tar vapor and maintain that its use will curtail the duration and lessen the severity of catarrhal attacks. Tar is also administered internally in pills containing two grains of the *pix liquida* of the *United States and British Pharmacopœias*. Terebene in 5 to 15-minim doses has been strongly recommended in the treatment of this complaint; creosote also has given good results whether administered in capsules or in a mixture with mucilage.

Bronchorrhœa.—Although in chronic bronchitis the greatest difficulty results from scantiness and tenacity of expectoration, indicating therefore the use of expectorants, cases are frequently met with in which the mucus is extremely abundant. To this condition the term bronchorrhœa has been applied. This abundance of expectoration often gives trouble and calls for the employment of remedies like senega or quillaia, which will assist in the expulsion by increasing the fluid character. Both of these remedies must be used with discretion, since, although they may relieve the more urgent symptoms, they may occasionally cause the cough to be more protracted. If the expectoration is extremely abundant, relief may sometimes be afforded by the use of emetics; zinc sulphate and ammonium carbonate being the best, though ipecacuanha wine is often employed. An emetic is indicated when there is much cyanosis, more particularly when the pulse shows signs of failure. The removal of quantities of fluid from the air passages is often followed by increased force of cardiac contractions and by increased facility of breathing. Ammonium chloride is another remedy which gives good results in the treatment of bronchorrhœa, and it may be added to mixtures of senega or quillaia. In severe cases when the patient is confined to bed, benefit will also be obtained from the application of counter-irritants over the upper part of the thorax.

Fomentations or poultices, with turpentine or cajuput, will frequently increase the comfort. When these are used, there can be no doubt that the benefit obtained results in part from the continuous inhalation of these remedies as well as from the purely local effect.

In addition to the use of ipecacuanha wine as an emetic it is also valuable when employed as a spray or when given internally. When used as a spray, in all probability benefit follows the absorption of ipecacuanha by the stomach, since probably only a small proportion reaches the air passages. There is little doubt, however, that some local effect ensues from this mode of employing ipecacuanha wine.

Bronchiectasis. When the bronchi have become dilated in consequence of prolonged attacks of chronic bronchitis, it is not uncommon for the expectoration to become offensive. This forms an additional source of weakness, since the well-being of the patient is liable to be greatly affected. For the correction of this form of putrid bronchitis it is necessary to employ various inhalations in addition to the ordinary measures adopted for the treatment of chronic bronchitis. Inhalations of chlorine or iodine are sometimes very beneficial, but they frequently cause much discomfort, owing to the irritation and cough which they are liable to cause. Inhalations of carbolic acid are preferable, but the drugs which receive the greatest favor for use as inhalations in putrid bronchitis are creosote, turpentine, and tar. Relief is often experienced from the employment in the form of spray of dilute solutions of carbolic acid (2 to 4 per cent.). Eucalyptus oil and pinol will also tend to correct the fetor, and tincture of eucalyptus may be administered internally with benefit. Other remedies which have recently been used are santal oil and myrtol, the latter being perhaps best administered in capsules containing two minims of the oil.

Many cases of chronic bronchitis appear to have their origin in a gouty diathesis, and thus may be treated with the ordinary remedies used for gout, and improvement is frequently considerable during the use of alkaline mineral waters. These cases especially do well if the circumstances of the patient permit of residence in Southern California, or along the lower planes of Arizona or New Mexico, during the winter months, or of occasional visits to foreign spas adapted to the treatment of gout. With the more common cases of chronic bronchitis benefit results from residence during the winter months in one or other of the Southern health resorts, as, for

example, Asheville or Thomasville in this country, or Bournemouth, Ventnor, and Torquay in England, where the daily variations of heat and cold are less marked than in other parts of the country, and where, also, from their sheltered position, there is less exposure to strong winds or to great changes in the temperature at night-fall. Patients with chronic bronchitis should be encouraged to take exercise in the open air on fine days, and they frequently derive benefit from the "open-air treatment" which has of late years been recommended in cases of phthisis. When the means permit of foreign residence patients may be sent to the south of France, to the Riviera, to Madeira, to Algiers, or even to Egypt; but if sent up the Nile they should be warned against the risks attendant on the great fall of temperature after sunset, and the prevalence of dust if they make expeditions on land.

Bronchial Asthma. Bronchial asthma, or spasmodic asthma, is generally ascribed to spasmodic contraction of the muscles surrounding the smaller bronchi. This contraction occasionally occurs alone, but frequently it is accompanied, or followed, by inflammatory changes within the bronchi. The sudden supervention of bronchial inflammatory changes has been regarded as the first element in this disease, but in comparatively frequent cases bronchial asthma passes off so rapidly that it is impossible to assume the constant existence of inflammatory changes. Although the spasmodic contraction of the smaller bronchi and inflammatory changes within the bronchi are the two theories of causation which are practically held by most clinical observers, there is yet a third theory according to which the affection depends primarily upon spasmodic contraction of the diaphragm and other muscles of ordinary respiration, this contraction leading to the characteristic alteration in the shape of the thorax during an attack of spasmodic asthma, and necessitating the employment of much muscular force to cause any expiratory alteration in the shape of the thorax. It is well known that, during an attack of asthma, the chief change consists of prolongation of the expiratory efforts, the inspiration being somewhat short and shallow, while the expiration is prolonged and noisy, and effected with difficulty.

The attack of bronchial asthma, or of spasmodic asthma, occurs so suddenly that there can be no doubt of its depending upon some neurosis. The chief difficulty in the treatment lies in discovering the cause of this neurosis. The immediate exciting cause may be

connected with the character of the air inspired, or it may be dependent upon some alteration in the course of the air passages, which may be sufficient either to start reflex irritation and thus directly to produce an attack, or to obstruct the passages to such an extent that the respiration must be largely effected through the mouth, when consequently the inspired air reaches the bronchi without being moistened and warmed, and without the removal of irritating particles of dust. It is always well, therefore, to examine closely, at the commencement of treatment, for any abnormality in the nasal passages, since the correction of slight deviations, the removal of polypi, or the destruction of any unduly sensitive spot on the nasal mucous membrane by means of the galvano-cautery, will occasionally suffice to cure the asthma, or at least to reduce the severity of subsequent attacks.

It must not, however, be assumed that all cases of asthma will be improved by nasal operations, since slight abnormalities may play a very secondary part as compared with the influence of hereditary or acquired excitability of the nerve centres.

Another frequent cause of bronchial asthma may sometimes be found in disturbances of digestion, and careful inquiry must therefore be made in this direction. The removal of constipation, the correction of errors of diet, such as the avoidance of late suppers and of various indigestible articles, may serve to effect a cure; but, even when undoubtedly resulting from digestive abnormality, bronchial asthma is peculiarly capricious, since, under special conditions which cannot be accurately defined, chronic asthmatics sometimes find that they may indulge in late suppers and indigestible articles with impunity. Those who have previously suffered from bronchial attacks will often find that they may be excited by emotional disturbances. These attacks may ensue during the night, after immoderate laughter, or after a fit of passion.

Although the immediate symptoms of asthma do not differ very materially, being marked by a sudden attack of urgent dyspnoea with intense anxiety and distress, which sometimes gradually subsides after some hours, either leaving the patient well, though exhausted, or else with some bronchitis which may last for a few days, yet it is evident, from what has been said, that it is impossible to treat this disease upon any definite plan which does not take account of the immediate exciting cause. Symptomatic treatment will often afford relief during the height of the attack, but, during the inter-

vals, empiric efforts must be made to ascertain the exciting cause in each case, since it is only by successful treatment of the cause that the patient can be freed from subsequent attacks.

Hitherto attention has been confined to forms of asthma which are not associated with other general diseases, but special varieties are of fairly common occurrence, as, for example, the asthma connected with advanced Bright's disease, or that which occurs with arthritic affections, either of gouty or rheumatic origin ; when such general diseases are known to coexist, they will call for the special treatment appropriate to these conditions, as well as for the treatment of prominent symptoms.

During an attack of bronchial asthma, relief can be most readily effected by inhalations, since these will influence the bronchial mucous membrane and favor relaxation of contracted muscle. The inhalations which are preferred are those which arise during the smouldering of strips of unglazed paper which have been previously soaked in a concentrated solution of potassium nitrate and carefully dried. When required for use, these strips of paper are folded and placed in a soup-plate, one corner of the paper is then ignited, and the patient inhales the nitrous fumes as they rise. The action is sometimes increased by mixing various proportions of potassium chlorate with the potassium nitrate ; potassium iodide may be similarly used.

The inhalation of amyl nitrite has been strongly recommended, and in exceptional cases it may give relief, but even then the difficulty of breathing is likely to return soon after the inhalation has ceased. Chloroform and ether are occasionally employed, and, under conditions of great exhaustion, they may enable the patient to obtain a few snatches of sleep, though they cannot be relied upon to cut short an attack.

Ethyl iodide has been credited with more lasting power ; it acts not only as an antispasmodic, but it appears to be of some value in bronchial catarrh, and during its inhalation sleep may ensue after the chest has been relieved of expectoration. The most favored remedies, however, in connection with spasmodic asthma are those which are derived from solanaceous plants, and although belladonna and hyoscyamus are sometimes used, stramonium occupies the foremost place. Stramonium leaves may be made into cigarettes, and, when coarsely powdered, the leaves of eucalyptus or of coca have been similarly employed ; lobelia also may be used in the same way.

Martindale states that in most of the powders and cigarettes sold as nostrums for the relief of asthma by inhalation, nitre is constantly and stramonium is generally an ingredient (*The Extra Pharmacopæia*, ninth edition, p. 383). Thus Himrod's Cure, Bliss's Cure, and the Green Mountain Cure may be imitated by the following :

"Pulvis lobeliae compositus.

"Potassium nitrate 240, boiling distilled water 240. Dissolve and add to lobelia in powder, stramonium leaves in powder, black tea in powder, 240 of each. Mix well, dry, and add oil of anise 1. The fumes of half a teaspoonful or more, burnt on a plate, to be inhaled six or eight times a day, and the bedroom fumigated with the same."

When stramonium and nitre are used alone they are ordinarily mixed in the proportions of two parts of stramonium leaves in coarse powder to one part of nitre. Arsenical cigarettes, impregnated with sodium arsenate, so that each contains $\frac{3}{4}$ gr. of the salt, are occasionally recommended, and three or four deep inhalations of the fumes sometimes give relief. The dry fumes which result from smouldering are perhaps most beneficial when the asthmatic attack is accompanied by little or no expectoration, but when moist râles are present and indicate that bronchial spasm is associated with some degree of engorgement, or even of bronchitis, further relief may sometimes be afforded by the inhalation of steam alone, or of steam impregnated with some volatile substance, such as the compound tincture of benzoin, oil of cajuput, oil of turpentine, or of eucalyptus.

Occasionally an attack of asthma may be cut short by provoking nausea rapidly, either by means of ipecacuanha, given internally in emetic doses, or by recommending the use of tobacco for those who are not accustomed to smoking. Fagge considers tobacco to be the best remedy for hay asthma, and adds significantly that those who smoke habitually are incapable of deriving benefit from it.

Germain See thinks that pyridine, which is present in nicotine in the fumes of tobacco, is, in all probability, the active agent in relieving the dyspnœa of asthma, and accordingly recommends that pyridine should be used by itself in the treatment of this condition. Pyridine is placed on a plate in a small room, in which the patient remains from twenty to thirty minutes, three times a day.

Cigarettes of the powder of cubebs are sometimes of very great service, but they appear to be most valuable when there is much

bronchial secretion. When respiration is very seriously impeded, and when there is much cyanosis, inhalations of oxygen may be used occasionally. These relieve the cyanotic condition and the dyspnœa, but they do not appear to influence the spasm of the bronchi.

The remedies employed internally are almost as numerous as those used for inhalation, but they possess the obvious disadvantage of being more slow in their action. Some are used with the distinct object of acting as sedatives; others are intended to act as alteratives, and are, therefore, more serviceable during the intervals between the attacks of spasm. Of the sedatives morphine is perhaps the most useful, and the rapidity of action may be increased by its injection hypodermatically. Doses of from $\frac{1}{8}$ to $\frac{1}{3}$ gr., given with $\frac{1}{120}$ to $\frac{1}{60}$ gr. atropine sulphate, will occasionally soothe excitement, check spasm and favor sleep. Morphine has obvious dangers, however, in the treatment of a disease of chronic character like asthma, but many sufferers prefer to run the risks of acquiring the morphine habit rather than to endure the discomforts of asthma. Chloral hydrate is occasionally employed instead of morphine, but it must be used with some discrimination on account of its depressant influence upon the circulation. Cannabis indica has often been recommended and is occasionally of great service. Mention has, however, already been made in these pages of the uncertainty of action of various preparations of this drug, and it is, therefore, advisable always to commence with small doses and to increase the amount gradually, if no immediate result is obtained.

The ethereal tincture of lobelia of the *British Pharmacopœia* may be used in doses of from 5 to 15 minims, and the action is sometimes very much increased by the addition of potassium bromide, or iodide. The extract of stramonium is occasionally employed internally, in doses of $\frac{1}{4}$ to 1 grain, but the action is slow, and there can be no doubt that this drug is much more serviceable when used as an inhalation. Hyoscine hydrobromate, in doses of $\frac{1}{200}$ or $\frac{1}{100}$ gr., by hypodermatic injection or by the mouth, is sometimes of great service when the attack has been of long duration, and the patient is becoming exhausted from want of sleep. I have frequently found that in asthmatic attacks associated with much bronchitis, the most speedy relief is afforded by full doses of spiritus ætheris; the breath mixture of our hospital, which contains equal parts of spiritus ætheris and of spiritus ammonii aromaticus, has

often cut short an attack and favored the removal of fluid from the bronchi.

Although, in general, the sedative plan is that which is most favored, some patients prefer the use of remedies which promote wakefulness; thus strong, hot coffee, or a full dose of citrated caffeine, may prevent the feeling of exhaustion which so constantly ensues after a number of hours have been spent in fighting for breath, and this treatment may perhaps be defended, as the severity of the attack will often pass off in the early morning and allow the patient to sink into quiet slumber.

Strychnine and nux vomica may also be employed, but, on account of their tonic action, they are more serviceable if administered in the intervals between the different attacks of spasm. Reference has already been made to the employment of ipecacuanha in emetic doses. Other emetics will sometimes give relief, and, in severe cases, it may occasionally be worth trying the effect of apomorphine either hypodermatically or given by the mouth.

During the attack, stimulants are sometimes very useful, especially if given in repeated small doses with hot water, and they counteract much of the depression and exhaustion which usually accompanies an attack of asthma.

Pilocarpine has sometimes been recommended for this condition on account of the rapidity with which it promotes bronchial as well as salivary secretion. Bronchial mucus is generally expectorated in increasing quantities toward the end of an attack of asthma, and it has, therefore, been thought that the attack might be curtailed if this expectoration could be hastened. It must be urged, however, against the use of pilocarpine, that it frequently causes considerable depression, and with this disease the patient is already the subject of exhaustion.

The bronchitis which ordinarily follows a severe attack of spasmodic asthma must be treated on general principles.

During the intervals between the attacks, tonic measures are frequently of great service, as, for example, the administration of some form of arsenic, of nux vomica, or of strychnine, or the use of large doses of potassium iodide. These drugs are sometimes very useful when the causal indications of asthma are not apparent. Change of air will sometimes prove beneficial, though it is impossible to lay down any definite rule. Most patients are better in smoky towns, and Fagge mentions one patient who found that he could only live

in perfect freedom from asthma in the Seven Dials. On the other hand, when asthma is found to develop in large centres of civilization it will be well to try the effect of change either to the seaside or to mountainous or hilly districts.

Emphysema. Emphysema is one of those chronic diseases which it is difficult to treat when free from complications; on the other hand, it is so commonly associated with severe attacks of bronchial catarrh, or even with attacks of bronchial spasm, that patients are extremely prone to seek treatment and to follow advice during that time only when they are troubled by these complications, while in the intervals of such attacks it is often somewhat difficult to induce them to adopt any precautionary measures whatever. To some extent emphysema may be prevented by careful avoidance of the causes: over-indulgence in various forms of athleticism has been credited with the production of emphysema, and it has been thought that the strain of the air cells by forced efforts of respiration might favor the onset of this anatomical change; accordingly those who object to athletic sports are likely to forbid indulgence in such sports and to terrorize their patients with the dread evils they may consequently incur. Inasmuch as such sports may perhaps favor the onset of acute pulmonary affections such as acute bronchitis, they certainly may favor the onset of emphysema. There can be no doubt that emphysema of the lung is a frequent sequel of repeated attacks of acute or chronic bronchitis, and also that it often arises, especially amongst young adults, when whooping-cough is allowed to run its course with but little medicinal treatment. In such cases the bronchi may become dilated and thus lead to bronchiectasis, or, on the other hand, the air cells may dilate with the rupture of the walls of the alveoli, so that two or more air cells are thrown into direct communication with each other. Those who suffer from bronchial asthma—that is, from the true variety in which spasm of the muscles of the bronchi opposes the freedom of movement of air—are also extremely likely to develop emphysema. It is accordingly necessary to treat such conditions continuously and energetically, in order to diminish the risk of developing an emphysematous condition of the lungs.

Another class of individuals amongst whom the disease is fairly common consists of those who habitually, from their occupation, are exposed to severe muscular strain, especially if at the same time the dietary of the individual is of a poor character. It is, therefore,

common amongst laborers, and it is frequently seen amongst soldiers who have been through exhausting campaigns.

Should a patient with emphysema come under treatment during an attack of bronchial catarrh, the main efforts have to be directed toward relieving the latter condition, and remedies should be employed which will render the expectoration more liquid and perhaps more abundant ; at the same time, the treatment should be calculated to reduce the frequency and to diminish the intensity of cough, since a succession of violent expiratory efforts can only tend to make matters worse. It is accordingly advisable to reduce the viscid character of the expectoration by the administration of expectorants, such as ammonium carbonate, senega, spirit of chloroform, and other remedies already mentioned in connection with chronic bronchitis. The administration of opiates, provided that the fluid within the bronchi is not excessive in amount, will also reduce the frequency of cough in this condition. The treatment demands considerable circumspection, since, in some cases, stimulant expectorants are unnecessary and really undesirable ; for example, when the patient is bringing up a quantity of frothy mucus, which he expectorates with comparative ease, it is advisable to employ tonic remedies together with acid to diminish the amount of expectoration, and it is therefore well to be sparing in the use of opiates in such cases ; but, on the other hand, when there is constant troublesome cough with but little expectoration, when in fact the frequency of cough is unnecessary and is dependent on an abnormally sensitive condition of the mucous membrane, opiates must be employed.

Many cases of emphysema and bronchitis occurring in advanced middle age derive benefit from the use of ether, a remedy which often gives relief with comparative rapidity, particularly in those cases associated with much bronchial spasm. It will often be found that the chief difficulty consists in expiratory dyspnœa, and when this symptom is present, ether should be employed with a free hand. Under such circumstances, also, various inhalations may give considerable relief ; for example, inhalations of conium, of turpentine, or of compound tincture of benzoin. Under their influence the spasm may sometimes be relaxed and the removal of expectoration facilitated. For the relief of the same condition, various nitrites have been essayed, and of these amyl nitrite has been employed with the greatest amount of sanguine expectation. I must confess

that, in my hands, this remedy has given somewhat disappointing results, and that I have found that except in rare cases greater value attaches to remedies of more continuous action. The spirit of glonoin has often given some relief in patients with tense arteries and much expiratory dyspnœa, and the more recently introduced erythrol tetranitrate has been used for the same purpose.

In plethoric individuals, with much cyanosis, benefit occasionally results from venesection, and although this treatment has rather fallen into disuse, I have on many occasions seen the removal of some ten ounces of blood followed by increased facility of respiration, and in some cases by a return of consciousness. When the condition of the patient is severe, and when the weakness precludes the possibility of venesection, relief of a temporary character may be afforded by the inhalation of oxygen. It must be remembered, however, that the improvement following the use of oxygen is purely temporary, and that it must be conjoined with the administration of expectorants and in extreme cases with the use of emetics, since if the oxygen is inhaled, notwithstanding the relief to the breathing powers, expectoration may tend to accumulate unless energetic measures are simultaneously employed.

It will often be found that it is necessary to use remedies calculated to improve the force of contraction of the ventricles, since danger lies in the accumulation of blood on the right side of the heart and the over-distention of the right ventricle. The remedies most frequently employed are digitalis and strophanthus, but on account of its power on the bronchial mucous membrane squill is often used, more particularly in those cases where it is deemed advisable to attempt to reduce the amount of expectoration by the use of acid remedies. The syrup of squill, which is prepared from the acetum, is an acid preparation which is quite compatible with dilute sulphuric acid, or with most of the preparations of iron.

As the case progresses tonics are generally indicated, and there is great advantage in using acid tonics. Quinine may be administered in moderate doses, together with dilute sulphuric acid, with iron or with spirit of chloroform. Much benefit frequently ensues from the use of strychnine and nux vomica, which, in addition to their ordinary tonic power on the digestive system, undoubtedly strengthen the contractions of the ventricle. For its tonic properties and for its influence upon the respiration, arsenic is also administered with comparative frequency, especially in the intervals between the

attacks of bronchial catarrh. The preparation of arsenic selected will vary, to some extent, with the other drugs which are to be administered simultaneously. The official solution of arsenous acid may be given in conjunction with acids, while Fowler's solution is perhaps more particularly suitable when alkalies are indicated, or when it is desired to administer arsenic by itself. Since, in cases of emphysema, it is necessary to continue the use of these tonics for a great length of time, patients often prefer to take them in pill form, and arsenic can then be given as in chlorosis, in the form of the iron arsenate, together with ferrous sulphate, or as arsenous acid in conjunction with the ferrous sulphate, or carbonate.

As the general nutrition is liable to suffer during emphysema, cod-liver oil will prove beneficial, both in restoring breathing power and in improving the percentage of hæmoglobin. Efforts have been made from time to time to employ compressed air for this affection, and many devices have been arranged by which this treatment can be used, even in the homes of the patient. This form of treatment is perhaps not so frequent at the present time as it was a few years ago, but numerous cases are recorded in which the shortness of breath and the tendency to bronchial catarrh both appear to have been relieved. It has already been stated that oxygen can be beneficially employed in severe cases with bronchial catarrh, but there appears to be very little advantage in the employment either of oxygen or of compressed air when the patient is free from signs of bronchial irritation. There can be no doubt, however, that many emphysematous patients derive benefit from change of air, especially when their means will permit the winter to be spent in one or other of the southern health resorts. The liability to bronchitis, which really constitutes the chief danger in connection with emphysema, is very greatly diminished by residence in a dry and fairly equable temperature. Mountain air has been tried for these cases, but they derive less benefit from residence at a high altitude than from residence near the sea : as, for example, Thomasville, Ga., or Southern Pines, S. C., or at Nice or Mentone, Cannes or Bordighera. When patients have had several severe attacks of winter cough and their lungs show advanced physical signs of emphysema, they should, if possible, go still further, to Algiers, to Madeira, or to Teneriffe. Residence in Egypt during the winter months sometimes proves beneficial, but these patients have to remember the risk of chills with the sudden fall of the temperature after sunset, and frequently,

on account of the liability to bronchial spasm, they have to be very cautious in avoiding the sand storms which occasionally arise with great suddenness.

Patients with emphysema should adopt a form of diet which is at once nourishing, supporting, and yet not calculated to increase weight to any great extent. An emphysematous patient should never allow himself to get stout, and his dietary should accordingly be regulated so as to eliminate any articles of food by which this tendency might be increased. With the same object, to a certain extent, and also with the idea of facilitating the breathing powers, emphysematous patients should be encouraged to take as much muscular exercise as possible short of producing fatigue or dyspnœa. Moderate courses of exercises with dumb bells, or with Indian clubs, or with one or other form of chest expanders which have lately come into vogue, will often materially assist the breathing power. All such exercises, however, should not be carried to the stage of exhaustion, and when adopted they should be commenced gradually and increased gradually. When taking athletic exercises it is also advisable to avoid risks of chill; thus, for example, although emphysematous patients may gradually increase their general comfort by such means as riding, cycling, or rowing, yet the risk of inducing bronchitis, owing to exposure to wet, must be always borne in mind.

Another hygienic measure which demands mention is the employment of laxatives, or even purgatives, by which the general tendency to constipation may be avoided. It is a curious fact that most patients with emphysema suffer from constipation and from flatulent distention, and, inasmuch as both of these conditions tend to impede the movements of the diaphragm, while the thoracic movements are already interfered with, owing to the emphysema, it must be obvious that both purgatives and antispasmodics form an essential routine treatment.

Without being able to explain its mode of action, potassium iodide is undoubtedly often of great service in the treatment of emphysema in the intervals between the attacks of bronchial catarrh; and when employing this drug it will often be found that, as in syphilitic conditions, comparatively large doses can be tolerated and continued, while smaller doses produce symptoms of iodism.

Attempts have been made to reduce the sensitive character of the mucous membrane by the employment of various forms of sprays.

Those which are of the greatest value are saline or alkaline sprays. A spray of common salt, or a spray of sodium bicarbonate, used occasionally at night, appears to reduce the liability to bronchial catarrh, while, on the other hand, a spray of ipecacuanha will sometimes give great relief when the attack of bronchial catarrh is impending.

The whole treatment of emphysema has to be largely determined by the financial position of the patient. A workingman will struggle on through successive attacks of winter cough, and will only present himself for treatment when the bronchial catarrh is extreme, and he will then come to the hospital for admission. He will leave when the urgency of the bronchial catarrh has passed away, and in the intervals between his attacks he is not likely to be seen or to submit to any interference with the ordinary routine of his life. But, on the other hand, when dealing with patients whose circumstances allow them to adopt measures to counteract the liability to bronchial attacks, the treatment of emphysema becomes somewhat more hopeful as the need of treatment for bronchial catarrh is diminished.

Hæmoptysis. The treatment of hæmoptysis, like the prognosis, is to a great extent dependent upon the severity of the attack ; but although an attack of hæmoptysis may be comparatively trifling so far as the actual loss of blood is concerned, it is advisable to regard every case, at the commencement at least, as having the possibility of becoming hazardous at any moment, if proper treatment is not adopted. The preliminary hemorrhage may be slight and may occur after some comparatively trifling overstrain, but if precautions are not promptly taken, an attack commencing mildly may be speedily followed by severe hemorrhage. It is, therefore, necessary to minimize the risks of such an occurrence by keeping the patient at rest, so soon as any sign of hæmoptysis is apparent. The patient should be strictly kept to his bed for many days after the commencement, and well protected from cold by sufficient clothing. The bedclothes should be light and not overheating. The room should be well ventilated and kept at a relatively low temperature, and, to some extent, the position of the patient should be controlled. The head and shoulders should be raised so that he assumes a semi-sitting posture, and he should be directed to limit his movements as far as possible. All sources of irritation and anxiety should be removed, inasmuch as any sudden alteration in the rapidity of the

circulation might be followed by an increase of the hemorrhage. While, therefore, the seriousness of the condition is not to be denied, sympathetic friends should be rigidly excluded from the room. A patient with hæmoptysis is already, in all probability, sufficiently concerned about himself, and should not be further alarmed by a succession of anxious faces and anxious inquiries. It is, therefore, better, in most cases, to secure the co-operation of an intelligent nurse than to leave the patient to be attended to purely by relatives.

Before entering into any consideration of the dietary, it is desirable to follow out the immediate treatment that should be adopted, and I would venture to lay stress upon the importance of adopting many measures for the relief of this condition, measures that can be repeated at short intervals, so as to soothe the patient with the assurance that something is being done for his relief. It is essential, in cases of hæmoptysis, to quiet the patient's anxieties by every means in our power, and it is, therefore, most injudicious to be too skeptical about the power of remedies to check hemorrhage, or to allow such a skeptical attitude to be apparent to the patient. Everything should be done with the appearance of certainty of benefit, and every care should be taken to avoid the least suspicion in the patient's mind that treatment is of little avail. From the first, therefore, it is desirable to give small pieces of ice to suck, inasmuch as this will tend to reduce the frequency of cough and consequently the frequency with which the patient is alarmed by fresh appearances of blood ; at the same time, it is well to warn him that the blood which continues to appear after each effort of coughing is blood that has been, in all probability, poured out into the air passages and air cells with the original rupture of the bloodvessel, and that, therefore, it does not indicate a continuous cause for anxiety. He may also be further comforted by his attention being directed to the gradual alteration in the appearance of the blood that is expectorated, the frothy, bright hemorrhage of the commencement of hæmoptysis gradually giving place to darker blood of less frothy consistency, which may be expectorated many days after the onset of the original attack of hæmoptysis.

Should the physical signs permit the localization of the site of the hemorrhage, ice may be applied to the chest over the affected part. The ice may be inclosed in an ordinary india-rubber bag, such as a sponge bag ; or cold may be used by wringing out towels in ice-cold water, and applying them to the surface of the chest and

changing them repeatedly. Should Leiter's tubes be at hand, they may conveniently be applied to the chest over the affected site. Even when, as so often happens, the hemorrhage is followed by moist râles at all parts of the chest, which render it impossible to speak with certainty of the position of the ruptured vessel, it is desirable to employ ice over the front of the chest. At the same time that ice is being used it is advisable to administer opium, which not only serves to relieve the condition of extreme anxiety, but also acts beneficially in reducing the rapidity and force of the action of the heart. It is better to commence with a fairly large dose, followed at short intervals by smaller doses, or, if morphine is available, to administer a small dose hypodermatically, and to repeat this dose every half-hour. The amount administered is to be regulated by the age and the strength of the individual, and it is not to be pushed to the amount necessary to induce sleep. All that is desired is to diminish anxiety and to reduce blood-pressure, without necessarily diminishing reflex excitability and thus allowing the accumulation of blood in the air passages. This action of morphine and of opium is possibly so frequently overlooked or misunderstood that it perhaps demands a little further consideration here.

All who have witnessed cases of poisoning by this drug must have noticed that it produces diminished depth of inspiration, diminished frequency of respiration, and that during the condition of coma the pulse also is weakened in character. The drug, therefore, so far as circulation and respiration are concerned, induces precisely the conditions which accompany an ordinary fainting fit, and it is one of the truisms of surgery that the risk from hemorrhage is diminished by the onset of an attack of faintness ; since, while the heart is acting slowly and feebly, time is allowed for the natural arrest of hemorrhage by alteration in the wall of the vessel and by clotting of blood within the vessel and around the aperture. It is impossible, in hæmoptysis, to control the hemorrhage by any of the ordinary methods adopted in surgery, but it is possible, by means of opium, to favor the arrest of hemorrhage by producing changes in the circulation which promote or favor the coagulation of blood. From what has been said, the advisability of repeating the small doses of opium or morphine at short intervals will be apparent, apart from any question of satisfying the mind of the patient or his friends with the idea that something is being done.

Passing on now to further questions of treatment, should it be impossible to obtain ice, some relief may occasionally be afforded by dry cupping the chest over the affected area. This treatment, however, is not very often employed. Whitla strongly recommends that the room should be permeated with turpentine vapor, and thinks that this is beneficial in many ways ; he suggests that the turpentine vapor which reaches the lung may act as a hæmostatic and to some extent as an antiseptic. However this may be, it will certainly tend to soothe and allay cough, even though the hæmostatic action that has been claimed for it may be open to doubt, since it appears improbable that turpentine vapor pervading a room can ever be inhaled in sufficient amount to obtain any direct hæmostatic action. Whitla recommends that a large vessel should be filled with warm water, and that turpentine should be poured in small quantities into this at frequent intervals. He also suggests that turpentine may be poured upon cloths suspended in the air, or that it may be sprinkled upon sawdust, or upon shavings in a safe corner of the room, away from the danger of ignition.

With regard to food : this should be given cold and in liquid form, and only small quantities should be taken at a time ; in fact, very shortly after the attack of hæmoptysis, it is better not to give any nourishment unless the patient becomes extremely weak. The appearance of the patient and the weakness of the pulse might often suggest the propriety of the administration of alcohol. This, however, is as a rule likely to do harm rather than good, since in the initial stages of hæmoptysis the weakness of the pulse is, to a certain degree, a conservative process.

Notwithstanding the large number of hæmostatics employed in medicine, it is very doubtful to what extent any one is of service in hæmoptysis, since the hæmostatic has ordinarily to be absorbed by the bloodvessels in some remote part of the body before being carried to the lung, where its effect is desired. A very common routine is to administer ergot hypodermatically, and, after the employment in this way of a full pharmacopœial dose, to continue the action of this drug by the administration of smaller doses by the mouth. Ergot will undoubtedly cause contraction of the smaller arteries within the lung, and it is well known that the first effect of the action of ergot is to cause a fall of the blood-pressure in the systemic circulation, owing to the contraction of the pulmonary arterioles. When, therefore, the hemorrhage proceeds from vessels

of small diameter, this contraction of arterioles will reduce the blood-pressure at the affected area, and thus will serve to arrest hemorrhage; but, on the other hand, although in many cases of hæmoptysis the hemorrhage proceeds from small vessels, yet in cases of unusual severity there can be no doubt that a branch of a larger vessel, one perhaps crossing a phthisical cavity, has become involved; and under such circumstances the administration of a drug which will cause contraction of the terminal twigs of the arteries will raise the blood-pressure in the larger vessels, and thus will favor further hemorrhage, instead of acting as a remedial agent. I would, therefore, recommend that ergot should be used only in those cases where the amount of the hemorrhage, or the physical signs, render it probable that the lesion affects vessels of small size, and that it should not be employed when there are signs of a large phthisical cavity, and when the amount of hemorrhage affords an indication that a large vessel has given way.

Various astringents are often administered with a view of favoring the contraction of vessels, and of increasing the coagulability of the blood. Tannic acid and gallic acid are often given in large amounts.

R.—Acidi gallici gr. x.
 Tincturæ opii camphoratæ ℥xx.
 Acidi sulphurici diluti ℥xv.
 Aquæ q. s. ad ʒj.

S.—To be taken three or four times a day.

Thirty grains of either of these astringents have been recommended. I feel extremely doubtful about the benefit resulting from their employment, and I have on several occasions thought that the benefit, if any, was rather dearly purchased at the expense of the great disturbance of digestion which resulted from their use. I remember one patient in particular, a young medical man, for whom this treatment had been adopted, and his complaints of gastric pain, of nausea, and of loss of appetite were very distressing.

I am always reluctant to employ a remedy which, while of doubtful avail so far as the diseased process is concerned, possesses a marked action in interfering with the subsequent nutrition; and although it has been recommended above that only small quantities of food should be administered at a time, it is essential that the treatment adopted should not render nutrition a painful process. Lead acetate is another remedy that has been used in cases of

hæmoptysis, and a pill of lead acetate (gr. 3) and opium (gr. $\frac{1}{2}$) is often recommended, although perhaps it is of greater value in intestinal hemorrhage than in hemorrhage from the lung. With a view of favoring coagulation, dilute sulphuric acid has been frequently employed, while alum in small doses has been given with the same object.

R.—Acidi sulphurici diluti	℥ _{xx} .
Tincturæ opii	℥ _v .
Spiritus chloroformi	℥ _{xx} .
Aquæ cinnamomi q. s. ad	℥ _j .
R.—Aceti scillæ	℥ _x .
Acidi sulphurici diluti	℥ _x .
Spiritus chloroformi	℥ _x .
Syrupi	℥ _j .
Aquæ destillatæ q. s. ad	℥ _j .

Both of these remedies, if administered, should be given well diluted, so as to diminish, as far as possible, the risk of disordering the digestion. Compounds of iron, more particularly the astringent preparations, are often useful, and the sulphate, the acetate, or the chloride have been employed, with the hope of favoring coagulability ; but all of these also require to be administered in a very dilute form. The urgency of the case is by no means an indication for the need of a large dose. Even when hemorrhage continues, it is far better, when using one of these remedies, to give small doses repeatedly, than to give a massive dose which will almost certainly interfere with digestion. Should any of these strong astringents be used, the simultaneous employment of purgatives will be necessary, since considerable risk may be incurred by their promoting constipation, and thus causing violent expiratory efforts. When these remedies have been used, a saline purgative is frequently beneficial ; and if the action is at all retarded, it is better to employ enemata, or glycerin suppositories, than to permit constipation to continue. Preparations of hamamelis have been administered in cases of hæmoptysis, but the action is somewhat slow, and, indeed, in this disease it is rather doubtful whether this drug exercises any beneficial effects. Some practitioners are in favor of the internal use of turpentine, given in moderate doses at repeated short intervals ; this remedy has often appeared to act beneficially, since, as in cases of chronic bronchitis, it in all probability favors the removal of the fluid contents of the air passages, and, to some extent, prevents decomposition and resulting fetor.

Amyl nitrite has been administered as an inhalation in some cases of profuse hæmoptysis, and it is most likely to be of service when the hemorrhage is proceeding from a vessel of small size. The dilatation of the pulmonary arterioles must necessarily cause a fall of blood-pressure on the side of the vessel nearest to the heart, and this will serve to favor coagulation in an indirect method. Pyrogallic acid is an internal astringent which has been highly recommended for hæmoptysis, in doses of one grain every half-hour until the loss of blood ceases, and it is claimed for this drug that it does not cause vomiting nor produce dyspepsia ; it has been administered with ergot. Digitalis and its active principles have also been used in this condition, but the benefits derived from them appear mostly to be confined to the period subsequent to the acute hæmoptysis ; that is, they are probably of most value for the weakness of the circulation and the irregular cardiac action which may ensue for a few days after the hemorrhage has ceased. Some observers, however, recommend that digitalis should be employed even at the onset of an attack of hæmoptysis, and consider that it is especially useful when there is much rise of temperature associated with the hemorrhage, and in these circumstances they advocate the employment of large doses. It has also been urged that digitalis should be used when the action of the heart is rapid and excited, but this would practically include nearly every case of hæmoptysis, inasmuch as directly after an attack the circulation is almost invariably found to be rapid and weak, this being, in some degree, the result of the loss of blood, though perhaps it may be due to a still greater extent to the nervousness excited by this symptom.

With regard to the employment of digitalis in cases with rise of temperature, this rise is perhaps most likely to occur when the hemorrhage is not large in amount, and it appears to depend upon a pneumonic exudation occurring in the neighborhood of a tubercular deposit. The hæmoptysis in these cases, however, differs but little from the expectoration of ordinary cases of pneumonia.

Among other remedies for hæmoptysis, which have occasionally been employed, are those calculated to promote vomiting or nausea ; thus, for example, common salt, given in the powdered form, or in solution, has long been a domestic remedy, and is even sometimes employed under medical advice. Ipecacuanha is perhaps more certain in action, but, to produce any beneficial results, it must be given in fairly large doses, and the depression which follows is a

strong objection to its employment. Great benefit sometimes ensues from the use of brisk purgatives; but although a purgative is of advantage in tending to allay the expiratory efforts so often associated with constipation, this treatment cannot be repeated frequently. Whittle mentions having seen remarkable improvement from venesection in a severe case of hæmoptysis, but he admits that, although he witnessed this treatment a quarter of a century ago, he has never had the courage to try it himself.

The following prescriptions for various acute and chronic laryngeal, tracheal, and bronchial affections are frequently employed under different names in several London hospitals. To save repetition they are grouped together here :

R.—Ammonii carbonatis	gr. iv.
Vini ipecacuanhæ	℥x.
Tincturæ senegæ	ʒss.
Aquæ chloroformi	q. s. ad ʒj.
R.—Ammonii carbonatis	gr. v.
Spiritus ætheris	℥xv.
Tincturæ scillæ	℥xv.
Infusi senegæ	q. s. ad ʒj.
R.—Ammonii carbonatis	gr. iv.
Spiritus chloroformi	℥xx.
Mucilaginis acaciæ	ʒij.
Aquæ	q. s. ad ʒj.
R.—Ammonii carbonatis	gr. iij.
Vini ipecacuanhæ	℥viij.
Syrupi tolutani	℥xx.
Liquoris ammonii acetatis	ʒij.
Infusi senegæ	q. s. ad ʒj.
R.—Tincturæ opii camphoratæ	ʒss.
Vini ipecacuanhæ	℥x.
Aquæ anethi	q. s. ad ʒj.
R.—Spiritus chloroformi	℥xv.
Tincturæ opii camphoratæ	℥xx.
Syrupi scillæ	ʒss.
Aquæ	q. s. ad ʒj.
R.—Vini ipecacuanhæ	℥xij.
Spiritus ætheris nitrosi	ʒss.
Tincturæ opii camphoratæ	℥xv.
Liquoris ammonii acetatis	ʒij.
Syrupi tolutani	ʒss.
Aquæ	q. s. ad ʒj.

R.—Tincturæ scillæ	℥ _x .
Liquoris potassæ	℥ _{xv} .
Succi conii	ʒ _{ss} .
Aquæ camphoræ	ʒj.
Aquæ q. s. ad	ʒj.
R.—Tincturæ scillæ	℥ _{xv} .
Tincturæ opii camphoratæ	ʒ _{ss} .
Spiritus ætheris nitrosi	ʒ _{ss} .
Liquoris ammonii acetatis	ʒij.
Aquæ camphoræ	ʒj.
Aquæ q. s. ad	ʒj.
R.—Potassii citratis	gr. xv.
Liquoris ammonii acetatis	ʒij.
Tincturæ scillæ	℥ _{xv} .
Vini ipecacuanhæ	℥ _v .
Aquæ anisi q. s. ad	ʒj.
R.—Spiritus ammonii aromatici	ʒ _{ss} .
Spiritus ætheris	ʒ _{ss} .
Tincturæ aurantii	℥ _x .
Aquæ camphoræ	ʒj.
Aquæ q. s. ad	ʒj.
R.—Spiritus ætheris	ʒ _{ss} .
Tincturæ lobeliæ	℥ _{xv} .
Aquæ camphoræ	ʒj.
Aquæ q. s. ad	ʒj.
R.—Vini ipecacuanhæ	℥ _x .
Tincturæ scillæ	℥ _{xv} .
Spiritus ætheris nitrosi	ʒ _{ss} .
Aquæ chloroformi q. s. ad	ʒj.
R.—Vini ipecacuanhæ	℥ _{xv} .
Potassii nitratis	gr. vj.
Tincturæ opii camphoratæ	ʒ _{ss} .
Mucilaginis acaciæ	ʒj.
Aquæ q. s. ad	ʒj.
R.—Oxymellis scillæ	ʒ _{ss} .
Tincturæ opii camphoratæ	℥ _{xv} .
Spiritus ætheris nitrosi	℥ _{xx} .
Aquæ camphoræ	ʒj.
Aquæ q. s. ad	ʒj.
R.—Acidi sulphurici diluti	℥ _v .
Spiritus ætheris	ʒ _{ss} .
Aceti scillæ	℥ _{xx} .
Infusi senegæ q. s. ad	ʒj.

R.—Creosoti	℥j.
Tincturæ opii	℥iij.
Spiritus chloroformi	℥x.
Glycerini	3j.
Aquæ q. s. ad	3j.
R.—Copaibæ	℥xx.
Spiritus ætheris nitrosi	3ss.
Liquoris potassæ	℥xv.
Aquæ menthæ piperitæ q. s. ad	3j.

CHAPTER V.

RESPIRATION—*Continued.*

Pneumonia—Abscess of the Lung—Gangrene of the Lung—Pleurisy—Hydrothorax—Empyema—Pneumothorax—Reflex Cough.

Pneumonia. The treatment of acute croupous pneumonia, or lobar pneumonia, is very largely dependent upon a variety of conditions. Some cases do well with little or no treatment beyond rest in bed, while others call for the most energetic measures. The principal conditions which call for differences in treatment are : 1. The age of the individual ; 2, the severity of the attack ; and 3, the particular type of the disease. Cases of pneumonia occurring in infancy, or in old age, where the individual has already perhaps been weakened by some previous malady, will often call for energetic treatment which perhaps might scarcely seem to be needed if the attention were limited to the area of lung affected. Then with regard to the severity of the attack, this may be independent of the extent of lung affected, since, in young adults, notwithstanding a very high temperature and marked constitutional symptoms, the urgency may pass away almost suddenly if only one lobe has been attacked. But even when only one lobe has been affected by pneumonia, the severity of the case may be greatly increased by the extent of engorgement of the remaining portion of the lungs.

The most difficult cases, however, to treat are those of an adynamic type, more particularly when the pneumonia appears to be of an infective variety. In these, the temperature is often extremely irregular, or at all events it does not conform to the typical chart so often seen in the sthenic cases of young adults.

Patients with pneumonia must, from the urgency of the symptoms, be kept in bed in a well-ventilated room, and they should be protected from draughts by the use of screens if necessary. As a rule, however, it is not advisable to employ steam tents, since these patients require all the oxygen they can obtain. Owing to the restlessness and delirium which may occasionally be present, the patient should be warmly clad in flannel garments, so as to avoid exposure to chills.

It is well to commence the treatment with saline purgatives, but these need not be repeated unless there are special indications for their use. Mild saline diaphoretics are often employed, but although they may seem to add to the patient's comfort, they do not materially affect the course and duration of the disease. Frequently there is much complaint of pain, which in all probability depends upon the pleura, to some extent, sharing in the inflammation of the lung. This symptom, if severe, should be treated with poultices which should encircle the affected side, but unless the pain notably interferes with the patient's rest it is undesirable to employ poultices. Even when poultices are used great care should be taken not to impede the movements of respiration, either by weight or by tight constriction ; hence nurses should be warned to make the poultices thin and light, and to envelop them in an impervious covering so as to retain the heat as long as possible. When there is not much evidence of fluid within the bronchi, morphine may be injected subcutaneously for the relief of pain, but this is contraindicated when there is much bronchitis or secondary engorgement.

In lieu of poultices, fomentations may be used, and these may be sprinkled with laudanum when pain is severe. It is, however, necessary to remember that in pneumonia, particularly in children, the recovery of the patient will often be endangered by frequent disturbance, and it is therefore desirable, when possible, to apply fomentations or poultices only over the front or side of the thorax. For the relief of pain, and also with the object of reducing the temperature and controlling inflammation, cold has often been applied to the affected side. In this way cold compresses have been used, or india-rubber bags of large size, containing pounded ice, have been tied to the thorax. When this treatment is adopted, it is desirable to watch for signs of collapse, and any blueness of the lips or rapid fall of temperature should immediately be met by removing the ice bag and by the administration of stimulants. Such symptoms of collapse are most prone to occur when the ice bag has been applied over the pericardium. I have no doubt that, in many cases under my treatment, good results have followed from the use of the ice bag ; but it is a form of treatment which is perhaps best effected in hospital practice, owing to the fears so commonly expressed of the risks of cold. In less severe cases, pain may be relieved by the use of leeches over the affected area, and these may be followed by the application of poultices. Some practitioners are

in favor of the use of blisters, or of dry cupping the affected side, but these measures, more particularly the former, render subsequent local treatment somewhat difficult, and do not, in my experience, appear to be necessary.

At one time it was a common practice to employ antipyretics in the treatment of pneumonia, and nearly all the new antipyretics, such as antifebrin, antipyrin, and the like have been tried in turn; while other remedies, such as quinine and cocaine, have been used with the idea either of reducing the temperature or of controlling inflammation. In most cases of pneumonia such remedies are not only needless but distinctly harmful. The antipyretics of the aniline series are more particularly objectionable, since they frequently cause some degree of cardiac depression, and also, to a certain extent, interfere with the proper oxygenation of the blood. Moreover, in mild cases of pneumonia there can be no doubt that these antipyretics do not reduce the temperature unless they are employed in large doses, and even when so given, although they may cause some fall of temperature, they do not appear to curtail the duration of the fever.

When the temperature has reached 104° or more, however, there can be no harm in lowering the temperature by mild measures in the same way as in the treatment of typhoid fever. The frequent sponging of the surface of the body with tepid or cold water will serve to lower the temperature and to increase the patient's comfort. It is rarely necessary, however, to employ ice-cold water, and still more rarely is it desirable to use a cold bath. In cases of extreme hyperpyrexia such treatment may be resorted to when the fever has resisted other measures, but in using the cold bath the risk of depression must be borne in mind, and small doses of stimulants should be given both before and after the bath.

When cases of pneumonia are uncomplicated and occur in young adults, medicines may be unnecessary during the earlier stages, since consolidation cannot be hastened by the administration of drugs. It is very customary, although perhaps not essential, to administer mild salines as long as the temperature remains high. Moderate doses of the liquor ammonii acetatis, together with a little ammonium carbonate, will often satisfy the desire of the patient and his friends for some medication. Later, however, when the expectoration is becoming more free, its removal may be facilitated by treatment similar to that employed in cases of acute bronchitis, namely,

the administration of ammonium carbonate with ipecacuanha, or with antimony and potassium tartrate. Children bear ipecacuanha well, as a rule, but sometimes it appears to favor a tendency to diarrhoea, and its administration should then be discontinued. Later, when the expectoration has lost its viscid character and has become loose, and more freely expelled, benefit will result from the administration of tonics of an acid character. Small doses of quinine, given with dilute sulphuric acid, and perhaps with ferric chloride, will hasten convalescence, or quinine may be given in an effervescent form with citric acid and one of the alkaline carbonates. Benefit will also frequently be found to result from the use of nuxvomica, or of strychnine, which may be given with the acid quinine mixture above mentioned.

Soderberg (*Jahrb. f. Kinderheilk.*, xlviii. p. 365) strongly recommends pilocarpine in the treatment of acute pneumonia. He reports ten cases of acute pneumonia, six of them in children, treated with this drug; all recovered, and the duration of the disease was considerably reduced (from seven or eleven days to twenty-four or sixty hours). In acute pneumonia the symptoms became very much milder after the first dose of pilocarpine, and the pain disappeared in a few hours. Perspiration and salivation were marked, but no disquieting symptoms of collapse were observed, so that he considers the treatment to be free from danger. He gave the drug internally in watery solution, and in some cases administered at the same time alcohol, digitalis, or strophanthus, when these drugs appeared to be necessary. Schlesinger (*ibid.*) found the mortality of 173 children treated in the Kaiser und Kaiserin Friedrich Children's Hospital, in Berlin, to be only 4 per cent. The treatment which gave the best results when the temperature was high was the moderate and careful use of the cold pack. The cautious administration of stimulants, especially alcohol, was also looked upon as important.

Of the special symptoms which may call for separate treatment in the course of pneumonia the most important perhaps are those connected with cardiac failure. These symptoms may arise quite early, and they are indications for the use of stimulants. Many practitioners are in the habit of employing stimulants throughout the course of pneumonia, or at least during the time that the temperature is high. I am convinced, however, that in many cases this routine treatment is quite unnecessary, and that it is better to defer

the use of stimulants until they are specially indicated by the nature of the pulse. Then the amount to be given within the twenty-four hours must be determined by the degree of urgency of the case ; for adults 6 oz., 10 oz., or 12 oz. of brandy or whiskey may be given in the twenty-four hours in small divided doses, but the lavish employment of stimulants as a mere matter of routine is distinctly to be deprecated.

For the same class of symptoms cardiac tonics have been employed, and of these digitalis and strophanthus are most commonly used, and sometimes advantage results from the addition of strychnine to the above drugs, or from the hypodermatic injection of strychnine, the latter plan being most beneficial when the symptoms of cardiac failure are extremely urgent. In using digitalis for heart-failure in pneumonia, it is necessary to remember that comparatively large doses may be required so long as the temperature is high, but that these doses require reduction so soon as there is any marked fall of temperature, since large doses, which can be tolerated during fever, may cause toxic symptoms when the temperature is nearly normal.

In severe cases, where a large portion of the lung has become involved either with pneumonia or with great engorgement, urgent dyspnœa may be present, and the treatment of this symptom requires much circumspection. If due to overloading of the bronchi, or of the air cells, relief may be given by the employment of an emetic, or by the use of stimulant expectorants. But sometimes, in plethoric individuals, dyspnœa appears to result from embarrassment of the circulation and over-dilatation of the right side of the heart. Under such circumstances, it is desirable to bleed fairly freely from the arm, the relief thus afforded being sometimes very noticeable. When, however, the strength of the patient does not seem to allow of the employment of venesection, inhalations of oxygen may be extremely valuable, and may serve to tide over the time of danger, which is generally limited to the period of high temperature. Small doses of strychnine, given hypodermatically, may also be employed with urgent dyspnœa, more particularly when there appears to be reason to suppose that the dyspnœa is dependent upon cardiac weakness and embarrassment, rather than upon lung obstruction. Should the dyspnœa arise comparatively suddenly, without any marked increase in the extent of the physical signs, there may be grounds for believing that it is due to nerve influence, and on this

hypothesis it may be treated with small doses of ether and of morphine, administered by the mouth, or morphine may be given subcutaneously. The hypodermatic injection of morphine, however, requires great care, since no treatment can be less desirable if the dyspnœa is after all dependent upon obstruction of free entrance of air to the air cells.

Mention has already been made of the use of salines and expectorants in the treatment of pneumonia. In spite of these, however, the cough sometimes becomes so troublesome as to require further treatment calculated to lessen the expectoration and to facilitate its removal. It must be remembered that as a rule in pneumonia some degree of cough is a necessity, and although some patients, particularly children, may go through marked attacks of pneumonia with little or no cough and with no expectoration, yet, in the vast majority of cases of adults, the dulness over the affected area of lung is diminished only as the expectoration is removed by the act of coughing. Remedies must therefore be used, not to suppress cough, or to diminish the reflex excitability of the larynx, but to favor the removal of expectoration, and in this way to render expiratory efforts less frequent and less painful. These indications can be followed by the administration of fairly large doses of warm alkaline draughts. Alkaline sprays of ammonium chloride or of sodium bicarbonate will also sometimes facilitate the expectoration of viscid sputum. When sleep is disturbed by frequent cough, small doses of powder of ipecacuanha and opium may be given, or antimony and potassium tartrate may be added. The sleeplessness of pneumonia is perhaps best treated with small doses of chloral hydrate, but benefit often results from the simultaneous use of small quantities of stimulants, which counteract the depressing influence of chloral hydrate on the circulation.

Another complication, which occasionally calls for special treatment, is due to intestinal irritation. This condition, recognized by diarrhœa, is most prone to occur after the crisis, and it is perhaps most commonly seen in pneumonia in children. To some extent it appears to result from eliminative efforts, and therefore when it lasts only for a short time the symptom may be disregarded. When it occurs early, it may be the result of injudicious diet, or it may follow the employment of ipecacuanha in overdoses. Any error in diet or in the employment of remedies should be corrected, and if the diarrhœa continues, it may be necessary to administer astrin-

gents, and perhaps opium, if the age of the patient permits. The employment of opium is, however, contraindicated both in infancy and in the diarrhœa which sometimes complicates the pneumonia of old people. If there is any reason to believe that the diarrhœa is due to errors of diet, moderate doses of calomel, of gray powder, or of blue pill may be given, followed by a saline aperient. Should the diarrhœa be complicated by sickness, the diet should be restricted to milk, which may with advantage be diluted with any alkaline water.

In individuals with an alcoholic history, it is not uncommon for pneumonia to pursue a special course of an adynamic type, marked by low temperature, and by cerebral symptoms simulating those of delirium tremens. In these cases sleeplessness is commonly a marked feature, and the patient has almost to be treated on the principles suitable for delirium tremens. Stimulants should be given frequently in small doses, and cardiac tonics, such as digitalis and strophanthus, are required. Chloral hydrate will occasionally enable the patient to obtain sleep, or will at least check the continuance of the restless movements and mental excitement. Since many of these cases of delirium occur amongst individuals of alcoholic habit, they are frequently complicated by the existence of renal troubles and weakness of the left ventricle, and on this account opium is contraindicated.

In uncomplicated cases convalescence usually proceeds without interruption and is fairly rapid, but it may be hastened by the use of tonic measures, such as those already mentioned, namely, the administration of iron, of quinine, and of strychnine. As the patient gains strength, the diet should be rendered more generous and nutritious, and he should be encouraged to get daily exercise in suitable weather. Frequently the patient appears to be well, so far as his sensations and general symptoms are concerned, long before the physical signs have completely cleared up. Some dulness may remain over the affected lung for a lengthened period, and fine crepitations may be heard over this site, even when the cough has completely ceased. These conditions are to be treated by the application of counter-irritants over the thorax. Iodine may be painted over the site of the dulness, the whole area either being covered with two or three successive applications, or, preferably, small portions of the chest may be treated on successive days. Even when the dulness persists, this affords no contraindication against

change of air, and great benefit is commonly experienced from residence at the seaside, or, if the patient is a good sailor, from a short sea trip. When, however, the dulness is associated with continuance of cough and with much expectoration, a more supporting form of treatment is required. These conditions may arise in elderly people, and they call for the administration of stimulants and for the employment of tonics. When, however, they are associated with an oscillating temperature, and when they occur in young adults, it may be feared that phthisical changes are supervening, the probability being as a rule increased if to these symptoms night-sweats are superadded. Under these circumstances, benefit is sometimes found to result from the administration of cod-liver oil, and of ferrous iodide, or phosphate, each of which may be conveniently given in the form of a syrup.

Abscess of the Lung. Abscess of the lung is, happily, not a condition which frequently arises, although it may occur subsequently to an attack of pneumonia, or in connection with general pyæmia. The most important element in the diagnosis lies in the altered character of the expectoration, and in the presence of fragments of elastic tissue. Pyæmic or embolic cases are often overlooked, and the uncertainty of the diagnosis almost precludes any special line of treatment; but, on the other hand, with pneumonic cases the mode of treatment will depend upon the estimate formed of the size of the abscess, and upon its position. If only a small portion of the lung is involved, the case should be treated by hygienic measures, which are mainly to be directed toward improving the general health of the patient, and facilitating the expectoration of pus. A change of air is, therefore, often indicated; and the use of inhalations with turpentine, or other volatile correctives, may be beneficial; at the same time, the diet must be generous, provided that the temperature is not continuously high. Frequently, in these cases, the temperature oscillates, but it may, to some extent, be rendered more steady by the administration of quinine. When, however, it is thought that an abscess in the lung is of large size, and the patient is being exhausted by the continuous formation of pus, the question of surgical interference must arise. Several cases have now been recorded in which abscess of the lung has been successfully dealt with (*Lancet*, August 22, 1896). In the performance of the operation it is advisable to proceed somewhat as in the treatment of empyema, that is to say, an opening should be made by removing a

portion of one or more ribs over the affected area. If the parietal and visceral layers of the pleura are adherent, an incision may be made directly into the lung beneath; but when they appear to be distinct, it is advisable to expose only a small portion of the lung, and to surround the part thus exposed with iodoform gauze. The incision through the lung may be best made by means of the thermo-cautery, which diminishes the risks of hemorrhage. After the cavity has been reached and evacuated, it may be scraped dry and frequently steeped with iodoform gauze. In speaking of one of the cases thus treated, Mr. Treves stated that it is evident lung abscesses can be treated precisely in the same manner as suppurative collections in more accessible parts, and that an extensive incision can be made in the periphery of the lung without trouble from hemorrhage.

Although this treatment has been recommended in severe cases, abscess of the lung has sometimes been dealt with by aspiration, and by the injection of antiseptic solutions into the abscess cavity. The antiseptics which have been employed are carbolic acid, corrosive mercuric chloride, and creosote, but these measures rarely lead to satisfactory results, and there is always some danger of absorption of the antiseptic from the wall of the cavity. Efforts have sometimes been made to treat these cases by the internal administration of antiseptics, creosote being perhaps the one which has been used with the greatest amount of hope; but this treatment is, I consider, only applicable when there are reasonable grounds for uncertainty as to the diagnosis. When the abscess has been diagnosed with certainty, it is, I consider, better to deal with it by surgical measures.

Gangrene of the Lung. Gangrene of the lung occurs under somewhat the same conditions as abscess, but, in addition, it may arise in consequence of the irritation of the contents of a cavity, due either to bronchitis or to tuberculosis. It may also result from embolism of a branch of the pulmonary artery. It is characterized by intense fetor of the expectoration, which is far worse than that connected with abscess. The diagnosis rests almost entirely upon this condition of the expectoration, though there may be physical signs of a cavity, which may serve to localize the gangrenous area. If the position of this cavity can be established, surgical measures, similar to those already described in connection with abscess of the lung, may be adopted. In the majority of cases, however, treatment is almost entirely limited to the disinfection of the gangrenous

area, which may be effected by the use of sprays or inhalations. When it can be tolerated, an inhalation of chlorine or of iodine has often proved beneficial, but these drugs frequently produce so much irritation and cough that they have to be discontinued. Carbolic acid and creosote are often employed in sprays of the strength of 1 drachm in 10 ounces, while for the purpose of inhalation eucalyptus and menthol are frequently of service. Turpentine inhalations will often serve to correct the fetor and to reduce the amount of expectoration, while the surroundings of the patient are often rendered more tolerable by the impregnation of the atmosphere with vapor arising from turpentine, from eucalyptus, or other volatile antiseptics, which may either be employed as a spray about the room, or may be sprinkled upon tow, or gauze, in the neighborhood of the patient.

The penetrating odor of the expectoration may also be corrected by the use of turpentine, sanitas, sulphurous acid, or chlorinated lime. Bromine has been mentioned in this connection, but the characteristic odor is little better than that of the gangrenous expectoration. Care is taken promptly to disinfect and to deodorize the expectoration. It should be received in a vessel which contains chlorinated lime, Condyl's fluid, or turpentine, and should be removed at short intervals.

For internal use, it is advisable to employ volatile antiseptics, such as creosote or guaiacol. The former may be given satisfactorily in the form of capsules, the latter as a carbonate in cachets. Oil of eucalyptus, or oil of peppermint, has also been administered internally, and turpentine in moderate dose is frequently given. It must be admitted that most of these remedies are employed chiefly on theoretical grounds, and that the fetor of the expectoration is but little affected by the internal administration of these volatile antiseptics. For the correction of fetor by the internal use of these remedies, or by the internal administration of carbolic acid, the doses which would be required are larger than could be employed with safety for any length of time.

Tonics should be employed freely in this condition, the diet should be generous, and stimulants may be required, since gangrene of the lung almost invariably leads to great anorexia and rapid loss of strength.

Pleurisy. The treatment of pleurisy depends upon two factors: the degree of pain and the extent of effusion. The onset of all forms

of pleurisy is commonly marked by pain, but some cases are not attended by much effusion, while in others the effusion scarcely calls for treatment, the treatment of effusion being essentially dependent upon the estimate formed of its amount. With cases unattended by effusion, that is, with dry pleurisy, the pain is best treated by the application of a few leeches over the painful site, the patient necessarily being confined to bed in a room of an even temperature. After the application of leeches further relief may be given by the use of compresses, fomentations, or poultices, and sometimes these may alone be relied upon if the pain is not excessive. Benefit often results from the limitation of the movements of the chest either by broad strips of plaster over the affected side, or by the application of a bandage which renders the respiration more purely diaphragmatic. The local use of cold, either by applying an ice bag, or by Leiter's tubes, will also diminish discomfort, but there is still much popular prejudice against the employment of cold, notwithstanding its undoubted efficacy; it is therefore sometimes difficult to carry out this form of treatment.

Pain is also to be controlled by the use of preparations of opium or by the use of morphine, which may be given by the mouth or may be injected subcutaneously over the painful spot. For internal treatment salines may be given, and these will frequently diminish the risks of effusion. When the pleurisy is somewhat chronic, as, for example, in cases of phthisis, it is often unnecessary to keep the patient in bed, and some measure of relief may be afforded by counter-irritation over the painful site by painting repeatedly with dilute solutions of iodine until the skin shows signs of cracking. It must be remembered that dry pleurisy is frequently symptomatic of some more general disease, and that many of the measures above mentioned are purely palliative.

The treatment of pleurisy with effusion is, as above indicated, dependent upon the extent of the diffusion and upon the degree in which respiration is interfered with by compression of lung substance. The pain which marks the early stages speedily diminishes with the accumulation of fluid, but it calls for the adoption of similar measures to those which have been already mentioned for the relief of pain in connection with dry pleurisy. Opium may be given internally, or morphine may be injected subcutaneously over the painful area, the injection being repeated from time to time if necessary. Poultices or spongiopiline may be used, and so far the

treatment does not materially differ from that of dry pleurisy. Other remedies, however, may be called for ; thus, for example, in rare cases it may be desirable to employ antipyretics. Generally, however, the rise of temperature is but moderate and scarcely necessitates treatment.

Sodium salicylate or other alkaline salts may be used, and frequently serve to reduce discomfort. In this affection they frequently act as powerful diuretics :

R.—Sodii salicylatis	gr. v.
Sodii citratis	gr. v.
Sodii acetatis	gr. v.
Aqua menthæ piperitæ	q. s. ad \bar{z} ss.

M. ft. dosis. Sig.—One tablespoonful every two to four hours.

The group of saline purgatives is often indicated when the effusion is increasing slowly or when it remains fairly stationary. Indeed, under any circumstances a saline purgative may be followed by speedy diminution of the area of dulness. With the same object, calomel is often administered in moderate doses, and further efforts to reduce effusion may be made by the use of other diuretic remedies ; in fact, it is often found that the removal of fluid from the bloodvessels either by the kidney or by the bowel is followed by re-absorption of the fluid which has been poured out into the pleural cavity. When the fluid shows but little sign of alteration in amount, absorption may be promoted by the application of iodine to the surface or by dry cupping over the lower part of the chest, and if these measures fail, benefit will sometimes follow the use of small flying blisters.

When there is much complaint of cough producing pain, and when there is but little expectoration, the continuous use of narcotics is indicated, and for the production of sleep chloral hydrate, the bromides, and sulphonal are to be preferred. When the effusion has increased in amount its absorption is often favored by the aspiration of a small quantity of fluid. The removal even of a few ounces will often be followed by rapid reabsorption. It is frequently found, however, that this reabsorption is only partial, and that at the base of the lung on the affected side some degree of dulness may remain with but little variation, the patient experiencing very slight discomfort, indicated only perhaps by a slightly increased rate of respiration. Under these circumstances it is often

advisable to allow the patient to get up and to take exercise in the open air ; should the case still prove refractory, complete recovery may be hastened by a change of air to the seaside, remembering, however, that it is necessary strictly to enjoin the avoidance of chills and undue exposure.

With regard to the fairly numerous cases in which the amount of effusion is sufficient seriously to affect the respiration, these require more energetic measures. When the respiration becomes unduly rapid and the circulation is embarrassed, and especially when there is any indication of cyanosis, it is advisable to perform paracentesis early, since, independent of the immediate dangers to respiration and circulation, there are risks of undue compression of the lung and of the formation of fibrinous adhesions which may prevent its expansion. In recommending early paracentesis, however, it is necessary to remember that the thoracic cavity should not be completely drained and that the fluid should be removed comparatively slowly, since otherwise there is risk of provoking cough of a distressing character and also of unduly disturbing the balance of the circulation through the lung.

Before performing paracentesis, it is advisable to ascertain the nature of the fluid within the pleural cavity, and this may be effected by withdrawing a small quantity with an aspirating needle. This minor preliminary operation is especially desirable in cases marked either by high temperature, or by great fluctuations of temperature, more particularly when the effusion follows or accompanies one of the exanthemata, or when it occurs as a complication in the course of nephritis, either acute or chronic. If the fluid removed under these circumstances is found to be clear and there is but little interference with respiration and circulation, paracentesis may be postponed ; on the other hand, if the fluid is found to be purulent the case must be treated as one of empyema. When, however, the fluid is only moderately turbid or opaque, early paracentesis is generally advisable, since under such circumstances flakes of lymph are readily formed and may be deposited upon the surface of the lung and interfere with its proper expansion.

The fluid may be removed by means of an aspirator such as that of Dieulafoy or Potain, but many instrument-makers supply excellent aspirators fitted with two-way stopcocks which are extremely convenient. The trocar employed should be small and should permit the use of a blunt stylet to clear the orifice of flaky lymph, and the

whole operation should proceed very slowly ; even when the thoracic cavity seems to be fully distended with liquid, only some fifty ounces at most should be withdrawn. In performing this operation it is advisable to anæsthetize the skin either with strong carbolic acid, or with cocaine, or with ethyl chloride. Frequently, however, these local anæsthetics cause almost as much pain as that produced by the introduction of the trocar, and when the skin is very thick or tough, a small incision made quickly will facilitate the introduction of the trocar and produce almost as little pain as the introduction of the hypodermatic needle.

It is necessary, before performing paracentesis, to render the instruments and the skin thoroughly aseptic, and it is always advisable, however frequently the instruments may have been used, to test their working power before introducing the trocar. The need for caution during removal of fluid is further emphasized by the risk of damaging the lung during any violent efforts of coughing, as well as by the danger of allowing small quantities of air to be introduced into the pleural cavity during spasmodic efforts. The site of puncture is usually somewhat arbitrarily decided upon, and since the object is to remove fluid and to relieve pressure without emptying the pleural cavity, the site selected is ordinarily that which is most favorable to the introduction of the trocar, namely, the fifth or the sixth interspace in the posterior axillary line.

Instead of employing an aspirator, some physicians are in favor of the use of Southey's tubes with a long drainage tube passing into a vessel under the bed, the lower end of the tube being under water. During the removal of the trocar it is advisable to press the skin closely so as to prevent the entrance of air into the chest, and to apply at once over the site of the opening a small pad of lint dipped in collodion, which may in turn be covered with a small piece of gauze, over which collodion may be freely applied ; or since the application of collodion to a raw surface frequently causes considerable pain, a small quantity of aseptic cotton-wool may be placed over the opening, and this in turn covered with gauze, which is rendered adherent with collodion freely painted over it.

When much fluid has been removed by paracentesis, it is advisable to limit the movements of the chest by a broad strip of adhesive plaster, or by surrounding the chest with a broad flannel bandage. The operation of paracentesis is often attended by faintness, and it is therefore advisable to give a small quantity of some stimulant,

such as brandy, both before and after the operation. The tendency to cough during the removal of fluid may, to some extent, be controlled by the use of morphine. In all cases, it is generally desirable to administer morphine after the operation, so as to promote sleep and to diminish reflex excitability. After this operation there is generally rapid absorption of the fluid which has been left within the chest, though occasionally the fluid tends to accumulate again, and further paracentesis is necessary. The subsequent treatment in no way differs from that already detailed.

Hydrothorax. The somewhat indefinite term "hydrothorax" is often employed in medicine, and it indicates merely the slow accumulation of fluid within the pleural cavity. This accumulation is said to be of a more chronic and passive character than that formed in connection with pleurisy, but there can be little doubt that many cases of so-called hydrothorax are really cases of chronic pleurisy with effusion, in which the amount of effusion undergoes but little variation, and they are accordingly to be treated on the general principles already detailed for the treatment of pleurisy. Under the same term, however, many passive effusions may be grouped, as, for example, those which occur in connection with chronic forms of Bright's disease, and those resulting from chronic engorgement due either to lung or heart-failure. The treatment of such chronic forms of hydrothorax must therefore be dependent upon the cause. When ensuing from interference with the circulation and respiration, removal of fluid by paracentesis is advisable, but when this condition is associated with Bright's disease, it is perhaps better dealt with by the use of hydragogue purgatives, diuretics, and cardiac tonics. Frequently, however, it is merely an accompaniment of more universal dropsy, and if the dropsical accumulation in the extremities is sufficient to call for surgical interference, the pleural effusion is generally relieved simultaneously, although, in exceptional cases, it may call for separate operative measures.

Empyema. The existence of empyema, that is, the accumulation of pus within the pleural cavity, is often to be inferred from the circumstances under which the indications of pleural trouble are developed; but although an oscillating temperature, which perhaps never reaches the normal, may furnish grounds for suspicion, especially when the symptoms arise in a child soon after one of the exanthemata, there can be no certainty of diagnosis in the early stages until a small quantity of fluid has been removed with an

aspirating needle or hypodermatic syringe. When, however, it has been proved in this way that the pleural cavity contains pus, there can be no question about the desirability of its removal as early as possible, since the formation of the pus is in itself an exhausting process, and, moreover, there is always some risk of the pus seeking an outlet in some undesirable or dangerous direction. Delay in the removal of pus is also extremely likely to favor the formation of adhesions which render subsequent recovery more uncertain.

The removal of pus has been effected in three ways : by aspiration, by incision, and by incision together with resection. The first operation in no way differs from aspiration of the pleural cavity in cases of pleurisy with effusion, although, in cases which have been previously overlooked or neglected, the site of operation may occasionally be determined by the bulging of one of the intercostal spaces or by the pointing of pus endeavoring to form an outlet of its own. It was formerly recommended that aspiration should be attempted in all cases, and that the operation, like that of paracentesis, should be repeated if the pus re-accumulated. In recent years, however, this procedure has been much discredited, since it is difficult, when it is performed in the ordinary site, to remove the whole of the pus, and it is undoubtedly undesirable to leave any accumulation of pus within the pleural cavity, especially when, as sometimes happens, the lung does not readily expand to fill the place of the fluid removed ; and if expansion does not occur, there is extreme probability of the entrance of air, and of the pus that is formed subsequently undergoing putrefactive changes. Since, therefore, this operation is in itself unsatisfactory when we are dealing with pus, and further since it is attended by considerable risk to the patient, it has been almost entirely discarded in favor of measures which permit the complete drainage of the pleural cavity.

With regard to the operation of incision, a good deal of divergence of opinion exists. Some are in favor of making an opening by which the cavity may be freely drained, and trust to the use of antiseptic measures to render this operation comparatively free from danger. Others prefer making an opening which is only sufficiently large to allow of the introduction of a small drainage tube, through which the pus may continue to flow into the dressings long after the cavity has been opened. With regard also to the drainage tube opinions differ, some being in favor of a short tube which scarcely projects beyond the thoracic opening, connected with an expanded

shield to prevent it passing into the thoracic cavity, while others prefer the use of a long tube similar to that employed in the slow drainage of cases of pleurisy. When the practitioner is free to select the site of operation, the fifth or sixth interspace on the right side or the seventh on the left is usually selected, the opening being made below the lower angle of the scapula in the posterior axillary line. Although this opening does not reach the lowest point of the pleural cavity, it is found to be that which is most convenient for drainage and for insertion of a drainage tube, since, if the incision is made further back the space between the ribs is greatly reduced, and the drainage tube is therefore liable to be obstructed.

It was at one time recommended that two openings should be made in the thorax so as to allow of more perfect drainage, and also of irrigation of the pleural cavity with antiseptic fluids. Since the introduction of Listerism this operation has been practically given up, and at the present time empyema is generally treated by the removal of portions of one or more ribs so as to allow more space for the drainage tube, and to permit the wall of the thorax to fall in more thoroughly. This operation was originally recommended by Estländer, and the resection of the ribs is effected after the detachment of the periosteum. If more than one rib is resected, separate incisions are commonly recommended, although in children it may be possible to operate through one opening. After resection of the rib, a drainage tube of fairly large size is inserted, its outer extremity being covered with aseptic gauze to receive the drainage of the cavity. Even with this operation discussion has arisen over the desirability of washing out the pleural cavity. Unless the discharge is unduly fetid, this is unnecessary, and it is generally considered somewhat dangerous, many cases of troublesome collapse having arisen after such injections.

After operation the patient should be encouraged to lie on the affected side, so as to facilitate drainage. Happily this position is the one naturally adopted, since by limiting the movements of the thorax during respiration it diminishes pain, and hence contributes most to his comfort. It is of course essential that after the operation the patient should be kept in bed in a warm, well-ventilated room. Immediate relief is commonly seen in the fall of temperature to a point slightly below the normal line. If after a few days the temperature rises again, there is great probability of retention or imperfect drainage, and it indicates the need for changing the dressings.

Even a slight blockage of the drainage tube may be followed by a rise of temperature, and this is especially likely to occur at a late stage, when the drainage tube is being shortened as the cavity is gradually closing. The temperature chart, therefore, must be watched closely, since variations call for immediate treatment. Each time fresh dressings are applied it will be necessary to shorten the tube slightly, but some difficulty may be experienced in deciding when the tube should be removed entirely, and sometimes the removal is not at once followed by closure of the orifice. When the orifice is late in closing it may be desirable to allow the patient to get up and to move about the ward or sick-room, provided that the dressings are well retained in position. In protracted cases there is often some advantage in allowing exercise in the open air, or even in permitting the patient to be moved to the seaside.

Tardy closing of the opening is most likely to occur when the antiseptic precautions have failed, and under these circumstances the health and strength are liable to undergo great deterioration so long as suppuration continues. In mentioning this possibility, however, it must be remarked that it should not occur if care has been taken from the commencement of the treatment, but I have known cases where, even after a long time had been spent in convalescing in the country or at the seaside, a second operation has been found necessary for the removal of retained pus. This sometimes appears to be due to efforts having been made to force the closure of the opening at too early a date.

The desirability of performing the operation subperiosteally is to allow new growth of bone at a subsequent date, but it has been shown that in children this growth may be too rapid, and hence it has been recommended that the periosteum should be removed.

Before performing resection it is always desirable to make an exploratory puncture with a hypodermatic syringe, and to operate only over the site where the presence of pus has been thus demonstrated. The advisability of this precaution was well shown in a patient of mine upon whom my colleague, Mr. G. L. Cheatle, operated. This patient had been sent from abroad with an empyema which had formed a connection with a bronchus, through which pus was being expectorated. The physical signs demonstrated localized empyema in the front of the right side of the thorax; but although an exploratory puncture was made in the accustomed site in the axilla, no pus was found there, and it was necessary, there-

fore, to operate close to the sternum and to remove portions of costal cartilage so as to allow of the introduction of a drainage tube. The operation in this unusual site was followed by perfect recovery. This case further demonstrates the wisdom of removing pus by operation, even though it has already formed an outlet for itself through the lung. I have, however, seen one case in which the patient, who was discharging pus through a bronchus, passed from observation for a time, and on returning, careful physical examination, with a view of adopting operative measures, indicated that the cavity had completely closed. As a general rule, however, such a happy result cannot be counted upon, and it is safer to remove the pus by operation than to trust to the perfect evacuation of the cavity through the lung.

Pneumothorax. Literally, the term "pneumothorax" is only applicable to a condition which scarcely ever calls for treatment—the collection or accumulation of air within the pleural cavity. In the vast majority of cases, even if air should have obtained access to the pleural cavity through some accidental injury either of the wall of the chest or of the air cells of the lung, the condition is speedily complicated by some inflammatory effusion, and the pneumothorax becomes converted into hydropneumothorax, or into a pyopneumothorax. The treatment, therefore, must depend primarily upon the cause of the pneumothorax, and secondarily upon the symptoms which have become superadded to the presence of air within the pleural cavity. When due to perforated wounds of the chest, or to injury of the lung, the patient would, independently of the pneumothorax, of necessity be kept in bed, and the first principle of treatment must be to prevent the further entrance of air into the pleural cavity.

It is scarcely necessary to enter into details concerning the surgical treatment of perforative wounds, but when pneumothorax results from injury of the lung, either from overstrain or from perforation due to local disease, the most prominent symptom calling for treatment is the frequency of cough, which it is most necessary to allay, since not only does it cause pain, but it may lead to the further escape of air into the pleural cavity during the violent movements of respiration. This symptom, therefore, is to be treated with opium or with morphine, to be given internally in fairly large and repeated doses. If morphine is selected, it may be administered subcutaneously, and the amount thus given should be sufficient to

diminish the reflex excitability without necessarily causing narcotism. In exceptional cases rest and the use of opium may perhaps be sufficient to tide over the time of danger, and the air which has passed into the pleural cavity may gradually be reabsorbed. Frequently, however, even before the accumulation of serous fluid or of pus, there may be much distress of breathing, owing to collapse of lung on the affected side, and the distress may be increased by the displacement of other organs. When the affected side of the thorax is much distended, some relief may be given by tapping the pleural cavity with an exploring needle, to allow the exit of air, and when tension has thus been reduced, it is advisable to strap that side of the chest, so as to limit its movements. When fluid accumulates within the thorax, these cases must be treated on the general principles already detailed in connection with pleurisy or with empyema. If the pneumothorax has resulted from the perforation of a phthisical cavity, the prognosis is necessarily bad, even though, as Osler points out, an early pneumothorax appears to arrest the progress of tuberculosis. As a general rule, in phthisis it is desirable to postpone operative measures unless there is great interference with the respiration and circulation.

Reflex Cough. In the foregoing pages the treatment of many varieties of cough has been described, and it will be seen that in nearly every case cough is dependent upon some definite anatomical lesion of the air passages. Commonly the lesion consists of one of the stages of inflammation, and accordingly the varieties of cough already described are connected with more or less expectoration. Even during the dry stage of acute bronchitis or acute laryngitis scanty viscid expectoration may follow prolonged efforts of coughing, and the character of the cough and that of expectoration may become modified as the disease progresses. The cough is commonly less painful as the expectoration becomes more fluid, and therefore capable of removal with greater ease. But apart from these forms of cough dependent upon anatomical lesions in the air passages, numerous other forms of reflex cough occur in which the source of irritation is in some part remote from the air passages, and the irritation is conveyed along branches of the pneumogastric which are in anatomical connection with the air passages, and therefore permit the discomfort to excite cough in a reflex way.

For the treatment of these forms of reflex cough the first essential is to discover the cause, and it must not be thought that because

the air passages are free from local lesion when reflex cough commences they may remain in this condition if the reflex cough is allowed to continue. Independently of the discomfort resulting from the frequency of reflex cough, and independently of the annoyance both to the patient and to his friends, the violent expiratory efforts must be checked so far as possible, so as to diminish not only the risk of rupture of vessels during the violent efforts, but also the possible danger of producing emphysema. In all probability, however, emphysema of the lung—that is, the over-distention of the air cells and the thinning out of the capillaries—although it may follow upon continuous violent expiratory efforts, requires also some degenerative changes within the walls of the alveoli such as might be induced by persistent alcoholism or some other habit interfering with nutrition.

Troublesome cough may result from almost any chronic irritation in the throat or fauces. The constant irritation at the back of the tongue or epiglottis by means of an elongated uvula forms a frequent source of reflex cough, and those who are subject to sore throats or to chronic pharyngitis are also frequently subject to chronic cough. In these cases it is necessary to treat the obvious definite anatomical lesion, and so indirectly to cure the cough. Thus, for example, the removal of an elongated uvula, the excision of enlarged tonsils, or the removal of adenoids or polypi, which are causing irritation in the upper part of the pharynx, may be sufficient to cause an arrest of cough; hence in every case of cough of doubtful origin the throat must be carefully examined. When found in a catarrhal state, in the absence of any more definite abnormality, treatment with astringents, such as alum or tannin, will sometimes check the irritation and cough. These astringents must be employed either as a gargle or preferably as a spray or a local application.

The mucous membrane may sometimes be treated with potassium chlorate, or with silver nitrate, or the irritation may be allayed by the use of a spray of cocaine, but in most cases constitutional treatment has to be adopted in addition to the foregoing, since catarrhal sore throat is most likely to accompany a debilitated state.

Another frequent source of reflex cough lies in dentition. Reference has already been made to the onset of laryngismus stridulus in children during the time of dentition; but though sometimes the cough may be more purely of the reflex variety devoid of physical

signs, far more commonly, especially in rhachitic children, dentition is accompanied by cough of a true bronchitic character, so that râles and rhonchi are heard over the chest. The treatment of such cases must depend upon the physical signs. When there are indications of bronchitis, appropriate treatment must be adopted, but in the absence of such symptoms it is scarcely advisable to interfere before the crown of the tooth is pressing through the gum. Benefit then occasionally follows the small operation of lancing the gum, but generally all that is required is patience, with perhaps some simple mild mucilaginous remedy like the liquid extract of liquorice or the syrup of tolu. These are essentially cases in which it is undesirable to employ opiates.

Another cause of reflex cough which may readily escape recognition, unless specially sought for, consists in irritation of the external auditory meatus. Children are very fond of inserting foreign bodies, such as beads or peas, into the external meatus, and the irritation thus produced may find its expression in frequent noisy cough. Plugs of cerumen within the meatus may also give rise to the same symptom, more particularly when they are lying somewhat loosely in the meatus. The recognition of the cause will lead to the adoption of appropriate measures of relief.

The cough of chronic gastric irritation, which is less common than the foregoing, occurs at a later age, and it may be suspected when cough without expectoration is associated with indications of chronic gastritis. This form of cough sometimes accompanies the formation of gastric ulcers, and it is accordingly often found in connection with chlorosis. The treatment of the gastric trouble either by emetics in some cases of simple gastritis, or by gastric sedatives such as bismuth salicylate or other insoluble preparations of bismuth, together with hydrocyanic acid, or by small doses of ammonium carbonate and rhubarb, often serves to check reflex stomach cough.

Still less common is the reflex cough due to sources of irritation connected with the liver. Gallstones may sometimes give rise to cough, in addition to their own more characteristic symptoms, but in the other varieties of hepatic trouble cough is more likely to arise when an inflammatory process, starting within the substance of the liver, approaches and involves the capsule. An abscess within the liver may attain considerable dimensions without producing cough, so long as it is centrally placed and so long as the capsule is free.

Such severe disease within the liver is, however, by no means the sole hepatic cause for reflex cough. Disturbance of function, the result of an injudicious diet, may be followed by noisy cough which yields to purgatives, especially to mercurials. Cough may also be occasionally connected with irritation of other of the contents of the abdominal cavity. A mild attack of peritonitis, or an attack of appendicitis, may in rare cases be associated with reflex cough, while irritants within the intestine, such as the presence of round-worms or of indigestible materials, may also be connected with cough of a noisy character which will cease when the sources of irritation are removed.

Cough may occur with inflammation of the pericardium with no physical signs indicating any change in the respiratory passages, while with aneurism of the aorta cough is again a frequent symptom, though in these cases it is often associated with pressure upon the trachea and with some tracheitis and expectoration. Aneurismal cough is commonly of a noisy, barking character, and although to some extent it may be relieved by the use of opiates, it is far more likely to be controlled by rest and by the use of potassium iodide in large doses.

There are two forms of cough which frequently occasion much anxiety and really signify very little—the barking, noisy cough of puberty and the similar ringing cough of hysteria. In neither of these is there any expectoration, and they cause anxiety mainly because the onset of phthisis at about the same age may similarly be associated with a noisy cough. More often, however, early phthisis is marked by frequent short, dry cough, with which may be joined oscillations of temperature together with loss of flesh. The noisy cough of puberty is frequently amenable to purgatives and to the enforcement of a more moderate diet, while the treatment of the cough of hysteria lies in the judicious management of the patient, in assuring her of the absence of definite lung trouble, and in encouraging her to adopt a more healthy mode of life. Open air and cold baths, with perhaps the use of sedative remedies occasionally at night, may serve to check the cough of hysteria. It is, however, advisable to be extremely cautious in adopting opiates in such cases, since these patients are commonly very likely to develop the narcotic habit.

Occupying an intermediate position between these forms of reflex cough with no definite pulmonary lesion, and the varieties which

have been mentioned in connection with different pulmonary diseases, lies the cough which is sometimes heard in gouty patients. "Gouty bronchitis" is a term which has been employed to indicate the liability to bronchial attacks of those who are the subjects of gout, and although in these patients the physical signs of bronchitis may occasionally be found, these signs frequently disappear suddenly when an acute attack of gout declares itself in one of the joints. These forms of cough are perhaps best treated with iodides, with alkalies, or other remedies which are generally believed to favor the elimination of uric acid.

CHAPTER VI.

DIGESTION.

Aphthous Stomatitis—Stomatitis—Gangrenous Stomatitis—Acute Œsophagitis—
Spasm of the Œsophagus—Organic Stricture of the Œsophagus—Nutrient
Enemata—Vomiting, Gastric, Central, and Reflex—Vomiting of Pregnancy
—Seasickness.

Digestion. It will be convenient to consider the disorders of digestion in accordance with the same anatomical plan that has been followed in the chapters on circulation, and it is proposed, therefore, to deal in the following pages first with the treatment of diseases of the mouth, next with those of the salivary glands, then with the diseases of the pharynx, tonsils, and œsophagus, and subsequently to take into consideration the treatment of affections of the stomach and the intestines, which form a most important group. Of the diseases of the mouth, that is of the various forms of stomatitis, many are most frequent in infancy or in early life, and the treatment is accordingly somewhat restricted, since the range of remedies which may be safely employed in infancy is comparatively small.

Aphthous Stomatitis. Aphthous stomatitis, commonly called thrush, is the form of stomatitis most frequently seen in infants, and is a condition of inflammation associated with the development of white patches on the tongue, cheeks, or fauces, due to the growth of a special parasite, the *oïdium albicans*. When the child is being reared artificially the first essential is to make close inquiries into the cleanliness of every article used in preparing or administering food. The disease, however, is not limited to hand-fed children; it may occur occasionally among those reared at the breast, and it appears then to be dependent, to some extent, on the retention of milk within the mouth. This may be avoided by carefully drying and cleansing the mouth every time that the child has been nursed, and by taking care that the infant is not allowed to fall asleep while still at the breast. With hand-fed children it may similarly result from lack of care in seeing that the mouth is properly emptied before the child falls asleep, and it is therefore more likely to arise when the form of feeding-bottle permits the child to suck the milk

while still in its cradle, without involving the watchful care of the mother or nurse. It is for this reason, among others, that the feeding-bottle with the long, flexible tube is now so largely discarded in favor of the older slipper-shaped bottle, which requires to be held. Even with a bottle of the latter form, thrush may arise, particularly if due care has not been taken in washing out the bottle every time it has been used. The disease seems to originate in fermentative changes, and these may result from decomposition of milk, either within the mouth or within the feeding-bottle.

When a practitioner has satisfied himself that due precautions are being taken to prevent any further continuance of this source of irritation, one of the best forms of treatment consists in the application of glycerin of borax, which should be prepared with glycerin in accordance with the instructions in the 1898 *British Pharmacopœia*, that is to say, one ounce of borax to six of glycerin. It will be remembered that the glycerin of borax of the 1885 *British Pharmacopœia* contained less glycerin (4 oz.), and that this was diluted with two ounces of water. The use of the less dilute preparation is desirable, since it is essential that the borax should exert as much local effect as possible, and by being of a more fluid nature the action of the older formula was less localized. This glycerin of borax should be carefully placed every hour over the affected parts of the mouth or tongue, and if this is done, and if in addition ordinary care is taken with regard to cleanliness, as a rule little further treatment is required. It is found, sometimes, that the aphthous patches do not disappear, and it has accordingly been recommended that the affected surfaces should then be lightly sprinkled with a mixture of powdered borax and sugar. There is very little advantage in this treatment beyond the fact that it allows of the employment of borax in a more concentrated form; but, on the other hand, it has the disadvantage of occasionally causing some cough if the powder is used at all liberally. In place of the glycerin of borax, some practitioners prefer the borax honey of the *British Pharmacopœia*. This preparation, however, is not so strong in borax as the glycerin.

When the aphthous patches do not clear off with any of the above forms of treatment, it may be desirable to use stronger measures. The patch may be touched cautiously with caustic, either with silver nitrate or with nitric acid, but both of these are liable to cause considerable pain, and they should not be used unless the milder means have failed. This objection does not apply in the same degree to a

solution of alum, which may be well rubbed in over the affected area. The employment of a solution of potassium chlorate will depend, to some extent, upon the age of the child. When a fairly strong solution (1 in 50) can be applied to the inflamed surface without much chance of its being swallowed, potassium chlorate is often found to be very beneficial, but this drug cannot be used lavishly with impunity, since it may provoke gastric irritation and even hæmaturia, if much of it is swallowed. It is advisable, therefore, to reserve the use of potassium chlorate for children of sufficient age to understand that the mouth-wash should not be allowed to pass down.

Should aphthous stomatitis still persist in spite of all the above forms of treatment, it may be necessary to change the source of food and to engage a wet-nurse; or, if the child is not being fed at the breast, it will be desirable to use one or other of the sterilized preparations of milk. Many such preparations are now on the market. Some physicians prefer the humanized milk; others prefer milk which has been heated with special precautions; while others find that it is sufficient to dilute the milk in definite proportions, according to the age of the child, and, should it disagree, to have it peptonized. Frequently benefit is found to result from the use of small doses of mercury with chalk, which is especially beneficial if there is much constipation, or if the motions contain undigested milk. In severe cases of aphthous stomatitis, the general health suffers very greatly, as the result, probably, of the interference with digestion and of the constant discomfort in the mouth. It is therefore necessary to keep up the strength by the administration of small quantities of stimulants. These should be given in extremely small doses, distributed over the twenty-four hours, and mixed with milk, if the child is fed with the bottle, or else well diluted, so as to avoid provoking spasm of the laryngeal muscles. It is, as a rule, somewhat difficult to administer brandy or other form of stimulant to an infant who is being fed at the breast. With older children tonic remedies may be used, such as quinine and iron, but it is obviously impossible to employ these for the majority of sufferers from aphthous stomatitis.

Stomatitis. Stomatitis, consisting of irritation of the mouth, with possibly formation of ulcers and generally with some hæmorrhage, may occur amongst infants, but it is more usual at a somewhat later period than aphthous stomatitis. It may occur during

the time of dentition, or it may result from the irritation of the mouth and the salivary glands, owing to the administration of mercury or iodine. When it occurs in young children it may be treated on the same principles as aphthous stomatitis, but there is less danger in the employment of potassium chlorate, and the local action of this drug may be insured by the employment of the lozenges of the *Pharmacopœia*, which dissolve slowly.

Potassium chlorate may also be used in the form of a gargle or mouth-wash. It is however advisable, as in infants, to watch closely the effects of potassium chlorate, and to check its administration should the urine show indications of albumin or of blood-coloring matter. The following mouth-wash is sometimes of great service :

R.—Acidi salicylici	gr. xv.
Chloroformi	ʒiij.
Tincturæ benzoini compositæ	ʒiij.
Tincturæ myrrhæ	ʒiij.
Alcohol	ʒiv.

Ft. lotio. S.—A few drops in a wineglass of water.

When there is much bleeding from the mouth or from the gums, the use of some astringent is desirable. The most serviceable are those whose action depends upon the presence of tannic acid. Glycerite of tannic acid may be used in a dilute form, and decoctions of logwood or of rhatany may be either applied locally or used as a mouth-wash.

When there is much pain in the mouth, it may be controlled to some extent by the local application of cocaine. The strength of the solution and the frequency of employment must be determined by the age of the child, and by the constitutional effects produced. Ordinarily, it will be sufficient to paint over the surface once or twice daily with a solution of 1 in 20.

With most forms of stomatitis there is considerable loss of appetite and of strength, which must be combated by internal remedies. The tincture of ferric chloride is extremely beneficial, and may be given with advantage in combination with potassium chlorate, which, to some extent, renders the administration of this remedy less painful. At most children's hospitals it is customary to administer potassium chlorate in conjunction with the infusion of cinchona, or with the tincture of cinchona, and in this mixture the cinchona is of extreme value, not only on account of its tonic prop-

erties but because of its astringency, which serves to diminish the profuse flow of saliva which is so commonly a feature of stomatitis.

In toxic forms of stomatitis, that is, those dependent upon previous employment of drugs like mercury in overdoses, the secretions from the mouth are apt to become extremely unpleasant, and it is then necessary to use Condyl's fluid or chlorine water. The latter must, of course, be employed only as a mouth-wash, since it is far too irritating to allow of internal administration.

Gangrenous Stomatitis. Gangrenous stomatitis is marked by the rapid development of gangrene, which commencing frequently about the cheeks or gums leads commonly to extensive destruction of tissue. Very often it has its origin in tardy convalescence after acute fevers, more particularly if the patient is living in unsanitary surroundings. The rapidity with which the process sometimes extends may lead to a fatal result, and the possibility of this danger must be borne in mind from the onset, since treatment during the early stages may otherwise be lacking in vigor. As the disease is so frequently associated with weakness, one of the first essentials is attention to constitutional conditions. The surroundings should be ameliorated if possible. Tonics should be employed freely, and nourishing diet should be administered. Local treatment is necessary, but local treatment is not likely to succeed unless the general health of the child can be improved. Unhappily, in many cases, the disease had made great headway before the child is brought under medical treatment, and the local measures are then necessarily more severe. The gangrenous patch must be destroyed by the application of caustics. Should it be advisable, the actual cautery or the Paquelin cautery must be used to excise the whole of the discolored tissues. When these are not at hand, fuming nitric acid may be employed. With both of these methods the administration of chloroform is essential, since it is impossible for the treatment to be effective unless it is used so freely as to extend into the healthy tissues beyond the slough. Very commonly, after the removal of the gangrenous tissues, some degree of fetor of the breath will remain, and will call for the employment of antiseptic applications and of disinfectant mouth-washes.

Cases have been recorded in which success has followed the excision of necrosed masses and the application of a solution of corrosive mercuric chloride, 1 in 500. These measures are credited with promoting healthy granulation and rapid recovery. Occasionally

the gangrenous destruction extends through the cheek, and it is then easier to deal with the case by excising the gangrenous patch and applying nitric acid or strong solutions of corrosive mercuric chloride to the raw surfaces. Until the necrosis has been arrested, and the strength of the patient has been restored, no attempt can be made to repair the deformity which follows this operation.

It is somewhat curious that with gangrenous stomatitis the commencement is commonly very gradual, and is at first unassociated with pain. It is only at a later stage that constitutional disturbance may become severe, and marked by high temperature and diarrhoea. These symptoms, however, ordinarily require no special treatment, since they improve with successful treatment of the local affection. In milder forms improvement sometimes ensues after syringing the mouth with a solution of potassium chlorate, 1 in 50. Among the constitutional remedies to be employed may be enumerated the following: preparations of iron, preparations of cinchona, and preparations of ammonium. A combination of ammonium carbonate with cinchona is often found extremely beneficial, since it strengthens the pulse, and at the same time improves the appetite.

Diseases of the Œsophagus: Acute Œsophagitis. Acute œsophagitis, or inflammation of the œsophagus, commonly arises as the result of irritant poisoning, and is, therefore, happily a comparatively rare condition. It may, however, occur in connection with other forms of inflammation in its neighborhood; thus it is occasionally seen with inflammation of the pharynx and tonsils, whether simple or diphtheritic, and it also appears as a rare symptom of acute gastritis. The treatment of this condition will therefore be largely dependent upon its cause, and when it is dependent upon some other disease it may be quite unnecessary to adopt any special measures for its relief, since the treatment which has already been necessitated by the initial disease will probably reduce the pain and irritation of acute œsophagitis. When it occurs in connection with irritant poisons, after the appropriate treatment for the particular poison has been adopted, some sedative treatment will almost invariably be required for the relief of pain, while the diet must be so modified as to supply the greatest amount of nutrition with a minimum of irritation during the act of deglutition. This last consideration will entail the use of liquid food of nourishing character. The principal article of diet will be milk, and this may sometimes

with advantage be thickened, either with corn-flour, or with gruel, so as to introduce a sufficiency of carbohydrates. In very severe œsophagitis, however, the strength of the patient must be maintained by nutrient enemata, since the act of swallowing is attended with intense agony.

For the relief of pain, few drugs can compare with opium, and if swallowing is possible, this may be given repeatedly in small doses by the mouth ; but in cases of greater severity more relief may be afforded by the hypodermatic injection of morphine. Whichever way the drug is administered, it is desirable that the dose should be comparatively small, and that it should be given at frequent short intervals, since it is the prolonged anodyne effect that is desired rather than the narcotic. Care should be taken, however, to discontinue administering this remedy when it is but little required ; the frequency of administration and the dose should both be reduced as the inflammation of the œsophagus subsides. In mild cases which are not attended with much destruction of tissue, benefit may result from the employment of cocaine. Cocaine may be used for this condition in a variety of ways : a cocaine lozenge containing a twelfth of a grain of cocaine hydrochlorate may be employed, or the drug may be given in the form of a pastille, containing either one-tenth of a grain of the hydrochlorate when given alone, or one-fifteenth of a grain with one-thirtieth of a grain of morphine. These may be dissolved slowly in the mouth, and the dose may be repeated with any return of pain. The British pharmacopœial solution, prepared for hypodermatic injection, may also be given by the mouth in doses of from 2 to 5 minims, when the local action is desired. The use of cocaine is sometimes facilitated by its administration with iced water, which is in itself a local anæsthetic. The British pharmacopœial lozenge contains extract of *krameria* in addition to cocaine hydrochlorate ; hence, although it is serviceable in œsophagitis which results from inflammation about the pharynx due to tonsillitis or other acute ailment, it is not advisable to employ this lozenge when the disease is dependent upon irritant poisons, or upon mechanical injury.

It has already been indicated that the administration of any drug by the mouth must be reserved for cases in which there is no very great local damage, for when the condition is the result of irritant poisoning, it is essential to give the œsophagus as little work as possible, and to administer both nutriment and drugs by enemata. In

milder forms of œsophagitis, especially when associated with gastritis, the irritation may be allayed by the employment of one or other of the insoluble preparations of bismuth. The subcarbonate, the oxide, or the salicylate will occasionally afford a protective covering to the inflamed surface, but, on account of its occasional acidity, the subnitrate is not generally employed for this purpose.

Spasm of the Œsophagus. Spasm of the œsophagus is marked by difficulty of swallowing, accompanied by pain ; as a rule these symptoms arise only during attempts to swallow, the intervals between the acts of deglutition being ordinarily free from pain. This affection, which is sometimes termed *œsophagismus*, may result from a variety of conditions. It is perhaps most frequently seen in connection with hysteria, when the spasm may occur as food is passing down the œsophagus, while at other times nervous excitement may produce a sensation of constriction, causing the well-known *globus hystericus*. Less commonly the symptom may arise from errors in diet. Individuals who get into the habit of rapid eating and of attempting to swallow food which has been imperfectly masticated, as well as those who are addicted to the use of drinks which are either too hot or too cold, may suffer from this condition. It may also occur occasionally in connection with gout or with rheumatism. In every case it is essential to form an accurate estimate of the probable cause, since, although this symptom is one which creates discomfort rather than danger, it may produce great distress if the exciting cause is overlooked. It must not be forgotten that the nervous form of spasmodic stricture of the œsophagus may occur among men, as well as among women, and that it may arise in the former when a nervous temperament has been increased by occupation or by alcoholic habits.

The treatment of nervous types of œsophagismus will often demand the employment of many remedies, and in the selection of a drug due care must be taken to avoid creating the drug habit. Thus, although it is fairly easy to allay œsophagismus with cocaine, or with morphine, it is generally advisable to postpone employing these remedies as far as possible in neurotic cases, or at least to conceal from the patient the nature of the remedy administered. The preparations of valerian and asafoetida are perhaps those which give the best results, and these should be employed in full pharmacopœial dose and in a liquid form. The efficacy may sometimes be increased by the simultaneous employment of ammonium bromide,

which is especially serviceable in treating neurotic men who are troubled by business worry. Ammonium bromide may also be given in conjunction with camphor, a drug which is also particularly valuable for those suffering from mental distress and depression. The same class of patients will frequently derive benefit from the employment of zinc compounds, in tonic doses ; thus the sulphate or the acetate may be given in doses of from 1 to 2 grains, or the oxide in doses of from 3 to 10 grains. The last is most serviceable when there are dyspeptic symptoms in addition to the œsophagismus. In inveterate cases, relief is sometimes afforded by the employment of musk, which can be given in doses of from 5 to 10 grains, either as a pill or as an emulsion. In the *United States Pharmacopœia* there is a tincture of musk which is administered in doses of from 1 to 2 fluidrachms. It may be doubted whether musk has any direct value in controlling spasmodic stricture of the œsophagus, but the penetrating odor and the high price are important factors in dealing with neuroses.

In less severe cases, which may resist the action of the simpler antispasmodics, satisfactory results may sometimes be obtained with different preparations of belladonna. When there is a marked neurotic tendency it is rarely necessary to modify the diet materially, although a concession will sometimes have to be made in favor of liquid diet. When dependent upon gout and dyspepsia, it is important, however, to avoid articles which would increase either of these conditions. It is also desirable, in such cases, to encourage slow mastication when solid food can be taken, or to render the diet as nutritious as possible when a liquid dietary has to be followed. In exceptional cases the feeding will be best effected by means of a flexible œsophageal tube passed into the stomach.

When associated with symptoms of gout or dyspepsia it will also be necessary to employ remedies to counteract the exciting cause. Antacids, such as sodium bicarbonate, or preparations of bismuth, will often be of service, while the administration of saline purgatives will further tend to allay the nervous spasm. When the spasmodic stricture persists in spite of these remedies, it may be advisable to employ the œsophageal bougie ; but, before using this, great care must be taken to eliminate other and more serious causes of œsophagismus. When satisfied, however, that the condition has arisen fairly suddenly, and that it is not dependent upon pressure slowly exerted by an aneurism, it will be advisable to use the

œsophageal bougie, and when much spasm is excited by attempts to pass the bougie, its introduction may be facilitated by the preliminary use of cocaine. The bougie should be used daily, until the patient is convinced that there is no organic obstruction to the passages of food from the mouth to the stomach.

Organic Stricture, or Chronic Obstruction of the Œsophagus.

Cases of organic stricture of the œsophagus are marked by continuous difficulty in deglutition, which contrasts with the occasional spasm of œsophagismus. The difficulty of deglutition may be felt almost immediately after the food has left the mouth, while sometimes, when the obstruction is seated in the lower part of the œsophagus, the discomfort may be experienced after a somewhat prolonged interval, and it may be associated with regurgitation of food, scarcely altered in character. The difficulty of deglutition sometimes occurs only when solids are being taken, but I have on several occasions seen this symptom, in connection with aneurism, giving rise to discomfort both with solids and with liquids. With liquids the difficulty usually arises when large draughts of fluid are swallowed quickly and thoughtlessly. One of my patients, who had aneurism of the transverse part of the aorta, suffered greatly from spasmodic pain on deglutition, and he had learned from experience that solids would give him less trouble than liquids. The latter he was only able to take in frequently repeated sips.

The causes of organic stricture are very numerous. Narrowing of the passage may result from pressure from without, or from some cause of obstruction within the œsophagus. Among the conditions which may give rise to stricture, without any necessary alteration in the walls of the œsophagus, may be mentioned the pressure exerted by various tumors, such as aneurism, either of the transverse part of the aorta, or of the carotid or subclavian in the neck. The pressure of enlarged glands in the neck whether these are of tubercular character or not, may occasionally give rise to this symptom. More commonly, however, it arises when the mediastinal or bronchial glands are greatly enlarged and perhaps suppurating. Another gland which sometimes may produce this symptom is the thyroid. Frequently when the thyroid is highly placed in the neck, considerable enlargement may occur without causing stricture; while if the thyroid is somewhat low, so that some portion of it lies behind the sternum or the sternoclavicular joint, even a moderate degree of enlargement may suffice to cause difficulty of swallowing. This is

more particularly likely to occur when the enlargement affects the isthmus. A case of this nature occurred in my practice some years ago, where the pressure of the thyroid not only caused dysphagia, but led to œdema of the upper extremities. The development of bony tumors, or exostoses, pressing the outside of the œsophagus, may also produce this symptom.

Of the causes of obstruction arising within the œsophagus the most serious are those due to the development of morbid growths. These may be of malignant nature and may arise from the mucous lining of the œsophagus, or, more rarely, they may consist of polypoid formations which obstruct the channel. Less serious in nature are organic constrictions from the contraction of ulcerations of the mucous surface. These cicatrices may be due to syphilitic affections, or they may result from some irritation which in its acute stage produced œsophagismus.

The treatment of stricture must be based entirely upon the estimate formed of the cause, and it is necessary to be extremely careful in seeking for other symptoms of aneurism before interfering actively. When the symptom forms part of a clinical picture of aneurism of the aorta, the treatment must be directed to the aneurism, and occasionally considerable improvement may result from large doses of potassium iodide. This drug appears, to some extent, to influence the size of the aneurism, partly by its effect on the walls, partly by reducing the force of contraction of the ventricle; and although it is undoubtedly of the greatest value when a history of syphilis can be obtained, yet when the symptom appears to result from enlargements of the thyroid or other glands, potassium iodide may still be of service, although sooner or later the possibility of surgical interference will probably have to be considered. If there is reason to believe that the stricture arises from alterations in the walls of the œsophagus, it will be necessary to examine the food after regurgitation in order to detect any indications of the presence of malignant growth. These may sometimes be found in the form of small portions of malignant tissue, but more often the early and rapid recurrence of hemorrhage will tend to favor a diagnosis of malignant disease. The development of cachexia is of very little diagnostic value in these cases, since marked cachexia always results from interference with nutrition, even in non-malignant cases. A family history of malignant disease affords some presumption against taking a favorable view of the case.

When it is considered that the stricture is either of cicatricial or non-malignant origin, the bougie should be passed, partly in order to ascertain the site of the obstruction, and partly to learn the extent of the narrowing of the canal. Commonly the obstruction occurs in the lower third of the œsophagus, and is associated with considerable dilatation above the point of obstruction. This dilatation allows the retention of food for half an hour or more after it has left the mouth, before it is regurgitated. In dealing with non-malignant and cicatricial cases, the bougie may be employed fairly frequently, with the view of dilating the site of obstruction. It is sometimes found that the nutrition can be maintained satisfactorily by feeding the patient with liquid food through a soft, flexible tube passed through the nose and into the œsophagus. In extreme cases the tube may be left *in situ* for weeks, or even for months, being merely removed occasionally for cleansing. It is often found that fairly large quantities of nourishment may thus be administered with comparative comfort, even though any attempts to swallow may be immediately followed by spasm and by subsequent regurgitation.

In cicatricial cases, where there is reason to believe that the condition is dependent upon syphilis, potassium iodide should be used in massive doses, which are less liable, perhaps, to produce symptoms of iodism. When it appears evident that we are dealing with a malignant stricture, remedies for the relief of pain and for the maintenance of the general health must be employed. For the former, morphine is indicated, and may be administered subcutaneously when the pain occurs independently of deglutition, while, on the other hand, the pain which is associated with deglutition may sometimes be controlled by the frequent employment of moderate doses of cocaine, or of opium in the form of a pill. Yeo recommends that these drugs should be given either with creosote, or with thymol, and that a quarter of a grain of extract of opium, or of cocaine hydrochlorate, should be administered with a quarter of a grain of creosote, or half a grain of thymol, made into pill mass with powdered soap; he says that in this form the pill will dissolve in the œsophagus, especially if given with a teaspoonful of iced water.

The administration of arsenic will often afford considerable relief, and it appears not only to cause improvement of the general health, but to some extent to deaden the sensibility of the site of obstruction. Certainly, during its employment the capability of swallowing is often increased, while the appetite improves. To produce this local

and general action, arsenic is best prescribed in solution, and in general the liquor potassii arsenitis of the *Pharmacopœia* is to be preferred to the solution of arsenous acid, since the hydrochloric acid contained in the latter, although small in quantity, may excite pain. When employing arsenic in these cases it is well to give small repeated doses rather than to administer it twice or thrice a day after food, since the local action may perhaps be retarded or diminished when it is given only with food.

Reference has already been made to the need of careful attention to diet. It is obvious that in cases of organic stricture, especially in those of a malignant type, the diet must be in liquid form. Even with milk or beef tea it is better to give only a few ounces at a time, and to give these frequently rather than to employ larger quantities, since efforts at deglutition are so extremely liable to be interrupted by spasm. I have already mentioned this difficulty in connection with a case of aortic aneurism; the patient in question was able to take a fairly large amount of liquid daily, but any forgetfulness involving an attempt to swallow a full mouthful of liquid was sure to be interrupted by spasm and followed by pain. So long as the constriction is pervious, it is well to trust almost entirely to feeding by the mouth. When this gives rise to great difficulty, however, the system of tubage may be followed, so long as a short, flexible india-rubber tube can be passed beyond the stricture. Symonds recommends that a funnel-shaped tube should be connected with a strong silk thread, which is brought through the mouth, or through the nose, and fixed to the cheek with a piece of strapping. This silk cord not only prevents the funnel-shaped tube from passing through the stricture, but also permits of its ready removal for cleansing. The advantage of this funnel-shaped tube is that liquid nourishment is naturally guided to the small opening through the stricture, and Symonds has found that under this treatment further operative measures may be delayed.

When, however, it is impossible to pass one of these soft tubes through the stricture, the choice of treatment lies between the frequent employment of nutrient enemata and the performance of gastrostomy. The latter, notwithstanding the serious nature of the operation, affords a better prospect of prolonging life, since, although it is possible by nutrient enemata to maintain strength for a time after feeding by the mouth has become impossible, yet it is generally found that sooner or later the rectum rebels, and, even with the utmost care, nutrient enemata are apt to be returned.

It is not necessary, in a book dealing purely with medical treatment, to describe in detail the operation of gastrostomy. It will suffice to say that it is better to perform this operation comparatively early than to postpone it until by the continued obstruction to deglutition the patient is so far weakened that he possesses but little recuperative power. This operation, however, is naturally only a palliative. It permits of the introduction of food into the stomach, and in some instances it prolongs life ; but as the original site of disease is not dealt with, the end must necessarily follow at no distant date from an extension of the growth.

When it has been decided to employ nutrient enemata, it must be remembered that the rectum, although possessing the power of absorption, does not possess the power of digestion, and that therefore materials introduced must be prepared so as to permit of ready absorption. This is ordinarily effected by peptonizing the food which is used in this way. There appears to be no doubt that although liquid may be absorbed, the nutritious elements of the food, unless specially prepared, do not readily pass through the mucous membrane.

Nutrient enemata will be so frequently mentioned in the ensuing pages that this forms a convenient opportunity for describing at some length their preparation and administration. In the first place, before giving the nutrient enema, it is advisable to wash out the rectum thoroughly with warm water. The next consideration is the amount which may be judiciously given. This should always be relatively small, since otherwise, by distending the rectum, reflex contraction will be excited, and the enema will be returned. It has been found that only from four to six ounces of fluid can be introduced with reasonable probability of retention. When, however, the larger amount is speedily returned, the irritability of the rectum may be diminished by giving a small quantity of cocaine, or of laudanum, mixed with the food. The amount administered on each occasion has generally to be gradually reduced, since although at the commencement of the treatment six ounces or even more may be retained, after a few days this quantity is rejected, owing to the irritability excited by the frequent treatment. The material intended for nourishment should be slightly warmed before administration, and this demands great care, since if the temperature is raised too high, the albuminoids may be coagulated, or the process of peptonizing may be checked ; while, on the other hand, if the enema is

given too cold, it will produce some degree of discomfort and shock, which will favor its rejection. The most convenient way, perhaps, for preparing the material intended for administration is to heat it in a water-bath, or a *bain marie*, to a little above the temperature of the body, and to employ a thermometer to avoid over-heating. It has been suggested that a small proportion of acid should be added to the enema with the view of favoring osmosis, this curious proposal being based upon the alkaline nature of the rectal secretions. The addition of acid does not appear to improve matters, nor to be at all necessary, and it has the very obvious disadvantage of favoring irritation of the mucous membrane. Even when only a very small proportion of acid has been used, the enema, as a rule, is less able to be tolerated than in the absence of acid.

Although water is fairly readily absorbed from the rectum, it is always advisable to attempt to satisfy the craving for liquids by administering water by the mouth, since the quantity which can be introduced into the system by the rectum is very limited. It is, in general, unadvisable to repeat rectal injections more frequently than once in six hours or so ; and since this implies that at the best only twenty-four ounces can be given daily in this way, it is obvious that this is wholly insufficient for the liquid needs of the system. Hence it is desirable to favor the introduction of liquid when there is complaint of thirst by allowing the patient to suck ice, or to sip iced drinks. Even when the obstruction in the œsophagus will not permit the introduction of a tube, iced water appears to be absorbed to a great extent, though it is doubtful whether it is absorbed from the dilated pouch-like walls of the œsophagus, or whether a small quantity finds its way into the stomach.

The administration of a nutrient enema should be made very gently and very slowly, since reflex spasm is thus less likely to be excited. Rectal injections are perhaps best effected by a long, soft, flexible tube, the extremity of which should, if possible, reach the sigmoid flexure. By injecting the enema into the upper part of the rectum the liability to return is greatly diminished, and the probability of absorption is therefore increased. The fluid may be introduced either by gentle pressure applied to an ordinary soft globular syringe, or sometimes a glass funnel may be attached to the end of the tube, and by its elevation the fluid may be allowed to gravitate into the rectum. This method is extremely slow and tedious, and in general the hand syringe is preferred, provided that the nurse

can be induced to use it sufficiently gently and sufficiently slowly. With all precautions, however, it must be admitted that the time during which life may be prolonged by nutrient enemata is very limited. Sometimes the rectum becomes irritable after a few days, though in exceptional cases the treatment may be continued for two or three weeks or even more.

The materials which can be given in nutrient enemata form a very limited test. The foremost place must be assigned to milk, which is readily peptonized, and since it is essential that the enema should contain the greatest amount of nourishment in the smallest compass, eggs are frequently added to milk, and peptonized with it. Some practitioners are in favor of employing both the white and the yolk, beating up the eggs with the milk before adding the peptonizing powder. As it seems somewhat doubtful, however, whether the white of egg is absorbed to any great extent, it is, in my opinion, better to employ only the yolk of the egg, since it is most desirable that no insoluble material should be introduced with the enema, for if not absorbed, its presence in the rectum is liable to provoke irritation.

Occasionally, it is found that egg and milk administered in this way are somewhat too limited in character, and are therefore rather readily rejected. Under such circumstances, it is advisable to thicken the milk by the addition of gruel. Milk gruel is sometimes retained better without eggs, but even in this case the use of peptonizing powder is still necessary. When eggs are employed, absorption is said to be promoted by the addition of fifteen grains of sodium chloride to each egg. Some practitioners are in favor of employing beef tea, which can be given with the peptonized milk, or administered alone after artificial digestion. There are some extracts of meat which can be substituted for beef tea if desired, but in general it is well to taste these and to refrain from using any which are strongly flavored.

When there is considerable prostration, stimulants may be added to the nutrient enemata, but the amount must be relatively small, only a quarter of an ounce of whiskey or brandy being added to each dose. If these proportions are exceeded the prospect of rejection is increased. Dr. A. H. Smith has recommended the employment of defibrinated blood (Foster's *Practical Therapeutics*, vol. i. p. 380), and the method is described as follows :

The blood is defibrinated by whipping with twigs as it flows from

the slaughtered animals. It is injected usually twice a day, in severe cases every two or three hours, in quantity from three to six ounces, warmed to the rectal temperature. It is apt to cause constipation, the stools are rendered offensive, and the rectum is coated with an ill-smelling material, but these disadvantages may be easily removed by the occasional use of a cleansing injection of warm water.

Nutrient enemata, as above described, may be of very considerable service when it is desired to afford rest to the stomach, and will thus be invaluable in many cases of acute gastritis, or of gastric ulcer, especially when the latter condition is associated with much recent hemorrhage. They are of service in the treatment of malignant diseases of the œsophagus as a last resource, or while arranging for the performance of gastrostomy, but their value is greatly discounted by the short period during which they can be used. Nutrient enemata serve to tide over a difficulty, but they do not serve to prolong life indefinitely when other means of supplying nutrition fail.

Vomiting. The conditions under which vomiting may arise are extremely numerous and are dependent upon a great variety of causes. Frequently, however, the symptom is so prominent and so urgent that it appears to claim separate treatment. In reality the conditions may be grouped distinctly into three classes: First, those in which the symptom arises as the result of some disorder of the stomach or of direct interference with its functions. This form is perhaps appropriately to be termed gastric vomiting, or vomiting of gastric origin. Second, vomiting due to irritation of the vomiting centre within the medulla, or of some part of the central nervous system. This form may conveniently be termed central vomiting. Third, the comparatively large group in which the symptom is purely reflex, from irritation of some portion of the body which is organically connected with the medulla and generally with some portion of the pneumogastric. This may conveniently be termed reflex vomiting. The term "reflex vomiting" is, in general, used only as an indication that the source of irritation is reflected from some remote organ, and is open to the objection that gastric vomiting is essentially a reflex act. Although not scientifically accurate, however, the term is one which is found extremely convenient in practice.

The three forms of vomiting are frequently mentioned incident-

ally in these pages in connection with the various diseases of which vomiting forms a symptom, but since it must be dealt with in different ways according to the cause, it may be useful briefly to summarize the causes and the indications for treatment under different circumstances.

It is obvious that the ordinary treatment of the more common forms of vomiting by means of gastric sedatives must be useless when the act results from central irritation or from reflex causes. With regard to gastric vomiting, such as may be met with in connection with dyspepsia, or with severe gastritis, or with various obstructive diseases of the stomach, the indications are in all cases to remove the cause, if possible; for dyspepsia and gastritis, to ascertain the error of habit leading to these conditions, and to allay irritation either by the frequent use of hydrocyanic acid or of bismuth, or by the occasional employment of alkaline remedies; in more severe cases, to refrain from the administration of any food or drug by the mouth, and to feed with nutrient enemata, as, for example, in the treatment of gastric ulcer, especially after severe hæmatemesis. During such treatment thirst may be allayed by allowing small pieces of ice to be sucked frequently, and the sedative influence of the cold liquid is also of considerable service.

On the other hand, when vomiting is due to chronic dilatation of the stomach, whether this results from atony of the walls or from obstruction at the pyloric end due to ulceration, possibly of malignant character, it will be necessary to administer concentrated liquid nourishment and perhaps periodically to relieve over-distention of the stomach by the œsophageal tube. In malignant cases the question of operation must sooner or later be considered with the view of affording nourishment or of relieving obstruction, by forming a new opening between the stomach and some convenient portion of the intestine.

When vomiting from dilatation or obstruction is associated with the presence of *sarcinæ ventriculi*, the œsophageal tube should be used, and in addition the stomach should be periodically washed out with a diluted solution of sulphurous acid, or of potassium permanganate, or carbolic acid.

The vomiting of central origin is to be seen under great diversity of conditions; thus, for example, it may arise in connection with different forms of meningitis, or it may ensue after irritation of some portion of the brain during the formation of cerebral or cere-

bellar abscesses. It may also occur in connection with cerebral injuries, as with concussion or with compression, especially if the latter is associated with meningeal irritation. The mere mention of these different conditions sufficiently indicates the hopelessness of dealing with the symptom by means of gastric sedatives, or indeed by any remedies other than those capable of influencing the central irritation.

With many forms of vomiting, however, of central origin the irritation is supplied by some toxic agent circulating through the brain, as, for instance, in the vomiting associated with uræmia, with acute yellow atrophy of the liver, with Addison's disease, ague, and other forms of malarial fever. These necessarily must be dealt with according to the cause: in uræmia, by means of purgatives, diaphoretics, and perhaps by the use of vapor baths or the wet pack; in ague and malarial fever, by iced drinks and by quinine, while in Addison's disease and in acute yellow atrophy very little treatment is likely to have any beneficial action.

Of the reflex forms of vomiting, the different kinds of colic perhaps deserve first place, as, for example, biliary, renal, or intestinal colic, but in addition it is necessary to mention the vomiting of pregnancy, the vomiting of pelvic peritonitis, and of perforation of the stomach. Sickness also occurs in connection with whooping-cough, with ulcerative endocarditis, and with hepatic abscesses. The treatment of several of these conditions has already been fully dealt with, while the others will be mentioned in the ensuing pages.

The vomiting of pregnancy is frequently so troublesome that it deserves more detailed consideration here. It commonly occurs during the morning up to the third month of pregnancy. When it does not appear to interfere with the general nutrition it is well to avoid active treatment, though it is at all times important to encourage daily action of the intestine by means of some mild laxative, as, for example, by castor oil, by small doses of cascara sagrada, and in addition by the frequent use of fresh fruit and green vegetables. Occasionally it is found that some advantage results from remaining in the horizontal posture for a few hours after breakfast, or if this is found inconvenient, a cup of milk on first waking sometimes appears to diminish the frequency of this symptom.

The tendency to sickness may occasionally be checked by assuming the recumbent posture on the first warning indications, and frequently, with the first onset of the symptom, comfort may be

promoted by stimulating the circulation in the hands and feet, which are generally found to be cold and anæmic.

Although it cannot be defended upon scientific grounds, bismuth often appears to be beneficial, but in this condition it is better to employ the soluble form, the liquor bismuthi et ammonii citras, than the subcarbonate or subnitrate. Diluted hydrocyanic acid may sometimes be added to this mixture, and occasionally small doses of morphine are also of service. Very many other drugs have been used with varying success, as, for example, liquor potassii arsenitis, ipecacuanha wine, tincture of iodine, potassium bromide, or cocaine. Acetanilid and phenazone have also been employed, but they do not appear to be of any material service, nor have any very good results followed the employment of cerium oxalate, which at one time was recommended for the treatment of the vomiting of pregnancy.

In very severe cases it is advisable to keep the patient in the recumbent posture for the whole or for the greater part of the day; but if, in spite of this and of other methods of treatment, the symptom seriously interferes with the nutrition, the desirability of inducing labor must be considered. This frequently causes so much disappointment that the operation is delayed as long as possible, and occasionally it is found that the use of sedative remedies, such as morphine, especially if employed as a suppository, may enable the patient to tide over the time of greatest sickness.

It should not be forgotten that this symptom frequently ceases abruptly as pregnancy advances, and doubtless this fact has led to many exaggerated statements concerning the value of various remedies.

Seasickness. Seasickness is another form of vomiting which stands alone, both with regard to etiology, and, to a great extent, with regard to treatment. The conditions under which it arises are too familiar to need description, although it is often interesting to endeavor to estimate the precise part played by movements, by sights, sounds, and smells, or by other nervous influences. The curious exemption of some individuals and the hopelessness of any form of treatment in others are familiar, though puzzling, features of this condition. There is, however, no doubt that, to some extent, even with those liable to seasickness, much benefit may result from alteration of habits or from the adoption of some form of medicinal treatment. Those who have previously suffered should adopt a light and unstimulating diet for a few days before undertaking a

voyage, and usually they derive some benefit from the use of a mild aperient a day or two before starting. It is a mistake to endeavor to check a tendency to seasickness, either by taking a heavy meal, or by entirely abstaining from food for some hours before going on board, since both of these procedures are likely to be followed by gastric discomfort, which readily paves the way for further distress. Most sufferers find that if the voyage is one of only a few hours it is advisable to remain on deck, and, if possible, in an almost recumbent posture, provided that these conditions can be carried out without undue chill of the hands or feet. Although coldness of the extremities frequently forms a premonitory symptom of seasickness, there is extreme probability that it may occasionally act as an additional exciting cause, and undoubtedly, by the discomfort it produces, it destroys any hope or self-confidence with which the voyage may have been undertaken. For these reasons, therefore, it is advisable to select a sheltered nook and to have plenty of rugs or wraps. Brandy may be taken to counteract chill or to allay nervousness, and soda water is frequently employed to dilute the brandy, though it is often useful by itself as a gastric sedative.

Many people are content with these precautions, and find that if they can remain quietly reading, or, still better, if they can doze or sleep, the voyage may be taken with comparative comfort. Many, however, prefer to use some form of medicinal agent to counteract the tendency to seasickness. The remedies which have been most highly recommended are those possessing sedative action, and of these ammonium bromide is perhaps in best repute, although it must be admitted that it is by no means invariably successful. It is of greatest service when used for several days before the journey. Twenty-grain doses may be taken, twice or three times a day, for a week or so before the journey, and a larger dose may be taken immediately before going on board, or, in the case of a night passage, it may be taken immediately before retiring to the berth. Some prefer taking ammonium bromide or potassium bromide in simple solution, but the saline taste is very disagreeable, while, on the other hand, the addition of syrup of orange or of any other flavoring material is perhaps still more objectionable. The larger dose of bromide is perhaps most conveniently taken dissolved in soda water, and the sedative action appears to be further favored if this can be iced.

According to Martindale (*Extra British Pharmacopœia*, 1898, p.

125), chlorobrom, which is often used for seasickness, is a mixture which contains 30 grains both of chloralamide and of potassium bromide in an ounce; the mixture is flavored with liquorice, and the dose is from $\frac{1}{2}$ to 1 ounce. The same drugs in 15-grain doses have also been recommended, flavored with tincture of orange and chloroform water, but in general it is better to avoid flavoring agents, particularly those of a volatile character.

When the journey is undertaken at night, moderate doses of morphine, or of chloral hydrate, are sometimes of use in favoring sleep, and when the voyage extends over some days the former is particularly valuable in giving relief from the exhaustion due to seasickness. For short journeys, however, morphine is undesirable, since, with some individuals, after the sedative action has passed off, considerable nausea may ensue. Moreover, it is undesirable to place morphine in the hands of those likely to suffer from seasickness, since their dread of the sickness may induce them to employ repeated doses, which might be dangerous if not followed by vomiting.

It is often urged, in favor of the foregoing remedies, that, even though they may fail to prevent vomiting, they diminish the risks of continued retching and nausea, and the same advantages are sometimes claimed for the use of a drop or two of chloroform or of solution of cocaine on sugar. Dr. A. Morel-Lavallée recommends the following mixture to control the vomiting of seasickness :

R.—Menthol	.	.	.	.	.	.	.	gr. jss.
Cocaine hydrochlorate	.	.	.	.	.	.	.	gr. iij.
Alcohol	.	.	.	.	.	.	.	$\bar{3}$ ij.
Simple syrup	.	.	.	.	.	.	.	$\bar{3}$ j.

One teaspoonful every half-hour.

In extremely neurotic individuals the administration of chloroform during the whole duration of a voyage has occasionally been employed. This treatment, however, is not to be recommended, since the conditions may render the administration of an anæsthetic somewhat difficult, and prolonged anæsthesia is in itself often followed by much discomfort. Less open to question and more simple of performance is the use of firm constriction around the abdomen, some sufferers maintaining that a broad belt tightly fastened around the waist diminishes the tendency to sickness.

Iced champagne is sometimes used to counteract the weakness and depression which ensue after an attack, but iced soda water and

brandy are often equally efficacious, and are perhaps more generally available. Among other remedies that have been advocated it may be well to mention nitroglycerin and amyl nitrite. The former may be administered in tablets of $\frac{1}{200}$ gr. each, but both appear to be more rapid in action and more efficacious if employed in solution in suitable dose.

It is unnecessary to enumerate all the remedies that have, at various times, been vaunted as specifics for this condition, since experience has shown that the term "specific" is not one which can be applied to the treatment of seasickness. When, during long voyages, nausea and sickness resist other forms of treatment, the employment of minim doses of tincture of iodine may be tried, and cerium oxalate, which was once largely used in the treatment of the vomiting of pregnancy, may also be of some service.

It is very rare for seasickness to call for any after-treatment, since, on reaching land, many of those who have suffered acutely are very soon able to take warm tea or coffee, or even a more substantial meal, and they regain comfort as the freedom of circulation again becomes established.

CHAPTER VII.

DIGESTION—*Continued.*

Dyspepsia, Acute and Chronic—Acute Gastritis—Chronic Gastritis—Lavage—
Fermentation—Pain—Alkalies—Acids—Pepsin.

Dyspepsia. Although, in the ensuing pages, the more definite causes of dyspepsia will be considered in detail, together with the treatment appropriate to each condition, it will, however, be convenient to deal in general terms with this symptom here, as otherwise it would be difficult to avoid overlooking many of the commonest forms of dyspepsia in a work mainly arranged on a definite anatomical plan.

Dyspepsia may be due either to comparatively trifling errors or habits, or, on the other hand, it may be a symptom of a definite pathological change, such as the presence of gastric ulcer, either simple or malignant. Happily, very many of the cases of dyspepsia so frequently met with in practice are not caused by severe structural alterations. Perhaps the commonest cause of pain after food is imperfect mastication, which may be due either to excessive haste or to imperfectly working teeth. The habit of bolting partially masticated food is one into which many business people are likely to fall. The morning meal is frequently hurried, with the view of catching a train, while the midday meal is often curtailed, owing to the pressure of other engagements, and instead of adapting the amount taken to the time allowed, or instead of regulating the time so as to permit of satisfactorily masticating the food required, many business men are in the habit of hurrying through their meals with but little thought of the folly of leaving the stomach to cope with an unnecessary addition to its ordinary work.

Sometimes, however, the fault lies in the nature of the teeth, which may be deficient numerically, or may be so far decayed that they do not meet during the act of mastication ; or, even without decay, some of the molars may be so placed that they fail to offer a proper grinding surface to the food. It is therefore essential, at the commencement of the treatment of every case of dyspepsia, to in-

spect the teeth, and if they are at fault to see whether the aid of the dentist can supply the deficiency. Every practitioner has doubtless come across numerous cases where judicious dental assistance has sufficed to cure chronic dyspepsia.

Another frequent cause of dyspepsia lies in some error of diet, which may affect either the quantity, or the nature, or the frequency of the meals. With regard to the quantity of food, in general, undoubtedly many people eat too much for their requirements, while leading the comparatively sedentary life enforced by civilization. Alteration in the habits of the individual with regard to exercise may suffice to enable him to continue his ordinary routine of diet, but when the conditions of life prevent the devotion of much time to physical exercise, it is in general safe to advise some diminution in the quantity of food. With regard to the nature of the food, one of the most frequent causes of dyspepsia is the consumption of too large a supply of saccharine or of fatty matter. Very often, however, the error consists in the too frequent consumption of food, the individual overloading the stomach before the whole of the previous meal has been thoroughly digested. On the other hand, I have known many instances where the trouble resulted from an attempt to live on two meals a day, the patient taking an enormous breakfast before going to the city in the morning, and endeavoring to abstain from food of any kind until dinner in the evening. This attempt led, in one instance, to such heavy nitrogenous meals that albuminuria resulted, and was readily cured when once the cause of this symptom had been recognized.

Dyspepsia will often ensue when liquids are taken either in too great quantity, or at too high a temperature, or of an unduly irritating nature. It is, I think, scarcely sufficiently recognized that, so far as the digestive system is concerned, almost as much harm may result from the consumption of inordinate quantities of strong tea, as from the consumption of inordinate quantities of alcohol.

It is commonly thought that the harm which often follows the consumption of tea is due to the presence of an excess of tannic acid, and that if the tea is not allowed to stand too long this source of evil can be avoided. Although strong tea will undoubtedly disorder digestion and will also influence the circulation prejudicially, these evils may follow when weak tea or coffee is taken at a high temperature. Those who desire the stimulant effect of tea, and accord-

ingly drink it as hot as possible, are very prone to dyspeptic trouble. In the former case, the tannic acid undoubtedly disorders the digestive functions by reducing the amount of gastric juice secreted, and by favoring the coagulation of food, but when tea is too hot it serves as a direct irritant to the wall of the stomach, and causes over-secretion of mucus. Mere bulk of liquid will also give rise to dyspepsia, since the fluid not only serves to dilute the gastric juice, but, by the rapid distention of the stomach, appears also to inhibit its formation.

I have known a case of severe dyspepsia result from the foolish habit of emptying the coffee-pot at breakfast. The patient, an extremely abstemious young man, exhibited symptoms which might readily have been mistaken for the results of chronic alcoholism. The nausea, furred tongue, and morning sickness readily disappeared when he gave up the absurd practice of over-distending his stomach at one meal. Careful inquiry showed that he was not taking too great a bulk of liquid in the twenty-four hours, but that the error consisted merely in over-distention of the stomach at breakfast time.

It is scarcely necessary to lay stress upon the frequency with which dyspeptic symptoms result from alcoholic excesses, or to indicate the advisability of always making careful inquiry as to the habits of the patient, since a few words of advice may, if the advice is taken, suffice to remove the symptoms. Should the alcoholism be continued, it is likely to cause gastritis, either acute or chronic, which will demand further treatment. In this connection, it may be mentioned that dyspeptic symptoms are more prone to occur because the quantity of food consumed by a confirmed alcoholic is generally below the physiological needs; hence the alcohol is enabled to act more directly upon the gastric mucous membrane.

Severe dyspepsia may also originate in, or be increased by, excesses with tobacco, whether the excess consists in smoking strong tobacco or in smoking immediately before a meal. This question of excess may sometimes be inferred from the nature of the pulse, but it is one which is most difficult to determine, since habit plays so large a part.

In most of the forms of dyspepsia above mentioned, improvement will result from alteration of habit, but it may frequently be materially hastened by the use of various remedies; thus, when there is much pyrosis, considerable relief will follow from the employment of sodium bicarbonate. Many confirmed dyspeptics are in the habit

of taking sodium bicarbonate after their meals. The influence of this drug depends, to some extent, upon the dose which is taken ; ten grains of sodium bicarbonate, by neutralizing a certain amount of the gastric juice, may serve, in the long run, to make matters worse, instead of better, though it will perhaps give immediate relief from the sense of discomfort which may ensue shortly after food. If, on the other hand, the same amount is given with some bitter effusion, twenty minutes or half an hour before meals, it will promote the secretion of the gastric juice and will prevent the formation of butyric acid. The selection of a vegetable bitter is a matter of small importance. In hospital practice the infusion of quassia is largely given, but calumba is somewhat more pleasant and is perhaps more generally employed in private practice. The only reasons against its use in hospitals are, first, its relative cost, and, secondly, the difficulty of preparing the infusion of calumba without abstracting some of the starch, which might lead to decomposition of the mixture in hot weather.

Frequently in mild forms of dyspepsia benefit is obtained from the use of preparations of bismuth, together with hydrocyanic acid. These are best employed some two or three hours after food, when the stomach is comparatively empty. Occasionally, when the appetite is poor, improvement will follow the administration of preparations of iron, together with vegetable bitters. The solution of ferric chloride may be employed with infusion of calumba or of quassia, since these contain no tannin, and hence do not undergo discoloration on the addition of iron. It is often considered that vegetable infusions containing tannin are incompatible with iron, since they form an inky-looking mixture, but the physiological activity does not appear to be in any way altered by this change, although perhaps, from its repulsive appearance, a mixture of iron with infusion of cinchona, or infusion of gentian, is less likely to be taken readily. It is sometimes found that the actions of any of the above remedies are materially assisted by the occasional employment of saline purgatives, but greater benefit will often result from the use of calomel at bedtime, with a dose of black draught, or with one or other of the purgative mineral waters, on rising in the morning. These remedies will frequently remove the headache of dyspepsia, which is generally of a dull, heavy character, and in all probability they act mainly by the removal of various toxins, which may be formed and absorbed during prolonged constipation.

It is only in comparatively rare cases of simple dyspepsia that it is necessary to use pepsin to assist the digestion, though when the condition continues, in spite of alterations in errors of diet and habits of life, and in spite of the use of tonics, it may be desirable to employ this remedy. Generally, as has been said, it is necessary, in every case of dyspepsia, to insist upon reduction in the amount of food taken and to allow time for the digestion to be effected thoroughly. Very often when the digestive powers are weak it is advisable to recommend the consumption of less liquid. The action of the gastric juice is extremely likely to be reduced if quantities of liquid are taken with the meal, and, further, the difficulty is made greater by a larger amount of food being taken when the act of deglutition is assisted by copious draughts of liquid.

When there is very much trouble with flatulence, relief is often afforded from the use of charcoal, which should be given either as the powder in wafer paper, in doses of from 60 to 120 grains, or stirred up with water, or made into biscuits. The charcoal appears to absorb gases and also to influence chemical changes occurring in the stomach.

An increased amount of exercise will often be very beneficial. Many who are dyspeptic so long as they live in large towns and follow their ordinary occupation, will lose their troubles during a holiday in which exercise is taken, and the symptom will often be greatly reduced if arrangements can be made for some form of bodily exercise which does not involve complete interference with their ordinary work. Chronic dyspepsia is often beneficially treated by horse exercise, and if this is beyond the patient's means a bicycle ride will often form a good substitute.

There are many forms of chronic dyspepsia in which the symptom appears to result from the existence of some chronic malady or dyscrasia ; thus, in connection with chronic kidney disease, dyspepsia is a prominent symptom, and when it occurs late in the course of the disease it may even be an indication of uræmia. Although it is still advisable, under these circumstances, to use the remedies for simple dyspepsia, it will often be found that these are of little service unless the elimination of nitrogenous material is assisted, either by the frequent use of laxatives, or by the occasional employment of a vapor bath. This subject will, however, be found more fully dealt with in the chapters on kidney diseases. Dyspepsia also forms a prominent symptom in gout and in rheumatism, and the

primary disease has then to be dealt with simultaneously with the treatment of the symptom. With heart disease, with chronic lung disease, and with diseases of the liver which impede the portal circulation, dyspepsia may result from interference with the removal of blood from the veins of the stomach, or from deficient blood supply through the arteries. When dyspepsia occurs in connection with any of the above-named conditions, benefit will often follow the administration of mercurials and of saline purgatives, but simultaneous treatment of the primary disease is also essential.

Acute Gastritis. Acute gastritis, or acute gastric catarrh, is most likely to arise from severe irritation of the stomach, either by indigestible materials or by direct irritants, such as excesses of alcohol, or the accidental or intentional introduction of some other irritant poison. The first essential, therefore, in any case of acute gastritis is to endeavor to ascertain the cause, and if there is reason to believe that the cause remains within the stomach, it is necessary to effect its prompt removal. In many cases of acute gastritis vomiting has already formed one of the prominent symptoms before the patient has come under treatment, and therefore there is probably no further need to employ emetics or any other form of treatment to remove the source of irritation.

When, however, the patient is suffering from severe gastric pain, evidently due to an irritant retained within the stomach, it will be desirable to consider the best method for its speedy removal. This is perhaps most conveniently performed by introducing a long, soft, flexible tube and washing out the stomach by siphon action; the mode of performing *lavage*—that is, the rapid removal of the contents of the stomach and the irrigation of the mucous membrane with a bland fluid—will be more fully described under the heading of Chronic Gastritis (see p. 172). By successive washings the contents may be thus removed until the fluid which passes out is colorless and odorless. Should no long, flexible tube be available, it will be necessary to employ emetics, and it is desirable to select an emetic which acts promptly and produces little local irritation or subsequent depression. The choice usually rests between zinc sulphate and ammonium carbonate. The more homely emetics which are employed, such as mustard or salt and water, usually increase discomfort by their action on the inflamed surface. When employing zinc sulphate or ammonium carbonate, it is advisable to give somewhat large doses and to follow the administration with two or

more tumblerfuls of lukewarm water, until the act of vomiting is excited. The administration of apomorphine, either by the mouth or subcutaneously, is contraindicated on account of the depression which sometimes ensues, and also on account of the act of vomiting thus excited being occasionally repeated.

When, however, some considerable time has elapsed since the source of irritation has been taken, the use of an emetic is less imperative, and the removal from the stomach of any remnants of the irritant may be facilitated by the administration of a mild saline purgative.

In acute gastritis it is always necessary to employ measures calculated to subdue pain, which frequently persists even after vomiting has ceased. For the immediate relief of pain it may be desirable to employ external applications as well as internal remedies, but in severe cases it is essential to adopt measures for insuring rest, especially when vomiting is frequent. The patient should be kept in the recumbent posture, and his clothing should be loose and light. All sources of extraneous irritation should be removed, and in very severe cases it may be necessary to insist on absolute silence, and even on the mental quiet which ensues after the room has been darkened. The most serviceable external applications are those by which heat is applied over the epigastrium. A mustard plaster, with 1 part of mustard to 4 of flour or of linseed, may be placed upon the epigastrium, and retained there as long as possible. Sometimes these proportions are rather too strong, and preference has been expressed for milder applications. Certainly when mixed in the proportion of 1 to 10 the mustard plaster can be endured for a greater length of time, and its benefits are therefore more prolonged. A less severe treatment, and one which is perhaps more readily accepted by the patient, is the application of hot fomentations over the epigastrium, and their efficacy may be increased by sprinkling the surface of the flannel or spongiopiline with turpentine or oil of cajuput. Either of these will increase the sense of warmth, but from their volatile character they may give rise to nausea, and should then be discontinued. When vomiting persists in spite of these warm applications, it will be desirable to adopt other measures, the foremost being the application of cold. A fairly large india-rubber bag, filled with ice, may be applied over the epigastrium, and will sometimes afford relief in rebellious cases. Somewhat more manageable, if available, is the application of cold by

means of Leiter's tubes, which are to be preferred, as they are not so heavy, and therefore are more easily tolerated.

While these external applications are being employed, it is necessary also to administer remedies internally for the relief of pain. Moderate doses of opium generally give the best results, but they must be employed with caution, since they may promote constipation and subsequent headache. It has also been found that, although opium may relieve pain, if administered after vomiting has ceased, it occasionally appears to favor the frequency of vomiting, if given too early. In mild attacks the following draught frequently relieves headache and gastric discomfort :

R.—Potassii bromidi	gr. xv.
Spiritus chloroformi	℥xx.
Tincture gentianæ compositæ	℥x.
Tincture cardamomi compositæ	℥x.
Spiritus ammoniæ aromatici	℥x.
Syrupi	℥ss.
Aquæ menthæ piperitæ	q. s. ad ℥j.

Of other gastric sedatives the most important are the insoluble salts of bismuth and diluted hydrocyanic acid. These may be given in combination or alone; the salts of bismuth have the further advantage that they not only allay pain and irritation, but also act as direct antidotes to free acids. They are thus of peculiar value in cases of acute gastritis due to poisoning with mineral acids, but even when the disease is the result of excessive consumption of alcohol or of food, the salts of bismuth serve to neutralize the free acids produced by the decomposition or fermentation of food within the stomach.

The selection of the bismuth compound will, to a certain extent, depend on the stage of acute gastritis. In the early stages, when there is but little reason to suspect retention and decomposition of food, the subcarbonate or the oxide will probably be of the greatest service. The subnitrate is often employed at this time, but it must be borne in mind in administering the subnitrate that owing to its frequent acid reaction it may cause effervescence when given with any of the alkaline carbonates, which are often indicated in these cases. At a later stage, when fermentation is progressing, bismuth salicylate is frequently more serviceable than any of the above, since it decomposes within the stomach, and then affords both the sedative action of bismuth and the antiseptic action of salicylic acid.

When administering preparations of bismuth in acute gastritis, the efficacy is very greatly increased by giving them upon an empty stomach.

Although it is bad pharmacy to prescribe bismuth subnitrate with alkaline carbonates, these are often administered with citric acid, to obtain the sedative action of free carbonic acid. When employed in this way it is desirable to form an alkaline solution with sodium bicarbonate, and to mix finely powdered citric acid with this solution when it is about to be taken, so that the draught is swallowed during effervescence. The amounts of alkali and acid thus given should allow of an excess of free alkali after effervescence has ceased. Fifteen grains of powdered citric acid, dissolved in a tablespoonful of water, can be mixed with from 20 to 25 grains of sodium bicarbonate, dissolved in two tablespoonsfuls of water. The sedative action of this mixture may be increased by its association with diluted hydrocyanic acid, or with cherry-laurel water, and it is often found that, after the use of effervescing mixtures of this nature, copious eructations of gas will result, and their removal will be followed by considerable relief.

During the early stages of severe acute gastritis some degree of diarrhœa occasionally arises, and it is not advisable to endeavor to arrest this symptom unless it appears to be causing considerable weakness. The diarrhœa is commonly an indication of the association of enteritis, by which the elimination of irritants is favored, and it is therefore better to assist elimination by employing purgatives or laxatives instead of astringents. An ordinary saline purgative may be of value, or, when vomiting contraindicates the administration of a saline purgative in bulk, it will be better to use average doses of gray powder or of calomel. When, however, the diarrhœa is more persistent and troublesome, and when it produces much collapse, it should be arrested by the use of astringents or opiates, the best astringents for this purpose being those whose action is independent of the presence of tannic acid. The chalk mixture of the *United States Pharmacopœia*, or one other of the bismuth salts above mentioned, may be combined with small doses of opium.

The dietary of acute gastritis is naturally of great importance, both during the attack and during convalescence. At the onset, it is desirable to give the stomach as little as possible to do, and patients readily fall in with the suggestion of affording complete rest for the stomach by abstinence from food for twenty-four to

thirty-six hours, or even more. During this time thirst may be relieved by allowing small pieces of ice to be sucked repeatedly. When, however, there is complaint of weakness, the time of enforced abstinence may be prolonged by the judicious use of a few minims of tincture of opium, given at frequent short intervals.

When, nevertheless, the patient still feels faint, it may be necessary, during the first day or two, to administer nutrient enemata or nutrient suppositories. In acute gastritis, however, these are to be regarded merely as the means of satisfying the patient, while insuring rest for his stomach, and they need not therefore be employed frequently. The conditions under which acute gastritis arises will, however, afford some guidance as to the propriety of withholding food. When the attack occurs after indiscretions with alcohol or with food, the patient is, as a rule, the better for a day or two of starvation. On the other hand, when it is the result of irritant poisoning, nutrient enemata are more urgently called for, and it will then also be desirable to administer bland, unirritating food, so soon as it can be retained. For this purpose, although the idiosyncrasy of the patient has to be considered, milk may be given. It is sometimes best tolerated when given frequently in small quantities, and when given cold; milk that has been boiled and afterward allowed to cool, or milk to which ice has been added, will often assist in allaying pain and in checking the frequency of vomiting. The prolonged employment of milk may be facilitated if it is somewhat thickened either with arrowroot or with corn-flour, but in general it is better, if possible, to defer the use of carbohydrates until the acute stage of the disease shows signs of abatement, since carbohydrates, if not digested, are prone to undergo decomposition, and thus increase the discomfort.

The return to ordinary diet, after acute gastritis, must be effected very gradually; during convalescence the nourishing character of the diet is greatly increased by the addition of beef tea, or chicken broth, and later by that of fish and chicken, but it is important to caution the patient against the use of any form of alcohol, since its administration is always apt to be followed by pain and frequently by some return of acute symptoms.

All well-known indigestible articles should be carefully excluded from the dietary. The patient should avoid pastry, sugar, strong tea, or strong coffee, and both food and drink should, in general, be taken at a moderately low temperature. Any hot drink is likely to

provoke further discomfort. Convalescence is commonly attended by constipation, and mild purgatives will therefore be required, such as small doses of aloes, which may be administered as ordinary dinner-pills, or small doses of rhubarb, which when taken after meals act beneficially on the stomach, as well as on the intestine. Sometimes, if the former produces much rectal irritation, or if the employment of the latter is followed by any subsequent constipation, these remedies may give place to saline purgatives, such as magnesium sulphate, or sodium sulphate, or potassium and sodium tartrate. Preference is often expressed for purgative saline waters, such as Pullna water, or Hunyadi, or Apenta; these, like other salines, are most efficacious when taken in the early morning on first rising.

Chronic Gastritis. Chronic gastritis, or chronic gastric catarrh, arises under such a variety of conditions that routine treatment is impossible, for, as in so many diseases, it is absolutely necessary to ascertain the cause of the gastric catarrh, and in a large proportion it is only possible to treat the catarrh indirectly by dealing with its cause. Thus chronic gastritis may occur when the importance of an acute attack has been underrated and the conditions under which it has arisen have been ignorantly continued, such as excess of alcohol, or some error of diet. Chronic gastritis may also occur as a complication in the course of diseases of many of the viscera, more particularly when these diseases result in impeded circulation through the stomach. Thus, it may arise in connection with any form of heart disease, in which venous obstruction is a prominent symptom. It is unlikely, therefore, to be met with so long as compensation is perfect, but when the compensatory hypertrophy is failing, difficulty of respiration and cough are likely to be followed by indications of chronic gastric catarrh. Similarly with many chronic lung diseases, especially with emphysema and chronic bronchitis, gastritis may be noted when the right side of the heart becomes distended, and the circulation through the liver impeded.

Chronic diseases of the liver, which are associated with interference in the portal circulation, are also frequently marked by evidence of disturbed gastric functions. With all these conditions, although some of the local measures which will be mentioned below may be adopted, there is but little prospect of affording relief, unless it is possible to deal satisfactorily with the primary disease; in other words, treatment in which attention is concentrated upon

the stomach will be certain to fail, so long as the cause of the gastric disturbance is overlooked or is not satisfactorily dealt with. Chronic gastritis may also develop with severe anæmia, whether the anæmia forms a symptom of chlorosis, or results from some wasting disease, or whether it follows one or other of the acute specific fevers ; under these conditions again the chronic gastritis is only likely to yield when measures for the correction of anæmia are simultaneously adopted.

In connection with phthisis, chronic gastritis may either be the result of the frequent irritation of the stomach with expectoration that has been swallowed, or it may be the expression of debility, associated with the wasting progress of the disease ; hence it becomes important to ascertain, if possible, to which of these causes the condition is to be ascribed. When due to the former, a few words of advice and some of the simpler measures for the treatment of gastritis may serve to cure the trouble, but when it occurs as a consequence of the latter condition, it is far more difficult to deal with. In late stages of phthisis it may even be the result of the irritation produced by some of the remedies that are being employed in the treatment of the primary disease. The frequency of gastritis in connection with tuberculosis is considered more fully in another chapter, together with the desirability of changing the treatment whenever it appears to cause gastric irritation.

The occurrence of chronic gastritis, in connection with organic diseases of the stomach, must not be overlooked. It is frequently associated with ulceration of the stomach, whether the ulceration is due to malignant disease, or whether it is of the variety which has been termed simple or perforating ulcer. With the former it is only possible to adopt palliative measures for the relief of the more prominent symptoms, and the outlook is necessarily extremely gloomy. With chronic non-malignant gastric ulcer, however, the treatment, although still palliative, can be pursued more hopefully, though it has to be based upon the treatment of gastric ulcer, rather than upon that of chronic gastritis, and it will therefore be dealt with more appropriately under the heading of Gastric Ulcer.

Although it has been deemed necessary to indicate the very various conditions under which chronic gastritis may arise, the treatment of gastritis, as a separate affection, is comparatively simple when the cause has been ascertained. The first object is naturally to correct any errors of diet, or of habit, which may appear to be

responsible for the disordered functions of the stomach, while, if the gastritis is due to disease of some other important organ, or organs, as above enumerated, these special diseases must be treated at the same time that attention is being paid to the gastric functions.

Most commonly, chronic gastritis, as seen in hospital practice, is the result of excessive indulgence in alcohol, and it is, of course, often necessary to enforce abstinence. When satisfied that the gastric pain and the discomfort after food result from some such simple error, the management of the case presents few difficulties. Frequently, if patients will submit to it, lavage forms the best and quickest mode of treatment, since, when judiciously performed, it serves to remove the abundant tenacious mucus which is produced by the continued irritation of the mucous glands. This mucus seriously impedes the efficacy of most remedies, and even when the gastric juice is being secreted, apparently in sufficient quantity and of sufficiently active properties, digestion is notwithstanding retarded, so long as the stomach is clogged up with this viscid mucus.

The modern method of using lavage consists in the employment of a soft india-rubber tube, which should be a yard and a half long, or somewhat more, and the diameter of the lumen should be from one-third to two-fifths of an inch. Near to the end which is to be passed into the mouth, several lateral openings of various sizes should be made, care being taken in making these openings so as to avoid leaving any sharp edges or projections. A mark should be made on the tube, about twenty-four inches from the end which has been fenestrated, this mark indicating the average distance from the incisor teeth to the cardiac orifice of the stomach. Should it be found that this tube is not of sufficient length, additional tubing can be easily affixed with a short piece of glass tube. The glass tube and the new tubing should, however, be of the same or of greater internal diameter.

The introduction of the tube will be greatly facilitated by thoroughly moistening it with water or with very dilute glycerin. It is important not to employ oil, or other greasy material, to lubricate the end of the tube, as this will be likely to excite nausea and even vomiting. When the tube has been well moistened, the patient is instructed to breathe quietly, with the mouth wide open, and after ascertaining that respiration is being properly performed, the tube may be guided with the finger-tip to the posterior portion of the

pharynx, and the patient is then directed to swallow, the tube being gently pushed forward as the act of swallowing is being performed. In this way, with two or three efforts of deglutition, the fenestrated portion of the tube may be safely guided into the cardiac end of the stomach. A short period of pause is then allowed, to see that respiration is still being satisfactorily effected. During the introduction of the tube, while facilitating the onward movement, it is necessary to be extremely careful not to irritate the pharynx by undue haste. Although it is usually easy with a patient who is anæsthetized, or otherwise unconscious, to introduce the tube by external agencies, any hurry in endeavoring to force the tube onward while the patient is conscious, will probably be attended by vomiting and retching.

Nausea may occur as the end of the tube reaches the lower part of the œsophagus, or vomiting may follow the entrance of the tube into the stomach, and although part of the object of the tube is to cause removal of the contents of the stomach, it is very troublesome when vomiting occurs suddenly in this way, since the tube is almost certain to be ejected with the contents of the stomach. When, however, none of these accidents have arisen, the next step is to procure the removal of the contents of the stomach. Occasionally this may be effected by the conscious efforts of the patient. Slight pressure over the epigastrium, combined with deep inspiration, or with efforts to cough, so that the contents of the abdominal cavity are pressed upon, may effect speedy evacuation of the gastric contents through the tube. It is, however, perhaps more satisfactory to use the tube as a siphon, fluid being poured into the outer portion of the tube through a large glass funnel and the tube being then pinched between the fingers so soon as it appears that fluid occupies its whole length. The outer end is then quickly depressed below the level of the stomach, and when the constriction of the tube is removed, the contents speedily pour forth without any difficulty.

It has been recommended that lavage should be effected by an aspirating apparatus, such as the ordinary bulb syringe. The multiplication of apparatus is, however, an inconvenience, and it is, usually, wholly unnecessary. When the stomach appears to be cleared of its contents, the funnel is once more raised and filled with slightly warmed water, until about a pint has passed into the stomach, when the funnel is depressed as before and the fluid removed. This operation may be repeated several times, until the fluid which comes away is clear and almost odorless. The operation

may be rendered more efficient if the position of the patient is changed from time to time, or if the length of the tube is altered, so that the fluid reaches portions which were perhaps not previously thoroughly moistened. When this operation of lavage is frequently repeated, patients may prefer to swallow the warm water after the tube is already in position. There are no reasons against this proceeding, provided that warm water only is being used; but if the stomach is being washed out with some saline solution, it is better, as a rule, to introduce it through the tube, less nausea being thus caused.

Saline solutions are employed when there is evidence of much over-secretion of the mucous glands, since they effect detachment and removal of viscid mucus more readily than simple warm water. Sodium bicarbonate is often employed in this way in the proportion of from 2 to 4 grains to the ounce of warm water. Three or 4 grains of borax may be substituted, or a solution of common salt may be used when the greater part of the viscid mucus has been removed. As an antiseptic for washing out the stomach, Rosenheim employs salicylic acid in the following form :

R.—Acidi salicylici	.	.	.	.	.	.	.	gr. xvij.
Thymolis	.	.	.	.	.	.	.	gr. iv.
Creolini	.	.	.	.	.	.	.	gr. iv.
Sodii boratis	.	.	.	.	.	.	.	3 ij.—M.

Dissolve in a quart of tepid water and use with a siphon tube, after clear water lavage, once a day.

In performing the operation of lavage, it is desirable to introduce the water somewhat slowly, and also to effect its removal gradually, since there seem to be certain risks attendant on sudden alterations of pressure within the stomach. These precautions are more particularly necessary when there is any doubt about the existence of an ulcer, or when the history indicates that on some previous occasion an ulcer has existed. With ulceration rapid alterations of the dimensions of the stomach might possibly give rise to severe hemorrhage, or even to perforation. In some cases the operation has been followed by rigidity of the limbs or even by tetanic convulsions, but these, although most serious, occur rarely, and as a rule lavage involves very little danger, and indeed very little discomfort after the initial repugnance has been overcome.

This repugnance is, however, sometimes so extreme that it is impossible to persuade the patient to submit to lavage. Under such

circumstances it will be advisable to commence treatment with a simple emetic, either zinc sulphate or ammonium carbonate ; occasionally powdered ipecacuanha may be used, in doses of from 15 to 30 grains of the powdered root, followed by copious draughts of warm water until vomiting is produced. The emetic will serve not only to remove any source of irritation, but it may also carry up the tenacious mucus which is retarding digestion and favoring fermentation. This cleansing process may be further insured by the administration of saline purgatives, more particularly those which can be given with some alkaline carbonate. Many of the alkaline mineral waters may be administered in this way, such as the waters of Carlsbad, or of Marienbad, or if these are not available, the artificial Carlsbad salt may be used. This should contain 16 parts of sodium sulphate with 2 parts of sodium carbonate and 1 of sodium chloride ; the dose will vary with the habits of the individual. When employing this artificial Carlsbad salt, it is desirable to give it in the early morning before food has been taken, and to mix it with a fairly large quantity of water ; the activity is thus increased, and the stomach is generally emptied very completely. The advantage of the presence of the alkaline carbonate is that it counteracts any undue acidity of the gastric contents, and to some extent facilitates the removal of mucus.

The further treatment of chronic gastritis must to a large extent be symptomatic, that is, the treatment must vary with the prominence of special symptoms associated with this disease ; for while it is desirable to check fermentation, the symptomatic treatment must, notwithstanding, be pursued simultaneously. Fermentation may sometimes be arrested by the employment of creosote, which may be given in small doses of from 1 to 3 minims in capsule ; or it may be administered as a pill, in mixture, or in solution. In smaller doses of from $\frac{1}{2}$ to 1 minim, it may be given after meals to arrest gastric fermentation. Resorcin has often been employed with the same object in doses of from 3 to 8 grains ; this drug requires free dilution with water, and should be flavored with glycerin, or with syrup of orange. It has the disadvantage of occasionally producing profuse perspiration ; hence it is not a desirable drug to employ in full dose, unless the patient is sufficiently ill to be kept in bed. Small doses of thymol ($\frac{1}{2}$ to 2 grains) may be administered, either as a pill with powdered soap, or in solution with oil, or with water ; thymol is occasionally of considerable ser-

vice in checking fermentative processes and in favoring the removal of collections of flatus.

When there is much complaint of pain, or when there is a frequent tendency to vomit, silver nitrate is occasionally of great service. It can be given as a pill in doses of from $\frac{1}{4}$ to $\frac{1}{2}$ grain. Martindale recommends that kaolin ointment should be used as an excipient, instead of bread crumb, since the latter contains salt which decomposes the silver nitrate. It is perhaps scarcely necessary to point out that silver nitrate should not be given in conjunction with creosote or guaiacol. For the relief of pain, however, it is more usual to employ one or other of the bismuth compounds, the insoluble salts being preferred. These are most efficacious when given suspended in mucilage two hours or more after food has been taken, so that the influence of the bismuth is brought to bear upon the mucous membrane as intimately as possible. The administration of the bismuth compounds at the commencement of the treatment of chronic gastritis will very often produce very little benefit, since the mucous membrane must first be cleared of viscid mucus. Sometimes the bismuth salts are given with an alkaline carbonate, the latter being intended to neutralize the acidity and to favor the removal of mucus. In such combination, it is necessary to remember that bismuth subnitrate cannot be used on account of its acid properties. As in acute gastritis, I certainly prefer bismuth salicylate, since this checks fermentative processes and also allays eructation. When, however, the chief complaint is of pain, and when there appears to be but little distention after the administration of food, bismuth oxide or subcarbonate may give very good results. For the relief of pain, they may be associated with diluted hydrocyanic acid, which is so feebly acid that it will not break up the bismuth compounds. In severe gastritis the soluble preparations of bismuth usually do not act well, although they may be used when some progress toward recovery has been made. When, however, the symptoms are severe, it is desirable to employ the insoluble compounds of bismuth in full doses of 20 grains or more.

In some few selected cases, benefit will result from the use of opium, more particularly when the gastritis is associated with any tendency to vomiting. This drug has to be employed with great caution, since it will, if used too long or in too large quantity, favor constipation, which it is most desirable to avoid, and in so doing, it may also favor a continuance of nausea and vomiting.

The following prescription may prove useful :

R.—Morphinæ hydrochloratis	gr. $\frac{1}{2}$.
Acidi hydrocyanici diluti	℥iv.
Syrupi	℥j.
Mucilaginis acaciæ.	q. s. ad ℥j.

T. d. s.

When gastritis is dependent upon alcoholism, considerable benefit often follows the employment of the bitter tonics. Calumba and quassia, which contain no tannin, are the drugs most commonly employed, and they may be given as the infusion, in conjunction with diluted hydrocyanic acid, or together with one or other of the alkalies. The same class of cases will often show improvement during the administration of gentian, the compound tincture, or the compound infusion, being frequently of great service ; as a rule, these should be given with alkalies, though sometimes they appear to be effectual if mixed with some aromatic preparation, such as cinnamon, capsicum, or ginger.

In milder cases, alkalies are frequently beneficial. The value of alkalies in the treatment of chronic gastritis is well recognized, not only amongst members of the medical profession, but also by the public. Numerous sufferers from chronic dyspepsia are in the habit of dosing themselves with small quantities of sodium bicarbonate with, or shortly after, their meals, and it is generally held that when used in this way it serves to allay heartburn. With this object it may be given in medicinal doses of from 10 to 20 grains, or more, if by itself, but the dose is naturally reduced when employed with other remedies. The sodium bicarbonate serves not only to neutralize any free acid which has been formed within the stomach, such as lactic or butyric acid, but it also appears, to a great extent, to retard and even to prevent the morbid fermentation which accompanies decomposition of undigested food.

Lemoine¹ advises the administration of large doses of alkalies at the moment that digestion is supposed to finish, shortly before the usual hour for discomfort. He gives for each dose

R.—Sodii bicarbonatis	gr. xl.
Lithii carbonatis	gr. iij.

in a cachet. This is swallowed with half a tumbler of tepid Vichy water about 11 A.M., 3 P.M., 6 P.M., and 10 P.M.

¹ Nord Médicale, February 1, 1895.

If there is any diarrhœa, such as not infrequently takes place after meals, the contents of each cachet are altered as follows :

R.—Sodii bicarbonatis	gr. xl.
Calci phosphatis	gr. xv.
Cretæ præparatæ	gr. x.

And if the diarrhœa is fetid, internal disinfectants should be added :

R.—Sodii bicarbonatis	gr. xl.
Benzo-naphthol	gr. x.
Bismuthi salicylatis	gr. viij.
Pulveris opii	gr. $\frac{1}{4}$.

Smaller amounts are sometimes given before meals to promote the secretion of gastric juice ; when given after meals the possibility of neutralizing the natural free acid of gastric juice must not be overlooked, since, if sodium bicarbonate is used too freely, and especially if used when fermentative processes are not going on, it may promote dyspepsia and retard digestion by checking the activity of the gastric juice.

The value of alkalines in favoring the detachment of the viscid mucus, which so often covers the gastric mucous membrane, has already been referred to. For this purpose alkalies of greater strength are sometimes employed ; in fact, when there is great secretion of mucus, few remedies are as serviceable as the free alkalies, such as liquor potassæ, which may be given in doses of from 10 to 30 minims well diluted. When employed with this object liquor potassæ should be taken on an empty stomach, but unless sufficiently diluted it may do far more harm than good. Magnesia is frequently given, together with sodium bicarbonate. Ten grains of each may be administered, either in powder, or in mixture, toward the end of the meal. The magnesia appears to assist the sodium in neutralizing any free acid contained in the stomach.

Since the antiseptic value of salicylic acid has been recognized, both salicylic acid and sodium salicylate have been largely employed in the treatment of chronic gastritis. Preference is usually given to the sodium salicylate, since this drug appears to be broken up into its component parts by the free acid encountered in the stomach, and to exert there the antiseptic effects of salicylic acid, together with the virtues of the alkaline salt which is immediately formed. Sodium salicylate and salicylic acid share, with other compounds of

sodium, the disadvantage of favoring dyspepsia if their use is too long continued, especially if they are used in comparatively large doses, and hence it becomes important to check their administration from time to time, when the discomfort for which they have been originally employed seems to be under control.

It is well known that some forms of chronic gastritis do not improve under treatment with alkalies, while they speedily show signs of amelioration so soon as moderate doses of acids are employed, and perhaps one of the most troublesome problems connected with gastritis is to determine the particular case in which acids, instead of alkalies, are to be preferred. Some authors go so far as to advise the routine employment of acids in almost all cases of chronic gastritis. Ewald, in particular, recommends the administration of large doses of hydrochloric acid. In my own experience, however, with a very large number of dyspeptics, seen in out-patient practice, the majority improved so greatly during the administration of alkalies that it is, in my opinion, better in general to commence with preparations of sodium, or magnesium, instead of with free acids. From time to time, however, the free acids appear to be called for, and they are more especially indicated when distention after food is increased during the employment of alkalies. Acids are also serviceable in dealing with the gastritis of convalescence from an acute disease, though the first symptoms are best treated with alkalies, the acids being reserved for administration with quinine, or with other vegetable bitters, so soon as the urgency of the symptoms has been overcome. Even when the consumption of food is followed, within a short time, by discomfort from the formation of a considerable amount of gas in the stomach, dilute hydrochloric acid may cause considerable relief, although on the other hand these are essentially the conditions which so often yield to the administration of alkalies. The method of operation is somewhat uncertain. The free acid may perhaps check the growth of micro-organisms which favor the evolution of gas, or it may actually assist in the digestion of food by facilitating the action of the gastric juice; in fact, it may be assumed that in such cases the gastric juice is deficient in free hydrochloric acid.

The efficacy of the acid may occasionally be increased by the simultaneous administration of pepsin. This remedy was formerly recommended in the *British Pharmacopœia*, in a dose of from 2 to 5 grains only; the present *British Pharmacopœia*, however, recom-

mends the administration of from 5 to 10 grains, which may be given either in a pill with glycerin, or wrapped in wafer paper, or even sprinkled over the food in the form of powder. Pepsin may also be administered as the glycerate of pepsin, which can be given in doses of from 1 to 2 fluidrachms. This preparation contains 5 grains of pepsin to each fluidrachm, together with a small proportion of hydrochloric acid; the latter is employed to effect the solution of pepsin. Too prolonged use of hydrochloric acid, especially when it is given in conjunction with pepsin, is liable to be followed by diminution of the secretion of gastric juice; hence, as when using alkalies, it is advisable to check the administration after two or three weeks, and if the symptoms still persist, to resume it after an interval of from one to two weeks.

When it has been decided to employ acids the time of administration is a matter of some importance. On theoretical grounds it should be easy to determine whether the acid is to be given before or after meals. Thus, it has been asserted that, when the eructations are decidedly acid and occur almost immediately after eating, there is evidence of over-secretion of the acid elements of the gastric juice, and the administration of the acid before meals is therefore indicated, since it will thus diminish the secretion of gastric juice: while with ordinary mild acid dyspepsia, or when alkaline eructations occur, the acid is best administered after eating. In practice, however, it is found that it is impossible to follow any such hard-and-fast rule, since the conditions above mentioned are rarely strongly differentiated. It is therefore advisable that in every case the acid, in the first instance, should be given before food, and if no benefit results the effect of its administration after meals should first be tried before determining on any change of treatment. It is perhaps scarcely necessary to add that, during the administration of hydrochloric acid, free alkalies, or salts of silver, should not be given, since these will undergo undesirable chemical changes.

The following prescriptions for mixtures to be taken twice or thrice daily, culled from the pharmacopœias of different London hospitals, are frequently employed in the treatment of various phases of chronic gastritis:

R.—Acidi hydrocyanici diluti	.	.	.	.	.	℥iij.
Sodii bicarbonatis	.	.	.	.	.	gr. x.
Tincturæ belladonnæ	.	.	.	.	.	℥vj.
Infusi calumbæ	.	.	.	.	q. s. ad	℥j.

- R.—Acidi hydrocyanici diluti ℥v.
 Sodii bicarbonatis gr. x.
 Aquæ q. s. ad ʒj.
- R.—Sodii bicarbonatis gr. x.
 Acidi hydrocyanici diluti ℥ijss.
 Infusi gentianæ compositi ʒj.
- R.—Sodii bicarbonatis gr. x.
 Tincturæ nucis vomicæ ℥x.
 Chloroformi ℥j.
 Infusi rhei ʒss.
 Infusi gentianæ compositi q. s. ad ʒj.
- R.—Sodii bicarbonatis gr. x.
 Tincturæ gentianæ compositæ ʒss.
 Spiritus chloroformi ℥x.
 Aquæ menthæ piperitæ q. s. ad ʒj.
- R.—Sodii bicarbonatis gr. xx.
 Ammonii carbonatis gr. iij.
 Infusi gentianæ compositi ʒj.
- R.—Spiritus ammoniæ aromatici ℥xx.
 Sodii bicarbonatis gr. x.
 Infusi gentianæ compositi q. s. ad ʒj.
- R.—Pulveris rhei gr. v.
 Pulveris calumbæ gr. x.
 Sodii bicarbonatis gr. x.
 Aquæ menthæ piperitæ ʒj.
- R.—Pulveris rhei gr. iv.
 Ammonii carbonatis gr. ij.
 Infusi quassiæ ʒss.
 Aquæ menthæ piperitæ q. s. ad ʒj.
- R.—Pulveris rhei gr. iij.
 Sodii bicarbonatis gr. x.
 Ammonii carbonatis gr. iij.
 Pulveris zingiberis gr. iij.
 Magnesi sulphatis gr. x.
 Aquæ menthæ piperitæ q. s. ad ʒj.
- R.—Pulveris rhei gr. v.
 Sodii bicarbonatis gr. x.
 Spiritus ammoniæ aromatici ʒss.
 Infusi calumbæ q. s. ad ʒj.
- R.—Pulveris rhei gr. iv.
 Ammonii carbonatis gr. iij.
 Sodii bicarbonatis gr. x.
 Aquæ menthæ piperitæ q. s. ad ʒj.

R.—Acidi hydrochlorici diluti	.	.	.	.	.	℥x.
Infusi gentianæ compositi	.	.	.	q. s. ad		℥j.
R.—Acidi hydrochlorici diluti	.	.	.	.	.	℥x.
Tincturæ gentianæ compositæ	.	.	.	.	.	℥ss.
Spiritus chloroformi	.	.	.	.	.	℥x.
Aquæ	.	.	.	.	q. s. ad	℥j.
R.—Acidi sulphurici aromatici	.	.	.	.	.	℥x.
Spiritus chloroformi	.	.	.	.	.	℥v.
Infusi gentianæ compositi	.	.	.	q. s. ad		℥j.

CHAPTER VIII.

DIGESTION—*Continued.*

Gastric Ulcer—Hæmatemesis—Perforation—Cancer of the Stomach—Lavage—Antiseptics—Sedatives—Gastric Neuroses: Gastralgia or Gastrodynia.

Gastric Ulcer. Two very distinct forms of gastric ulcer occur under markedly different conditions. The one which it is proposed to deal with now is the simple round or chronic ulcer, to which the name “perforating ulcer” has been given, while the other is that associated with malignant disease of the stomach. The former occurs mainly in early adult life, more particularly in young females, especially among servants from the ages of eighteen to twenty-five, who may be in the habit of taking their meals hurriedly and masticating them imperfectly. It also arises among those who are in the habit of drinking tea or coffee at too high a temperature. The ulcer of malignant disease more commonly arises later in life, between the ages of forty-five and sixty, and although to some extent the symptoms resemble those of simple ulcer, there are more commonly indications of obstruction at the pyloric orifice, a symptom from which those suffering from simple ulcer are comparatively free.

The early symptoms of gastric ulcer are frequently somewhat obscure, and many cases, where the evidence is comparatively slight, have to be treated on a provisional diagnosis, the fact being that ulceration is almost invariably attended by symptoms of chronic gastric catarrh, which may precede the definite indications of gastric ulcer. The distinct indications of ulceration are the occurrence of hemorrhage, which may be large in amount; the occurrence of vomiting, which may ensue every time that solid food has been taken; and the existence of pain in the epigastrium, which may occasionally be relieved for a short time after the administration of food, though more commonly food is apt to render the pain more severe. To these symptoms may be added the existence of pain on pressure, which may be very acute over a limited area. It will be noted that many of the above indications may occur with acute or chronic gastritis, and when it is added that there is usually a com-

plaint of pyrosis, and perhaps of palpitation and distention after meals, it will be seen that the difficulty of diagnosis is increased.

The treatment of gastric ulcer will depend upon the prominent symptoms at the time when the case first comes under observation. Thus, for example, hemorrhage occasionally occurs suddenly, with but little warning, and may be so profuse as to cause the patient to become pale and pulseless. It is not uncommon, in hospital practice, for patients to be brought under treatment after a severe attack of hæmatemesis, where all the earlier symptoms of gastric ulcer have been practically ignored. It is evident, therefore, that in this condition, although there are clear indications for treatment, the treatment must be symptomatic; the point aimed at being the arrest of hemorrhage, or the prevention of a recurrence of hemorrhage, which may be best effected by promoting the healing of the ulcer. On the other hand, when the evidences of gastric ulcer are somewhat more indefinite, when there are frequent vomiting and some pain, although efforts must be primarily directed to the relief of these prominent symptoms, yet real benefit is best secured by measures calculated to promote the healing and cicatrization of the ulcer.

When there appears to be no reasonable cause for doubt that the case is one of simple gastric ulcer, it is generally advisable to promote healing by limiting the movements of the stomach, and by diminishing its work. With these objects the patient should be kept in bed, if possible, for a week or more, a course which is naturally imperative when hæmatemesis has occurred. Rest in bed is desirable, not only in order to check the movements of the body, and therefore the degree of strain which may be put upon the weakened wall of the stomach, but also on account of the fact that less food is needed when muscular work is not being performed. It is desirable, in these cases, either to discontinue the consumption of food by the mouth, or, when the symptoms are less urgent, considerably to diminish the amount that is thus taken, and comfort will therefore be increased when the sense of hunger and the need of food are reduced. When hemorrhage has occurred, it is essential to check the administration of food by the mouth, and to feed entirely with nutrient enemata. These should be given for a period of three to five days, or more, if they continue to be retained. Frequently, however, it will be found that after the third day, especially when there has been no further hæmatemesis, pain is so far relieved as to permit the administration of liquid food by the mouth.

During the early period of the disease there may be complaint of thirst, and inasmuch as the amount of liquid which can be conveniently absorbed from the rectum is very limited, other measures besides enemata must be adopted for allaying the sense of thirst. The most beneficial is the frequent administration of small quantities of ice-cold water ; half an ounce or so may be taken every half-hour, or, if the patient prefers, small lumps of ice may be sucked. Ice is of great service when employed in this way, since it not only allays thirst, but also reduces the sensibility of the stomach, and thus relieves pain. When it is deemed safe to resume the introduction of food into the stomach, it should be given in the liquid form, and small quantities only should be administered. During the early days, from 2 to 4 ounces of liquid food may be given every three or four hours, and since it is desirable to minimize the work and the movements of the stomach, the food should be pre-digested by the use of peptonizing powders, or of pancreatic emulsions. When the patient is able to take milk, the safety of administration is greatly increased by dilution. The discomfort which generally arises during the early stages of feeding by the mouth may also be diminished if alkalies are added to the milk. Fifteen grains of sodium bicarbonate and 5 grains of magnesia may be added to every 4 ounces of the diluted mixture. This alkaline mixture may be administered every two or three hours, and when it is found that it can be taken without pain, and that the appetite is returning and the patient is craving for more food, the milk may be rendered more nutritious, either by being thickened with finely powdered stale bread, or by being mixed with yolk of egg which has been well beaten up. To this, a few days later, may be added minced chicken, or minced veal ; only a small quantity must be given at a time during the first few days, and the results of this increased dietary must be carefully noted.

When the patient complains that milk appears to disagree, concentrated beef tea, or eggs, may be employed in lieu of milk ; should this intolerance of milk occur early in the course of treatment, it may be even necessary to substitute beef tea, or chicken broth, and to entirely discard the milk dietary. As improvement progresses the sense of thirst may be allayed by permitting a small teacupful of weak tea occasionally, but this should be mixed with a fairly large proportion of milk, and it should be given at a tolerably low temperature.

In less severe cases—that is, when the existence of a gastric ulcer is only suspected from the pain, or from the vomiting, although there may have been no hemorrhage—it may be very difficult to enforce the routine of diet and treatment above indicated; and, indeed, it may be found necessary to treat the case as though it were merely one of severe chronic gastritis. The symptoms are those of gastritis in an exaggerated form, and therefore the existence of a large quantity of viscid mucus within the stomach may be inferred, partly from the discomfort, and partly from the eructations. To relieve these symptoms sodium bicarbonate and sodium chloride may be given together, or sodium sulphate may be added to the mixture, so as to form the artificial Carlsbad salt already described. This alkaline mixture may be well diluted with warm water, and it is often most efficacious if administered in the early morning when fasting. A teaspoonful of Carlsbad salts may be given in half a tumblerful of warm water every ten minutes, until four doses have been taken, and no food should be allowed within at least half an hour of the last dose. Although the treatment in general is similar to that of chronic gastritis, it is dangerous, when an ulcer is suspected, to use lavage, or to encourage vomiting, since during the former the surface of the ulcer may be damaged in the introduction of the tube, while if vomiting is encouraged a strain is necessarily put upon the vessels of the ulcer during the act of vomiting, thus increasing the risks of hemorrhage. The whole treatment should be as sedative and as soothing as possible, and medicinal treatment should be adopted to check any tendency to vomiting.

The drugs which are of most service for affording a protective covering to the ulcer are the insoluble salts of bismuth. These are best administered when fasting, and they appear to be far more efficacious if given in suspension in a fairly large quantity of liquid. When giving bismuth salts, however, it is necessary to remember their constipating effect, and to counteract this by the simultaneous administration of some alkaline or saline purge. Magnesia or magnesium carbonate may be given with bismuth subcarbonate or with bismuth salicylate, but, when using the subnitrate, it is better to employ sodium sulphate. To be of much service, bismuth compounds should be given in full doses of 20 grains and upward. If the symptoms of gastritis are, however, less urgent, smaller doses may be administered, and their sedative action may be increased by combining them with diluted hydrocyanic acid, or with one of the

soluble preparations of opium, such as the compound or the simple tincture. The preparations of opium will, however, increase the tendency to constipation, and, in spite of the relief which they afford, will necessitate watchful care and the frequent employment of laxatives.

When the symptoms are not urgent, preparations of iron are often beneficial. The sulphate, the carbonate, and non-astringent preparations are preferable to ferric chloride, which may increase pain owing to the free acid it contains. It has already been indicated that gastric ulcer is very likely to occur among chlorotic women, and the iron salts will, therefore, assist in counteracting anæmia; they will also favor coagulability of the blood, which will assist in preventing hemorrhage. During the administration of the bismuth compounds, iron may be given conveniently in the official pill of aloes and iron, which should be taken at bedtime.

The treatment of cases marked by hemorrhage must, to some extent, depend upon the quantity of blood lost; but when hemorrhage has once occurred, even though it may have been slight, the patient must be kept absolutely at rest, since the loss of a small amount is very commonly the precursor of a more severe hemorrhage, and the treatment already mentioned, of feeding by enemata, of giving iced water, or ice to suck, and of applying cold over the epigastrium, must be rigidly followed for some days. It is not advisable, with recent hemorrhage, to give medicines by the mouth, as the chief object of treatment is to allay gastric irritation. Sometimes, however, there is much advantage not only in the employment of morphine subcutaneously, to relieve pain and to promote quiet, but also in the administration of the hypodermatic injection of ergot, of which from 3 to 10 minims may be given, according to the gravity of the case. This extract should be freshly prepared shortly before its employment. The ordinary astringents, such as ferric chloride or other astringent preparations of iron and tannic acid, or gallic acid, are, as a rule, better avoided with recent hæmatemesis.

As in the treatment of hæmoptysis, it is better to administer ergot in repeated small doses by subcutaneous injection than in a single large dose. In this way the continuous effect of ergot is obtained, and there is also the advantage of the moral effect upon the patient and his friends, who might perhaps otherwise feel alarmed at the apparent inactivity of the treatment.

In a clinical lecture, Robin, of Paris,¹ details the measures which he recommends on being summoned to a patient who is vomiting blood in large quantity. The patient should be put to bed at once with his head low, lying on his back; ergotin should be injected hypodermatically over the epigastrium, and ice applied to the same region. One or two grains of extract of opium should be given at once, and every two hours one tablespoonful of the following mixture:

R.—Extracti ergotæ fluidi	. . . . .	℥ iij.
Acidi gallici	. . . . .	gr. xxx.
Tincturæ opii deodorati	. . . . .	℥ x.
Syrupi terebinthinæ	. . . . .	℥ ss.
Aquæ auranti floris	. . . . . q. s. ad	℥ vj.

This mixture should be continued until the hemorrhage has entirely ceased. If obstinate vomiting continues, which may tend to keep up or increase the hemorrhage, he recommends from 8 to 10 drops of the following mixture in a little water: Picrotoxin and morphine hydrochlorate, of each 1 gr.; atropine sulphate, 1 gr.; ergotin, 15 gr.; distilled water, 4 dr.; and sufficient alcohol to effect solution. He further points out that the blood which has been shed, but is not vomited, is apt to undergo decomposition in the stomach or the bowel, especially if the patient is constipated. An auto-intoxication may thereby be set up, and the tongue becomes furred and the breath offensive. This condition may be dealt with by enemata and by purgatives.

The use of calcium chloride to arrest hemorrhage, internal or external, has often been urged by Professor Wright, of Netley. Parry (*Lancet*, July 16, 1898) describes a case of gastro-intestinal hemorrhage in a newly born child an event of obscure pathology which is commonly fatal. On the second day of the bleeding eight doses of 5 gr. of calcium chloride were administered, the same amount on the third day, and during the fourth day it was given every two hours. Altogether the child took 160 gr. in three days. The hemorrhage began to lessen twenty-four hours after its exhibition, and ceased completely in forty-eight hours, the child recovering. To be of any use, the drug must be given freely, and it is clear that in this case it had no harmful effects.

In cases of severe hemorrhage the tendency to fainting should be

¹ Year Book of Treatment, 1899.

counteracted by the subcutaneous injection of ether, given repeatedly in small doses, or by the rectal injection of stimulants, by the use of ammonium carbonate, or the cautious employment of ammonia for inhalations. The tendency to collapse may sometimes necessitate transfusion, which may be performed either with defibrinated blood, or with a saline solution, which may be injected into the connective tissues. A 3 per cent. solution of common salt may thus be used, and comparatively large amounts of fluid may be absorbed from the connective tissues, and thus serve to replace the fluid lost by the hæmatemesis.

Although when recent hemorrhage has occurred it is advisable to employ morphine subcutaneously, yet as in almost every case where the existence of gastric ulcer is suspected opium has to be administered, on account of pain or of frequent vomiting, it is preferable in cases without hemorrhage to give the drug by the mouth. It is desirable to check the administration of opium as pain diminishes, since gastric ulcer occurs so commonly in women of somewhat neurotic tendencies, and there is considerable danger of establishing the opium habit. If prescriptions are given to the patient, the presence of opium should, as far as possible, be concealed by the employment of preparations in which it is administered under some other name, such as, for example, the compound tincture of camphor, or the compound soap pill, or one of the synonyms, such as paregoric, or Scotch paregoric, should be employed. The pill of lead acetate (3 grains) with opium (1 grain) is often beneficial in cases of slight hæmatemesis, and has sometimes been termed the compound lead pill, although this synonym is not recognized in the *Pharmacopœia*.

Sometimes it is found that opium appears to increase general discomfort, although it allays local pain; it may cause headache and loss of appetite, and it frequently gives rise to nausea and constipation. Any of these symptoms will form an indication either for reducing the dose or for checking the administration. Should it be found necessary to discontinue the use of opium, some other local anæsthetic will, in all probability, be called for. Gastric pain is sometimes relieved by the use of cocaine hydrochlorate; from $\frac{1}{5}$ to $\frac{1}{2}$ grain may be given in solution with diluted hydrocyanic acid, or with cherry-laurel water, or the solution of cocaine ordinarily given by hypodermatic injection may be administered by the mouth in doses of from 2 to 5 minims, and upward. The results of the use of cocaine should be carefully watched, since, occasionally, even

these small doses may be followed by symptoms of marked collapse. This drug shares with opium the inconvenience of favoring the formation of a drug habit, and although it is a very satisfactory local anæsthetic, it should be discontinued when the urgency of the symptoms has subsided. Silver nitrate is sometimes employed in cases of gastric ulcer, either to diminish pain or to reduce the frequency of vomiting. It may be given for a short time as a pill in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain, but there is some risk of silver being deposited in the subcutaneous tissues, and causing troublesome and perhaps permanent discoloration of the skin.

Recently great attention has been paid to the prospects offered by surgery in the treatment of gastric ulcer. Some have advocated operative measures in cases where perforation has not occurred, but the grounds suggested scarcely seem to be adequate, while the prospects of affording relief are rather doubtful. Early operation has been recommended as a precautionary measure to save life in the class of cases which experience has shown to be generally fatal ; and it has also been advocated as a quicker means of cure than the ordinary treatment by rest and dieting. The chief indication for operation is, according to Leube,¹ small but frequently repeated hemorrhage from the stomach, but he thinks gastro-enterostomy should be performed when intense pain and urgent vomiting point to spasmodic closure of the pylorus. Operation has, however, been recommended for increasing emaciation when medical treatment has given little or no result, and the power of work and enjoyment of life are seriously impaired by continued pain, vomiting, and dyspepsia. The great difficulty in the surgical treatment of cases of hemorrhage lies in the general uncertainty of the position of the ulcer, while it is well known that perforation occurs most commonly when the previous symptoms of gastric ulcer have been very slightly marked. Hence the cases for surgical treatment previous to perforation are limited almost exclusively to those in which the vomiting, pain, and progressive emaciation indicate the existence of pyloric constriction either from spasm or from inflammatory thickening of the tissues in the pyloric region.

The sudden collapse which results from the perforation of a gastric ulcer calls for immediate treatment to prevent any further effusion of the gastric contents in the peritoneal cavity, and also to allay

¹ Centralbl. f. Chirurg., No. 28, 1897.

pain, which is commonly severe. The patient must necessarily be kept perfectly at rest, and fairly large doses of morphine should be given subcutaneously, or an opium suppository should be employed. Since it is absolutely essential to check further administration of food by the mouth, the feeding must be effected by means of nutrient enemata, as in the treatment of cases of profuse hæmatemesis. There can be no doubt that the best chances of recovery are offered by early operation, and the chances of success, to a great extent, depend upon the rapidity with which this is performed. In the successful cases which have been recorded the operation has generally been undertaken within from four to eight hours of the first symptoms of perforation, but recovery has occurred when the operation was commenced after twenty-four hours and even after sixty hours. As a rule, however, it is comparatively useless to operate after symptoms of general peritonitis have developed, and if, from any cause, surgical measures have been deferred until such symptoms have arisen, it may be better to trust entirely to the continuous use of opium and to the employment of fomentations, or of light poultices, over the abdomen. Operations for the relief of gastric ulcer are necessarily hazardous, since the ulcer is often situated at some part of the stomach which is difficult of access. Happily, however, the frequency of perforation is reduced by inflammatory processes over the site of the ulcer, which lead to adhesions with adjacent structures.

Cancer of the Stomach. The symptoms of cancer of the stomach to a large extent depend upon the site affected. When cancer involves one of the orifices of the stomach it will necessarily cause obstruction to the onward passage of food. Cancer of the cardiac orifice is, to all intents and purposes, practically similar to cancer of the lower end of the œsophagus, and the symptoms and treatment will therefore be the same. When cancer attacks the pyloric orifice, which is the commonest site, it causes obstruction, retention, and frequently subsequent symptoms of dyspepsia, flatulence, and vomiting. Cancer at other parts of the stomach may exist for a length of time without causing obstruction, but in general, after a prolonged period of dyspeptic symptoms, the cancer will extend, and by involving the pylorus lead to more persistent vomiting.

Another symptom of frequent occurrence is hæmatemesis, which may result either from passive engorgement of the vessels, or from ulcerative changes on the surface of the cancer. When hæmatemesis

has occurred there will probably be the appearance of blood in the motions, though it must be remembered that blood is also sometimes seen independently of hæmatemesis. Very frequently there is complaint of constipation, but this symptom may not be present unless there is some degree of pyloric obstruction. Gradually increasing distention of the stomach may also result from the same pathological condition. Throughout the course of malignant disease of the stomach, the patient is very rarely free from pain, which may probably increase in intensity after food has been taken. As in other malignant diseases there will be marked cachexia ; the wasting and anæmia are, however, much greater than in chronic gastritis.

Reference has already been made to the usual occurrence of this disease in later middle life, a feature which frequently helps in diagnosing malignant ulceration from simple ulceration, although it does not help to distinguish a case of chronic gastritis, which may occur at almost any age. The detection of a tumor will materially aid the diagnosis, though it must be remembered that in simple ulceration of the stomach there may be much inflammatory thickening, sufficient in fact to cause a tumor, while, on the other hand, with any of these conditions there is commonly much rigidity of the abdominal wall, which tends to obscure any alterations in the stomach, unless the patient is put under an anæsthetic.

Short of surgical interference, the treatment of cancer of the stomach must be almost entirely symptomatic. The first consideration is to regulate the diet, so as to afford the maximum of nutritive value with the minimum of work and also of waste. When there are indications of obstruction, the diet must be almost entirely liquid, and should usually be relatively rich in nitrogenous materials and poor in carbohydrates. Nitrogenous materials can frequently be rendered soluble within the stomach long after the presence of a gastric tumor has been established. On the other hand, when access to the intestine is difficult, carbohydrates, which are mainly digested within the intestine, will be liable to undergo fermentative changes within the stomach, and thus increase the complaints of dyspepsia. Indeed, in many cases of cancer of the pylorus, the frequency of vomiting is, to a great extent, dependent upon the frequency of administration of carbohydrates, the consequent fermentative changes promoting flatulence, distention, irritation of the wall of the stomach, nausea, and vomiting. Even with pyloric obstruction, the power of digesting solid animal food may be retained

for a length of time, provided that the meat is carefully cooked and finely divided, either by mastication or by previous mincing. With pyloric obstruction also, although the food may with advantage be given in the fluid form, everything that is taken should be as concentrated as possible, since otherwise the fluid may accumulate within the stomach and thus lead to considerable dilatation. In repeated small quantities, milk will often be tolerated for a length of time.

As the digestive powers fail, it may be necessary to resort to peptonizing the food before administration, for every effort should be made to prolong the period during which food is given by the mouth. Many cases of cancer of the stomach even when first seen are so extensive that operative measures are almost impossible, and although failing digestive powers may be supplemented by the administration of nutrient enemata, the time during which the latter can be serviceable is extremely limited. It is often necessary to cease feeding by the mouth on account of severe attacks of hæmatemesis, which, although they may occur quite independently of any pyloric obstruction, are as a rule more to be feared when pyloric obstruction is associated with frequent vomiting. The food substances administered by the rectum do not differ from those previously described (see p. 152), that is to say, peptonized milk, peptonized meat jelly, or beef peptones, which may be given in doses of from 3 to 4 ounces at a time. When owing to hemorrhage nutrient enemata have to be employed, the hemorrhage may, to some extent, be controlled, and the sense of thirst be relieved by allowing the patient to suck ice continuously. The loss of liquid may also to some extent be made good by the injection of tepid water into the upper part of the rectum or into the sigmoid flexure. Thus a pint of tepid water may be introduced with a long flexible tube, but the introduction must be effected very slowly, and the tube must be pushed high into the rectum, since otherwise the liquid will, in all probability, be expelled instead of being absorbed.

With regard to the further medical treatment required in cases of cancer of the stomach, the most prominent symptoms will afford guidance in the individual case. If there is evidence of pyloric obstruction and of dilatation of the stomach, it is desirable to empty the stomach daily and to employ lavage, as previously described (see Chronic Gastritis, p. 172). The removal of the contents of the stomach will often allay a good deal of the burning pain, but, as in

cases of simple gastric ulcer, it is necessary to be extremely cautious in introducing the tube, or even in employing lavage when there is any tendency to hemorrhage, more particularly if there has been recent or frequent hemorrhage. The performance of lavage will, however, often tend to diminish the risks of hemorrhage when the stomach is greatly overloaded with food and its walls are much dilated. When employing lavage, it will often be beneficial to wash out the stomach with sodium chloride or with an alkaline solution of sodium carbonate, since in these cases there is commonly an over-secretion of mucus, owing to the irritation produced by the presence of undigested or of decomposing food.

Cancer of the stomach is generally, although not invariably, associated with pain, and this symptom calls for relief, since, if allowed to remain unchecked, it tends to undermine the patient's strength. Moreover, even when cancer is present the pain felt in the stomach may sometimes be due to causes which can be cured; hence it becomes extremely important to form an accurate opinion as to the cause and nature of the pain. In some cases a tumor may have attained great size before there has been any complaint of pain, or at least sufficient complaint to indicate the severe nature of the disease. When cancer affects the lesser curvature and is not associated with any ulcerative process, there may be no pain so long as the pylorus is not involved and so long as the ordinary movements of the stomach are not materially affected. On the other hand, pain will frequently depend upon interference with the gastric functions, that is, from imperfect digestion leading to the decomposition or fermentation of food. When due to these causes the pain is likely to be intermittent and to occur some hours after food has been taken. With pyloric obstruction, pain is more constant in character, although it will be intensified during digestion. When, however, there is ulceration, the pain is likely to be more severe, even though it undergoes great exacerbations when food has been introduced into the stomach.

It will be obvious that in some of these forms of pain the only treatment likely to be of service is one which deadens the general sensibility. Hence, when there is reason to believe that the pain is due to organic causes, such as ulceration, or pyloric obstruction, it will be necessary to employ morphine or opium frequently; while, on the other hand, if there is reason to believe that the pain is due to fermentative changes, measures must be adopted to check fermen-

tation and to allay the abnormal irritation which it may have excited.

To deal with the latter case, since it presents the more hopeful field for treatment; apart from the modifications of diet previously indicated, it will be necessary to administer remedies capable of controlling fermentative processes. Much has been written for and against the employment of charcoal under such conditions. It has been urged that wood charcoal is beneficial on account of its remarkable power of absorbing gases, and there is no doubt that many patients have derived considerable relief from its use. On the other hand, it has frequently been asserted that charcoal only possesses the power of absorbing gases when it is dry, and that therefore its internal administration is based upon an erroneous hypothesis, and, further, it has been held that the benefits which have been ascribed to its employment are due to the mechanical removal of mucus or else to stimulation of the circulation and of peristaltic movements.

Dr. R. B. Wild¹ has recorded the results of numerous experiments undertaken to determine whether charcoal is an efficient deodorizer and oxidizer of organic substances when used in the wet state, and his experiments show very conclusively that wet charcoal hastens decomposition by oxidation. He attributes its benefits therefore not to its antiseptic properties, but to the oxidation of chemical substances which are formed during abnormal decomposition, and he suggests that this oxidation may even affect the various toxins produced by pathogenic organisms.

Wood charcoal may be prescribed in doses of from 60 to 120 grains in a fine powder, but as this powder is somewhat repulsive in appearance, various preparations have been made for the introduction of wood charcoal in some more convenient form. Thus charcoal may be administered in cachets, or in wafer papers, or it may be given as biscuits, which, although unsightly, can usually be taken with ease and comfort. In smaller doses of from 10 to 20 grains, charcoal may be given with equal parts of magnesium carbonate and bismuth subnitrate, and this mixture certainly relieves pain due to acidity and to the presence of large quantities of gas.

The antiseptic action of bismuth salicylate is less open to doubt. It may be administered in suspension with mucilage, or in wafer paper, or in cachets containing from 5 to 10 grains of the bismuth

¹ Medical Chronicle, March, 1896.

compound, together with either ammonium carbonate, sodium carbonate, or magnesia. I have often found benefit result from the use of cachets containing 5 grains of bismuth salicylate, with 2 grains of ammonium carbonate, and although larger doses of the salicylate are more efficacious, this compound is so very light that it is better to administer two such cachets rather than to attempt to get a larger dose into a single cachet. This remedy may be used either immediately before food or some two hours after food, when fermentative changes are proceeding. The above compound has the disadvantage of favoring constipation, and it may therefore occasionally be necessary to check its administration and to resort to the use of creosote or carboic acid.

Beechwood creosote may be given in doses of 1 minim, or upward, in capsules, which may be taken shortly after food, while carboic acid may be used as a pill. It has been asserted that creosote possesses the power of retarding the growth of cancer in certain cases of scirrhus of the pylorus. This assertion appears to be somewhat open to doubt, but there can be no question about the improvement which often follows the use of this remedy, more particularly with regard to the diminution of pain and of distention. It will often be found, however, that during the employment of creosote, notwithstanding the relief of pain, there may be loss of appetite owing to the persistent odor of the drug, and occasionally, during its administration, vomiting appears to be more frequent than before. This is especially likely to occur if the remedy is used too freely, or in too large a dose before toleration has been established with smaller doses.

When the pain is of a dull, persistent character, before resorting to opium, or to morphine, it is advisable to administer diluted hydrocyanic acid, which frequently gives great relief if the discomfort is largely due to gastritis. The diluted hydrocyanic acid may be given in combination with alkaline carbonates, such as sodium bicarbonate and magnesium carbonate. The benefit which follows the use of these drugs is sometimes very striking, and in their favor it must be remembered that they are largely curative, instead of being merely anodyne. The administration of opium should be deferred until some or all of the foregoing have been essayed, since although opium gives relief, the relief is purely of a temporary character, and will be followed in all probability by some of the discomforts inseparable from the frequent use of this drug. Thus it will increase

constipation, diminish appetite, and to some extent impair the digestive functions. At the commencement it should be used only at night, so as to enable the patient to obtain sleep, and it may then be given in doses of $\frac{1}{8}$ grain with 5 grains of sodium carbonate and 5 to 10 grains of bismuth subcarbonate; or morphine tartrate may be given, $\frac{1}{8}$ grain to $\frac{1}{2}$ grain with atropine sulphate $\frac{1}{200}$ grain to $\frac{1}{100}$ grain administered hypodermatically, commencing of course with the smaller doses and only increasing the amount when it is found that the smaller doses have lost their effect. Should there be any objection to the hypodermatic injection of morphine, some form of opium may be given, such as the tincture, the camphorated tincture of opium, or the tincture of deodorized opium, any of which may be employed whenever the pain is very severe; one of the solutions of morphine may be similarly given in combination with other drugs. As the disease progresses, it will always be found necessary to increase the amount of these remedies, and also to increase the frequency of their administration.

For the relief of vomiting some of the foregoing remedies may suffice, since vomiting and pain frequently go hand-in-hand. In addition, the employment of cold is often very serviceable, whether applied locally, by means of cold compresses or ice bags over the epigastrium, or internally by giving iced water or iced milk, or by encouraging the patient to suck ice frequently. The need of arresting feeding by the mouth whenever hemorrhage occurs has already been indicated, and the treatment of hemorrhage in cases of cancer in no way differs from the treatment of a similar condition in connection with simple ulcer.

For the relief of constipation, glycerin suppositories or an enema of glycerin, or simple enemata should be employed. This symptom, however, so often results from pyloric obstruction that there is little object in endeavoring to obtain a daily action of the bowels, since in these cases very little food reaches the intestine, and the reflex excitability of the intestine is therefore greatly diminished. Should there be much discomfort, however, associated with flatulence in the intestine, resulting apparently from the constipation, relief may be afforded by the occasional use of mild purgatives. Small doses of rhubarb may be given after meals, or the extract of aloes may be employed in pill form at night, while further relief may sometimes be afforded by the addition of a grain of calomel. Sooner or later surgical measures must be discussed; in nearly every case the chief

indications for operation will depend upon the site of the tumor. As a rule, in cases of pyloric obstruction, gastro-enterostomy is preferred. It is only, however, in very rare cases that it is possible or advisable to remove the affected portion of the stomach. Though the operation of pylorotomy, or resection of the pylorus, has been recommended, this operation is attended with a very high mortality, and it is somewhat difficult to perform. Far more frequently it is felt that it is safer not to interfere with the tumor, but to establish a fistulous opening between the stomach and the small intestine. This frequently affords relief, and it may also postpone the natural termination of the disease. For the modes of performing this and other operations in cases of cancer of the stomach the reader is referred to text-books on surgery.

Gastric Neuroses: Gastralgia, or Gastrodynia. There are various neuroses of the stomach associated with considerable pain, frequently, although not always, of neuralgic type; that is to say, the pain and the other symptoms of this class of cases very commonly appear to depend purely upon some alteration in the nervous system without any necessary local lesions. These cases are very difficult to differentiate from those dependent on anatomical lesions; thus, for example, the cases in which pain is the more prominent symptom strongly resemble many of those of simple or of malignant ulcer. These cases have been conveniently grouped under the name of gastralgia, or gastrodynia. They occur mainly in connection with anæmia, with chlorosis, and with hysteria, although in some instances the pain has its origin in alterations of the blood, due, for example, to malaria, gout, or rheumatism. The pain appears, also, especially among hysterical females, with irritation of some portion of the genito-urinary tract; it may occur only at the menstrual periods, or it may be most marked at these times.

The chief feature by which gastralgia, or gastrodynia, differs from the clinical picture of ulceration, is the sudden onset of the pain, together with the sudden relief which may occur after a short interval. This relief is sometimes associated with eructation of gas, or of watery fluid, or it may be attended with vomiting, or with free perspiration; sometimes, however, especially in neurotic patients, it ceases with the passage of a quantity of pale urine. These attacks of pain are very indefinite as to the time of their occurrence, which is not the case when the pain is due to organic causes. The intervals separating the attacks may be of considerable duration, although

in malarial cases they are likely to occur periodically. Neurotic pain also may not only be relieved by pressure, but it is often better after food has been taken, in both of which features it differs very markedly from the pain of gastric ulcer. It will be found too that if the character of this symptom is misunderstood, and the patient is treated with enforced abstinence, the condition usually becomes worse than before, especially in those cases which appear to have their origin in chlorosis.

The frequency of gastritis in connection with chlorosis must not, however, be overlooked, and it will often be necessary to assume the existence of gastritis, and to treat this condition together with the chlorosis before the neurotic character has been determined. Gastralgia may also be excited by some special article of diet, and the discovery of this exciting cause will naturally suggest the elimination of the irritant substance. The special irritant may sometimes be found among articles of diet which are commonly regarded as soothing rather than irritating; thus, in some instances, milk may be found to act as an exciting cause, while shell fish seem to be frequently more harmful than fish of the more ordinary kinds. Occasionally eggs will be found to disagree, and the pain will sometimes ensue in spite of alterations in the mode of their administration.

Special idiosyncrasies will also affect the use of some forms of fruit, whether cooked or raw, as well as some kinds of vegetables. Careful inquiry, therefore, will be needed to establish the exciting cause, and even when this cannot be determined, it is always well to modify the diet so as to supply only light, nourishing materials, which are easily digested. Meanwhile, it is advisable to note any associated dyscrasia, and when the patient is suffering from chlorosis, or anæmia, these conditions should be treated on general principles with unirritating forms of iron. The efficacy of the pills of ferrous carbonate will often be found to be greatly increased by the addition of ferrous arsenate, but occasionally it is impossible to employ this drug, as it may increase pain, and may even produce other symptoms of gastritis. It will often be necessary to change the form of iron administered, as well as to increase the amount. The saccharated carbonate is sometimes preferred to the ferrous carbonate pills, and it may be given in doses of from 10 to 30 grains, or $\frac{1}{2}$ to 1 fluidounce of the compound mixture of iron may be substituted. Reduced iron is also often of great service, and can be given in

doses of from 1 to 5 grains, either mixed with sugar or with some aromatic powder.

In chlorotic cases the immediate relief of pain may have to be considered, and when it is very severe the temptation to employ opium is very considerable ; indeed, it may be necessary to use morphine hypodermatically if the pain is continuous and the patient's rest is being disturbed. In general, however, it is well to defer the use of opiates as long as possible, since chlorotic patients are only too likely to magnify the pain for the sake of obtaining the remedy. It is better, therefore, to use some simpler form of sedative, as, for example, cannabis indica, chloroform, or ether. Cannabis indica can be employed as a pill, made with the extract, or the tincture may be given suspended in mucilage. This drug must be given with some degree of caution, since different specimens of the extract vary so much in strength, and I have known moderate doses of the pharmacopœial tincture to be followed by toxic symptoms, such as giddiness and sense of alarm. It is well, therefore, when using cannabis indica, to commence with small doses and to increase the amount by degrees while using the same preparation. It has been found that doses which have been taken for a length of time without ill effects have produced alarming symptoms when the prescription has been taken to another chemist.

The use of chloroform, either as the aqua chloroformi in doses of 1 ounce, or the spirit of chloroform in doses of 5 minims and upward, is sometimes extremely beneficial, while the moral effect of ether, largely due to its unpleasant taste and odor, will sometimes succeed where other remedies have failed. Different volatile oils have been used with advantage, such as oil of cajuput, or oil of peppermint, and these may be added to the mixture of chloroform, or they may be given with diluted hydrocyanic acid. Occasionally it is found that belladonna may give relief, 5 to 15 minims of the tincture being given with chloroform water, or with diluted hydrocyanic acid. Whitla speaks strongly in favor of large doses of sodium bicarbonate, 40 grains with $\frac{1}{8}$ grain of morphine.

When the pain persists, it will be advisable to employ local remedies which induce counter-irritation, such as poultices or fomentations, and the action of the fomentation may be increased by the use of oil of cajuput, oil of turpentine, or by the application of liniments of aconite or of belladonna. In some purely hysterical forms of pain relief may be afforded by the hypodermatic injection of water.

DR. L. G. TAYLOR,

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I have known cases of gastralgia to improve very much during the employment of *nux vomica*, or of strychnine, given either by the mouth, or by hypodermatic injection, though this last method of employment is required comparatively rarely ; strychnine appears to act beneficial mainly on account of its power of increasing the appetite and causing increased contractions of the wall of the stomach. In some forms of gastralgia, charcoal in wafer papers, or in cachets, will be very serviceable, especially where the gastralgia is associated with much flatulent dyspepsia. Other remedies which have been recommended are the following : salts of silver, as the oxide or the nitrate, which are best given in pill form ; antispasmodics, such as the compounds of zinc, more particularly the valerianate ; potassium iodide ; salol and resorcin. The last has been much commended, but in my hands it has not given very satisfactory results. When gastralgia appears to be of malarial origin, it is necessary to use quinine or arsenic. The former, as a rule, gives better relief, and should be administered in comparatively large doses, 5 grains and upward, three times a day. If, however, it fails, arsenic may be employed, but, as already indicated, the effect on the digestive powers must be carefully watched.

The dyspeptic symptoms associated with gastrodynia may be accompanied by a secretion of normal gastric juice, or the gastric juice may be altered in various ways. The amount of the acid may be greatly reduced, more particularly in cases of gastric neuroses occurring during convalescence, or, on the other hand, there may be a condition of hyperacidity, where it is probable that the acid which is present in such large excess is of a morbid character, and is not merely an increase in the normal acid of the gastric juice. This acid, which is commonly butyric or lactic, results from alterations in the food, and in all probability is owing to the presence of bacteria. The occurrence of these forms of dyspepsia will be marked by discomfort after food, together with pyrosis, and with alterations of appetite. The appetite may sometimes be greatly increased, so that there is a craving for food, which is, however, checked after the first few mouthfuls have been taken, and replaced then by a sense of fulness. More commonly the appetite is greatly diminished, and the sight of food may even provoke nausea.

Even when there is not much alteration in the character of the gastric juice, these cases may still give rise to great emaciation, which is so often seen in severe cases of neurasthenia. Occasionally

the appetite becomes perverted, so that there is craving for various indigestible articles which may induce severe forms of gastritis. In these morbid states of the nervous system, apart from the regulation of diet, there is generally extreme difficulty in treating the dyspepsia. Change of air, change of scene, and of surroundings will occasionally prove beneficial, but it is of very little use to employ the ordinary gastric sedatives, or antacids, so long as the patient remains in the normal surroundings. The best results are generally to be obtained from the Weir Mitchell treatment, but to be of any material use this must be rigidly enforced, and the isolation particularly must be insisted upon. Massage and electrical treatment are not likely to be of much service unless the patient is removed from the normal atmosphere of sympathy. It is often found that during the Weir Mitchell treatment, in which forced feeding takes a prominent place, the digestive powers are speedily restored, and, to their own surprise, patients are enabled to take enormous quantities of food, not only without discomfort, but even with some degree of enjoyment.

This treatment will also frequently prove very serviceable in cases of nervous vomiting. If the vomiting has not been of long duration, there is every probability that it will speedily be arrested by a short course of massage and electricity ; but in extreme cases, when associated with much wasting, the ordinary treatment for neurasthenia must be carried out in its entirety. When there is diminution in the acidity of the gastric juice, it is frequently necessary to employ pepsin and diluted hydrochloric acid, as in ordinary forms of atonic dyspepsia ; while, when there is much increase of acidity, although temporary relief may be given by the administration of sodium bicarbonate, the cure may be rendered more permanent by washing out the stomach with alkaline solutions, and by the subsequent employment of dilute sulphurous acid, or of potash, creosote, or carbolic acid, remedies which will check the fermentative changes which produce the free acids above mentioned.

In these cases of hyperacidity it is always desirable to diminish the amount of saccharine and starchy foods and to increase the amount of nitrogenous food. Frequently benefit is obtained by the administration of comparatively large quantities of finely minced lean meat, taking care to remove all traces of fat and of tendinous material. The nutrition may also be aided by the employment of cream, or eggs and cream whipped up together, and although some patients

turn against this diet, it is really surprising how much cream may sometimes be taken without any increase of dyspeptic symptoms, and with marked improvement of nutrition.

With both nervous dyspepsia and nervous vomiting, constipation is frequently a prominent symptom, and calls for the repeated administration of purgatives, such as senna, rhubarb, or occasionally small doses of calomel. When there is much flatulence in addition to constipation, the discomfort may be relieved by the employment of carminatives, such as the volatile oils, of which peppermint and turpentine are perhaps the best. These may be given with sodium bicarbonate, or with tincture of cinchona, the latter frequently assisting materially in restoring the appetite.

CHAPTER IX.

DIGESTION—*Continued.*

Intestinal Colic, or Enteralgia—Lead Colic—Constipation: Exercise, Diet,
Laxatives—Tympanites.

Intestinal Colic, or Enteralgia. Under these names may be included all those cases of intestinal pain which are not only independent of inflammation of any portion of the intestinal wall, or of the peritoneal covering, but also of any structural alteration in the intestine. The condition is distinctly comparable with gastralgia, and, like this affection, it may be due to spasmodic contraction of the muscular tissue; or it may be of a neuralgic type, affecting the nerves of the intestine. In the former case the pain is most commonly an indication of reflex spasm, which is generally due to irritation within the intestine. The neuralgic cases are less frequent, and are perhaps to be traced to cold or to some diathesis such as rheumatism or gout. Intestinal colic is very frequently associated with constipation, although constipation is not invariably the immediate exciting cause of the colic.

Among the reflex causes of colic which require recognition may be enumerated the following: direct irritation of the intestine, which may result either from the ingestion of some article of food which can only be digested with difficulty, or else from the swallowing of some hard substance which cannot possibly be digested. It may also ensue from the irritation produced by hard masses of feces, and by gallstones. Frequently severe colic appears in children in connection with irritation from intestinal worms, more particularly the round worm. Chronic constipation may give rise to this symptom, partly by the irritation from direct pressure, and partly, in all probability, from the spasm which may result from ineffectual attempts to drive onward the contents of the intestine.

It has been asserted that in cases of intestinal pain some, if not all, of the pain may be due to over-distention of a portion of the intestine with flatus; but it appears more probable that, as in chronic constipation, the pain is due to spasmodic contraction of the muscular coat rather than to over-distention. The spasmodic contraction

of involuntary muscle is almost invariably associated with severe pain, while on the other hand the intestine may frequently be much distended throughout the greater part of its length without the occurrence of pain. These forms of irritation can, as a rule, be easily treated when the cause has been recognized. In almost every case it is advisable to adopt some measures to relax muscular contraction, and the treatment will depend, to some extent, upon the severity and upon the persistence of the pain. When very severe, it may be necessary to give relief by the administration of opium, but at the same time any source of irritation within the intestine must be removed. This may be effected most conveniently by the employment of enemata of warm soap and water. It is desirable that these should be fairly bulky, from 20 to 30 ounces of liquid being employed. Sometimes simple soap and water will be sufficient, but frequently it is found better to use an enema of turpentine, like that included in the British *Pharmacopœia* of 1885, which consisted of 1 fluidounce of oil of turpentine with 15 fluidounces of mucilage of starch. It may be advisable to repeat the enema within an hour if the first has given no relief.

The local application of opium over the surface of the abdomen is often attended with good results, the best way of employing it being to use hot fomentations, or poultices, sprinkled with tinctura opii. This will often suffice to arrest the pain, while the enema may perhaps have removed the cause of the pain. Should pain persist, however, it will be necessary to use some mild purgative, like castor oil, or one or other of the natural purgative waters. A little calomel as a powder or pill will sometimes give greater relief, but in general it is desirable to employ the simplest and mildest purgatives, since any strong aperient will be only too likely to increase pain. Occasionally it is found that the pain is so severe as to demand the hypodermatic administration of morphine; but, if possible, it is desirable to avoid both morphine and opium, since they diminish the contractions of the intestine, promote constipation, and thus increase the liability to intestinal colic.

The milder forms of colic may frequently be treated more satisfactorily by the employment of preparations of belladonna, and of nux vomica, together with various carminatives. When intestinal colic is of a mild nature and associated with severe constipation, a pill containing extract of nux vomica, extract of belladonna, and a little capsicum will often be of very great service. This pill may

be rendered more laxative by the addition of extract of rhubarb or of compound extract of colocynth. The latter, however, even though it ultimately tends to give great relief, is very likely to increase pain for a short time, the action of colocynth being commonly associated with much more colic than that which follows the use of rhubarb.

Mild cases of intestinal colic associated with constipation are to be treated with laxatives and with general hygienic and dietetic measures, to be described later under the heading of Constipation.

The forms of colic due to neuralgic conditions, such as those which may result from exposure to cold, are commonly of greater severity than those already described, but, like them, they are to be treated with measures calculated to relieve spasm. Warm applications over the abdomen, together with hypodermatic injections of morphine, will in general afford the most speedy relief, and there need be no hesitation in employing these measures in cases that are free from any suspicion of the existence of local causes of irritation.

The great difficulty in dealing with many of these cases of intestinal colic consists in the differentiation of this neuralgic condition from acute inflammatory affections, more particularly of the mucous lining of the intestine or of its peritoneal covering. The symptoms of intestinal colic are sometimes very similar to those of appendicitis. The sudden onset of severe pain, which may be associated with vomiting; the hardness and rigidity of the abdominal wall, especially over the right side, form features which are frequently common to both conditions. In colic, however, there is an absence of febrile symptoms, and the pain is rarely so continuous as in appendicitis. It may diminish, or even cease, with an action of the bowels, or with the passage of flatus, while it is commonly somewhat relieved by pressure. It is important to bear in mind these points of difference, since in appendicitis the modern tendency is to avoid the use of opium or morphine, remedies which may, however, be extremely desirable if the patient is only suffering from enteralgia, from exposure to cold, or from other nerve irritation.

Colic in infants is frequently the result of unsuitable food, and is very often associated with constipation. It may occur at any time during the early months of life, but is most likely to arise when the infant is being fed artificially, and when the milk is not properly digested. In the first stages of infant life this will often result from the milk being given in too concentrated a form; but somewhat

later it may follow the too early employment of starchy foods. Colic in infancy, therefore, may arise even among children who have been fed at the breast when attempts are being made to supplement with artificial food. When due to the non-digestion of cow's milk, it is very frequently associated with vomiting, the milk being rejected in large masses of curd shortly after a meal. But independently of vomiting, colic may arise, the abdomen becoming hard and rigid, while the child may writhe in pain. During the pain there is frequently much pallor at the commencement of the attack, though with violent screaming this may be replaced by redness or even by a cyanotic condition.

The treatment to be adopted must depend upon the age of the infant. It is obviously improper to resort to the use of preparations of opium at this early age. The pain may be relieved by the administration of a little dill water, and the relief is often greater if this is given with an equal quantity of warm water. It is extremely difficult, in infants, to determine whether the colic is gastric or intestinal. Frequently the trouble appears to be gastric, since the regurgitation of milk or the eructation of flatus will be succeeded by a look of relief and a cessation of screaming. In infants, when colic results from indigestion of milk, it is advisable to dilute the milk with lime water, the proportion being determined by the age of the infant. Equal parts of good milk and of lime water may be given; occasionally this may favor constipation, and thus necessitate a reduction in the quantity of lime water, but the milk then should still be diluted with water. As the age increases, the degree of dilution must be diminished, so that by the third or fourth month good milk only requires to be diluted with a third or a fourth part of water. Colic may be excited in infants, even when fed at the breast, by the meals being administered too frequently; but in all probability this colic is gastric rather than intestinal, and can easily be overcome by greater attention to regularity and by giving the meals at stated hours. These forms of colic, if untreated, may very readily pass on to more severe conditions of gastro-enteritis, marked by severe vomiting and purging, with rapid wasting. I have little doubt that most of the cases of infantile diarrhœa have commenced as cases of simple colic, which might perhaps have been arrested if treated at the commencement.

The medicinal treatment employed in infants must largely depend upon the age and upon the prominent symptom or symptoms.

When the condition is purely one of colic, without any vomiting or diarrhœa, the pain may be relieved partly by the alteration in the nature of the food, and partly by the administration of carminatives.

The compound tincture of cardamoms and dill water are extremely serviceable, and their efficacy may be greatly increased by the addition of small quantities of sodium bicarbonate. Dill water has been mentioned, since it is perhaps the carminative most commonly used ; but almost any of the volatile aromatic oils may be employed, in suitable doses, for the relief of intestinal colic. Very often the action of these may be increased by the addition of some form of stimulant. Small amounts of the aromatic spirit of ammonia may be added to the alkaline and aromatic mixture with advantage, the skin becoming warm and the pulse more full during the administration of this remedy. It is, however, necessary to be careful in its administration, and to graduate the dose with due regard to the age of the infant, since I have known children momentarily stop breathing from reflex laryngeal spasm when aromatic spirit of ammonia has been employed in too concentrated a form. Some practitioners prefer brandy in place of aromatic spirit of ammonia, but there are many arguments to be adduced against this practice ; thus, samples of brandy obtained from various sources are of very different strengths, while another objection lies in the frequency with which this stimulant is directed to be mixed with milk by the nurse, instead of being mixed with the medicine by the chemist. Although I have seen very great improvement from the use of brandy, the improvement has been mainly in the relief of the condition of collapse, which so often ensues if the colic is succeeded by diarrhœa ; but even in these cases I prefer employing this remedy in the form of the *mistura spiritus vini gallici* of the *British Pharmacopœia*, instead of directing that the stimulant should be given in the crude form. This mixture is made of four ounces of brandy, four ounces of cinnamon water, half an ounce of sugar, and the yolks of two eggs.

It is perhaps well to remember that, although compound tincture of cardamoms and ammonium carbonate are of use in these cases, these two compounds do not mix very well together, since the alkali destroys the clear color of the compound tincture of cardamoms.

When colic in infants is associated with constipation and the passage of clay-like motions, benefit is often derived from the administration of castor oil, the increased action of the bowel appearing to stimulate the secretion of bile, or at all events to promote the elimi-

nation of bile without allowing time for its reabsorption. A teaspoonful of castor oil may be given to a child of the age of ten months or more, and may be repeated on alternate mornings until the habit of constipation is overcome. Toward the end of the first year a good deal of colic may be associated with intestinal irregularities due to dentition, but in these cases, as a rule, the more prominent symptom is diarrhœa. With regard to treatment, apart from attention to the condition of the gums, and apart from the necessary modifications of diet, benefit may be obtained from the use of ipecacuanha wine, or even from the employment of the powder of ipecacuanha and opium. The latter, however, as a preparation of opium, must be used with great caution. The wine is the safer remedy, but not more than one or two minims should be given repeatedly, on account of the readiness with which it may promote nausea and even vomiting. In very young children who are much emaciated, the spasmodic contraction of the intestine, which is the cause of colic, may often be witnessed. Waves of contraction are readily traceable over the abdominal wall, the pain diminishing as the little nodule of firm contraction becomes relaxed. These contractions are frequently witnessed in the absence of either constipation or diarrhœa, and they appear to be of a reflex, neurotic variety, since they improve so rapidly during the administration of potassium or ammonium bromide.

As age advances, the causes of colic in children are different in character. Frequently pain and the disturbance of sleep, which results from pain, are both due to the irritation of worms. In early childhood these are most likely to be in the form of thread worms, which may excite reflex spasm of the intestine, or even reflex convulsions from the irritation that ensues from their movements. This irritation may sometimes be due to worms that have issued from the rectum and may be found wandering about from the rectum to the vulva, or it may be due to the movements of worms within the rectum. When arising from worms, colic usually occurs at night, and the child wakes pale and frightened, and perhaps screaming. It is obviously impossible to treat this symptom separately without attacking the entozoa. (*See Thread Worms.*)

Forms of colic which have yet to be mentioned are those dependent upon irregularities of the nervous system, the hysterical and neuralgic types. With regard to the former, although spoken of as hysterical, and although undoubtedly associated with other hys-

terical manifestations, the symptom of colic frequently depends directly or indirectly either upon a perverted appetite or indigestible articles of food, or upon some injudicious dietary to which the patient is subjecting herself. Colic, although it may result from the irritation produced by indigestible articles of food, or from the irritation of over-distention of the alimentary canal, may nevertheless follow upon irregular contractions due to the presence of an insufficient amount of waste material in the intestine. Many cases of this hysterical type will be found to be connected with constipation, which is best overcome by breaking down the rigid rules of restriction which so many of these patients have formed for themselves.

Although, in these cases, it is advisable to insist upon a more liberal dietary, it is also necessary to employ some of the antispasmodics. Preparations of zinc are often beneficial. The sulphate can be given as a pill, in doses of from 1 to 3 grains, and this amount may be gradually increased if the pill is carefully administered after food, so that the irritant effect on the mucous membrane of the stomach is only gradually exerted. If given in a larger dose, or if given upon an empty stomach, this drug will be likely to promote nausea or even vomiting. In place of the sulphate, the valerianate may be employed, in doses of from 1 to 3 grains, or the ammoniated tincture of valerian, in doses of $\frac{1}{2}$ to 1 fluidrachm. These remedies are mainly beneficial to the hysterical condition causing the intestinal colic, and they probably exert very little, if any, direct influence on the spasmodic contraction of the intestine. It is more uncertain, however, whether the other remedy which is so often serviceable in these cases—namely, asafœtida—may not possess some direct curative properties, but its constituents have been said to be inert when experimenters tried it upon themselves. The selection of the preparation of asafœtida will, to some extent, depend upon whether the practitioner wishes the patient to endure the moral effect of taking the tincture or the fetid spirit of ammonia, consisting of spirit of ammonia with asafœtida, by the mouth, or whether he attributes sufficient physiological activity to the aloes and asafœtida pill or the compound galbanum pill. Occasionally, in neuralgic cases, which are closely linked with the hysterical, the activity of these remedies may be increased by the administration of preparations of arsenic. While this drug is being taken the appetite and digestion usually increase; more food

therefore is consumed, and one of the fertile sources of colic is thus removed. The liquor potassii arsenitis may be added to the tincture of asafœtida or to the fetid spirit of ammonia, or, if the patient is taking asafœtida in pill form, arsenious acid or ferrous arsenate may conveniently be mixed in the pill.

Lead Colic. Lead colic is so severe in its manifestations, and its treatment is so different from the foregoing, that it demands special consideration. The symptoms of lead colic differ from those just described mainly in their greater severity, but the exciting causes of this condition are extremely various, though as a rule the lead finds its way into the system, owing to its employment in the ordinary work of the patient. Thus lead colic is common among those working with white lead, or with any form of lead in fine powder, and it is most likely to arise when these workmen take their meals in the middle of their work, especially if they do not trouble to wash their hands before eating. It may also result from drinking water or other liquid impregnated with lead, beer which has stood in the pipes overnight being peculiarly prone to give rise to this condition, and I have known it to occur when lead had been used instead of bismuth as a face powder. Recently a good deal of attention has been directed to the cases of lead-poisoning occurring in the potteries; but whatever the cause of the use of lead, the dangers connected with its employment can be greatly diminished by habits of personal cleanliness and by the use of acid drinks and mild saline purgatives. These facts are well recognized by most employers where lead is used, and they supply quantities of very dilute sulphuric acid for the workmen to drink.

The prominent symptom in lead colic is the occurrence of severe pain in the region of the umbilicus, which is occasionally relieved by pressure. This pain is almost invariably associated with constipation, with emaciation, and with increasing pallor. The diminution in nutrition is frequently the result of loss of appetite, due to constipation, though undoubtedly definite lead cachexia exists. The blue line along the gums, which is so often enumerated as one of the symptoms, is really to be regarded as a diagnostic indication, since it is not associated with any altered sensations.

The treatment of lead colic demands measures calculated not only to relieve the pain and constipation, but also to remove lead which has already been deposited in the tissues. With regard to the constipation, it is perhaps best dealt with by the administration of

repeated doses of magnesium sulphate, and to a mixture containing this drug small quantities of diluted sulphuric acid may be added, with the view of forming an insoluble sulphate of lead with any lead compound that may remain in the course of the intestine. Magnesium sulphate may be given occasionally either as the effervescing sulphate, or mixed with citric acid and sodium bicarbonate in sufficient quantity to form an effervescing mixture. Other purgatives have been employed for this condition, but they do not give such good results. The vegetable purgatives, like colocynth or jalap, may increase the pain of lead colic by causing more rapid contractions of the muscular wall of the intestine; while magnesium sulphate causes an increased flow of fluid from the mucous lining of the intestine without materially altering the rapidity of the contractions.

The pain of lead colic may sometimes be relieved by the local application of opiates, or by the employment of fomentations or poultices. The internal administration of opium, or the use of morphine hypodermatically, may sometimes be necessary when the pain is very severe. As a rule, however, it is well to avoid these drugs, since they favor the constipation which it is desirable to overcome.

The elimination of lead from the system may be effected by the administration of potassium iodide, but it is well to employ this drug in moderate doses of 5 grains or so, and to continue the administration for a length of time rather than to endeavor to produce a strikingly rapid effect by larger doses, since it has been asserted that fresh symptoms of poisoning may occur when large doses of potassium iodide are given, owing to the quantities of lead, which had previously been deposited in the tissues, being again passed into the circulation in the form of the soluble iodide.

As the patient recovers, it is necessary to employ tonics and bitters, such as quinine, calumba, or quassia, and to continue the use of an occasional dose of magnesium sulphate to counteract any return of constipation. Should he be obliged to return to the same work, it will be well to give him directions calculated to diminish the risks of fresh symptoms of lead-poisoning. Apart from strict injunctions concerning cleanliness, the use of occasional saline purgatives, and the avoidance of alcoholic stimulants, it may be necessary to give special instructions according to the nature of the work. Thus, if there is much lead in the form of a dry powder, it will be desirable for him to use a respirator of muslin, which should be fre-

quently cleansed and moistened. It is also necessary to caution the individual not to commence work before taking a meal. Recent observations appear to indicate that when lead enters the system by the alimentary canal, it is most active during the intervals between meals. The frequent connection between the symptoms of lead-poisoning, of gout, and of chronic kidney disease, has been fully dealt with in another work. (*See Albuminuria and Bright's Disease.*) Certainly those who suffer from a gouty diathesis are more likely to develop symptoms of lead-poisoning, and more particularly so if, in addition, they are addicted to habits of alcoholism.

Constipation. Constipation, with which colic is so often associated, agrees with it in being a symptom rather than a disease; nevertheless, it demands separate consideration here on account of its frequency and on account of the discomforts to which it leads. Constipation cannot be regarded as a distinct disease, nor is it symptomatic of any single disease. Although it may result from diseased conditions, it is far more frequently the consequence of habits of carelessness than of any pathological change. It demands treatment under two main conditions: First, when it occurs as an accidental occasional condition; and, secondly, when it exists fairly continuously. In the former case, an individual of previously regular habits may, as the result of some accident or circumstance, either connected with this occupation or with his dietary, miss the regular morning relief, and may be so placed during the greater part of the day as not to be able to attend to his sensations of discomfort. He may, on the following morning, find that his routine is disturbed and that he has some slight headache and loss of appetite. Under these conditions, a moderate dose of magnesium sulphate, or of any effervescent saline purgative, or even some slight modification in diet, such as the use of brown bread, figs, prunes, or other mild laxatives, may be sufficient to restore the normal healthy condition. With such individuals the employment of purgatives of greater force would be undesirable, since, although they would relieve the loaded rectum, they would be liable to be followed by another day or two of inaction.

The whole secret of the treatment of constipation lies not in emptying the alimentary canal but in the stimulation of the lower portion of the bowel to resume its daily routine. It will be found, therefore, that many of the purgatives enumerated in text-books of materia medica will not be so much as mentioned here in this

connection, the so-called cholagogue and hydragogue purgatives, and still more the drastic purgatives, being of service in special conditions of disease rather than in the mild form of irregularity of function at present under consideration. In dealing with more chronic forms of constipation, it is essential to make careful inquiries as to the nature of the error to which the individual case may be due ; since chronic constipation may result from widely different causes, although in their results they may, as a rule, be traced down to two conditions only, the first affecting the intestinal contents, the second affecting the contractions of the wall of the intestine. With regard to the first, the errors which lead to chronic constipation are generally connected with faulty habits of diet. Constipation may be prompted by an insufficient supply of liquids, a fact to be borne in mind whenever a diet table is being constructed with the view of reducing the amount of liquid taken by the patient. Constipation will also sometimes occur when there has been a large drain of fluid from the system, which may be due either to copious perspiration during muscular exercise or may occur as the consequence of some disease such as diabetes, in both forms. It may also result from a dietary which is rich in nutritious elements and poor in waste material, so that the greater portion of the food is digested, leaving very little residue to excite the peristaltic action of the intestine.

Further, it may be due to insufficient digestive power, owing to defective secretion of the intestine, of the pancreas, or liver. Cases of obstructive jaundice, in which the amount of bile reaching the intestine is reduced, are frequently associated with constipation. Under these conditions there are doubtless two factors at work : the one leading to imperfect digestion of food, the other to imperfect stimulation of the muscular wall of the intestine. When the secretion of bile is deficient either from lack of exercise or from overstimulation of the liver with food or with alcohol, constipation is again liable to result. Deficiency in the contraction of the wall of the intestine may occur as an indication of weakness during convalescence from wasting diseases, or more commonly it may arise from carelessness and inattention to the calls of nature. The peristaltic contractions which lead to the evacuation of the lower part of the bowel are very largely under the influence of habit, and when this habit of regularity has not been cultivated, or when it has been wilfully or carelessly neglected, the rectum will require considerable stimulus before being excited to contract.

There appear to be grounds for believing that, to some extent, constipation may depend upon deficient circulation through the wall of the intestine, since it is frequently found that any active exertion which increases the rapidity of the circulation will counteract the tendency to constipation. It is on this account that those forms of active exercise are so often recommended which, while taken in the open air, involve the movement of the muscles of the abdominal wall; thus, for example, riding is frequently beneficial, and it is most efficacious when it can be taken in the early morning. With the same object a short ride on a bicycle may be recommended, when the patient's circumstances do not admit of horse exercise; but to be of use, no form of muscular exercise should be carried to excess, since free perspiration is likely to be followed by constipation, owing to the reduction of the amount of fluid in the circulation. Even when bicycle riding is impossible, relief will often ensue after various bodily movements of a mild gymnastic character, which may be carried out in the open air. The use of dumb-bells should be encouraged, although greater benefit will follow the employment of one or other of the modern forms of apparatus for the development of the chest and muscles of the arms, since with the latter the body is bent forward and the muscular contractions of the abdominal walls are called into play.

Occasionally, in elderly individuals, the contractions of the intestine may be stimulated more directly by massage of the abdominal wall, the contents of the abdomen being kneaded from side to side in the direction of the course of contraction of the colon.

Among younger and more vigorous patients the same object may be attained by the daily use of the cold sponge bath. The rationale of the action is a little difficult to explain, but possibly it results from the stimulus to the circulation that is induced by the cold shock, although in all probability the subsequent brisk movements and the pressure over the abdominal wall serve to stimulate peristalsis.

Short of these various forms of somewhat energetic muscular movements, a good deal of relief is often obtained from an increased amount of daily exercise in walking. Constipation very often is associated with sedentary studious habits, and daily exercise, especially if taken in the early morning, may afford relief. Frequently the intestinal contractions may be further stimulated by an increase in the amount of liquid taken when fasting. Some patients prefer taking a glass of cold water on going to bed, or on first rising,

though the shock is sometimes found to be extremely unpleasant, and the beneficial effect may often be obtained as well from swallowing a glass of fairly warm water. The cup of tea which is so frequently taken on waking undoubtedly owes its action to the increased supply of liquid rather than to any direct stimulation due to the tea itself, since tea, especially when strong, is more likely to induce constipation on account of the tannin it contains. The same explanation, in all probability, holds good for the effect of black coffee. In some individuals this appears to act as a laxative, but the contractions of the intestine are more likely to be induced by the temperature at which the coffee is taken than by active principle contained in coffee, since when coffee is allowed to cool very little intestinal stimulant action remains.

Careful attention to the diet will often serve to remove the troublesome habit of constipation. It is often necessary to encourage the patient to take some form of food which contains a relatively large proportion of waste indigestible material. This can be conveniently obtained from the use of fresh vegetables, more particularly green vegetables, but these must be well boiled and well masticated, since otherwise they might promote indigestion. Various forms of fruit will also be beneficial, and the relief which they afford may be due either to the presence of some laxative principle or to the gentle stimulus afforded by indigestible particles. Figs, either well soaked previously to being eaten or taken after meals and well masticated, will often act as sufficient stimulus, owing to the slight irritation produced by the small seeds they contain; while stewed apples, stewed prunes, tamarinds, oranges, and bananas possess a laxative action well recognized among the laity. Grapes are also frequently used with the same object, but it is advisable to caution the patient not to eat the skins, and either to masticate the seeds or else to reject them. With the same view, marmalade is often taken at breakfast time; it acts as a mechanical stimulus from the small pieces of orange peel it contains, and as a laxative on account of the sugar and the neutral salts of vegetable acids. Strawberry and raspberry jams are less efficacious perhaps, but still of service, while for children golden syrup and honey frequently produce a fairly powerful laxative action. The older form of black treacle, which has so largely passed out of use, is yet more powerful as a laxative, and taken with brown bread, or with oatmeal porridge, it forms a very useful adjunct to the resources of the nursery.

The laxative action of stewed prunes may be greatly increased by the device recommended by Lauder Brunton. He says that a few senna leaves or pods should be put in a small muslin bag, tied up at the end, and dropped into the pan in which the prunes are stewing. In this way the active principle of the senna, cathartic acid, is dissolved, and the flavor of the prunes is not materially affected, while their action is greatly increased. Frequently the substitution of brown bread, or of whole meal bread, for the bread made of fine white flour will favor daily action of the bowel. These forms of bread leave enough indigestible material to stimulate the bowel, while in white wheaten flour not only have the indigestible substances been carefully removed, but frequently alum has been used to increase the whiteness of the bread.

With habitual constipation, it is generally advisable to reduce the amount of meat that is taken, or, at all events, to increase the proportion of vegetable fibre. With some constitutions, eggs are found to favor constipation, especially if they are hard-boiled; sometimes indeed this result will follow their employment in any form, even when made into puddings with milk, and with farinaceous substances. Milk is constipating, especially if taken cold, though the foreign plan of taking a small amount of coffee with much warm milk in the early morning certainly helps the daily action of the bowel. On account of a tendency to obesity, many people avoid butter and fat, but the laxative effect of fresh butter with meals, or of olive oil with salad, may sometimes be sufficient to overcome mild cases of constipation. The laxative action of oil is frequently well seen in children, whose digestion improves during the time that cod-liver oil is being taken; in fact, cod-liver oil has occasionally to be discontinued when it promotes undue diarrhœa.

It should be remembered that a great deal will still depend upon the habits of the individual, even when following any of the foregoing hygienic and dietetic principles. Time should be allowed daily at the same hour for attention to the calls of nature, and the patient should make some efforts whether there are any sensations of desire or not. The habit of thus attempting daily to obtain relief at the same hour will frequently be attended with success. It is especially important to encourage the habit of regularity in children, who are prone to be thoughtless; in women, who from feelings of modesty are perhaps likely to fall into habits of carelessness; and in city men, who from late rising frequently do not allow time to

attend to this duty. It is necessary to lay some stress upon thus encouraging the habit of regularity, since so often patients remain content with the occasional employment of strong purgatives, which may be followed by constipation for two or three days. The whole of the efforts of the patient and of the doctor should be directed to the establishment of normal habits of regularity rather than to obtaining relief by occasional violent action.

With regard to the medicinal treatment of constipation, much will depend upon the estimate that has been formed of the nature of the condition, and also upon the circumstances under which the patient first comes under treatment; thus, for example, it is often necessary to effect rapid and free evacuation of the bowel at the commencement of acute febrile disorders, and the treatment under such circumstances must be very different from that adopted for the relief of chronic constipation. For rapidity of action, saline purgatives will perhaps be sufficiently satisfactory. Magnesium sulphate and magnesium carbonate can be given together in the well-known white mixture of most hospital pharmacopœias. Frequently this is taken rather more readily as an effervescing draught; the effervescing magnesium sulphate may be employed with this object, or due proportions of sodium bicarbonate and citric and tartaric acid may be added to the ordinary white mixture to render it effervescent. When given thus in these cases, these drugs rarely require repetition, and it suffices to administer a single fairly strong dose as a draught. Occasionally, however, in the course of acute febrile disorders, it is desirable to continue the laxative effect, and magnesium sulphate will then be more conveniently given in smaller doses distributed over the day. Another very favorite saline purgative is sodium phosphate, which has the advantage of mild action and of comparatively little taste. This is frequently employed for children, and can be easily given mixed with soup without the child knowing that any medicine has been taken. The dose must be regulated according to the age of the patient; for adults, when given on a single occasion as a draught, from $\frac{1}{4}$ to $\frac{1}{2}$ ounce may be administered; but if given frequently, the adult dose is from $\frac{1}{2}$ to 2 drachms. This drug also may be administered in an effervescent form, which may be taken in larger doses than the official salt. The effervescent sodium phosphate, although not official in the *United States Pharmacopœia*, is kept by all druggists. Sodium sulphate is also occasionally used in preference to magnesium sulphate, and can be given in

the same dose, or the effervescent magnesium sulphate may be found to be more agreeable. Compared with the phosphate, the taste is much more unpleasant, being not only saline, but bitter. This salt is one of the principal constituents of many of the natural mineral waters used as laxatives. Carlsbad water contains both sodium sulphate and bicarbonate, together with many other salts of less efficacy ; hence Carlsbad water is used as a mild laxative, while the Carlsbad salts—which can be procured either as the natural salt, obtained by evaporation, or in the form of the sodium sulphate and the sodium bicarbonate, mixed in the same proportions—are occasionally used at the commencement of febrile attacks, or indeed whenever it is desired to obtain a moderately rapid action of the intestine with the evacuation of a fairly large amount of watery secretion.

When treating chronic constipation medicinally, it is not always necessary to employ laxatives or even purgatives. Thus, for example, when the urine is found to be of high specific gravity, and to contain considerable quantities of urates, a few doses of potassium bicarbonate may suffice to restore the action of the bowel at the same time that the condition of the urine is rendered more normal. It may be stated, however, in general terms, that it is better, in the treatment of chronic constipation, to employ drugs of greater purgative power occasionally, and it is therefore necessary, in the individual case, to ascertain the smallest dose of any drug which can be counted upon to produce the desired effect. It is then well to repeat this dose for two or three days in succession, and afterward to trust to the restoration of the habit of regularity with the discontinuance of the medicine. It is also essential to select the remedy, which it is proposed to employ, with due regard to the habits of life and social standing of the patients, since many remedies which have but slight action upon a strong workingman might violently purge delicate, nervous, excitable patients of a higher social grade ; thus, for example, a remedy which might be administered with great advantage to a cabman, a Covent Garden porter, or a navvy, would be likely to produce disastrous results upon a delicate, nervous lady of fashion.

It is also advisable, before embarking upon a course of treatment for chronic constipation, to ascertain if possible the cause of the condition. Frequently it may depend upon a comparative insensibility of the lower part of the bowel, which has been gradually produced

by the habit of disregarding the normal calls for relief. In elderly patients, more particularly, chronic constipation is apt to result from this form of deficient reflex excitability, and the rectum and sigmoid flexure may be loaded with feces which require removal, either by the employment of enemata or by suppositories.

When the habit of constipation has been acquired, the contents of the lower portion of the bowel tend to become hard and dry, and difficult to remove by the administration of laxatives or purgatives by the mouth, and it may even be necessary, in severe cases, to break down these fecal masses by the finger or by some mechanical agency, such as the handle of a spoon, before the rectum and sigmoid flexure can be satisfactorily evacuated. Before resorting to these measures, however, it is well to await the results of the use of enemata, and in some cases it is advisable to employ a comparatively large amount of liquid, introduced into the rectum by a long, flexible tube. The passage of fluid past the sigmoid flexure may be facilitated by employing the rectal tube, with the patient resting on his knees, the head and upper part of the body being depressed, so that the fluid shall gravitate gently along the course of the descending colon. In this way a large quantity of fluid may be introduced, although it is difficult, and perhaps unsafe, to attempt to pass the flexible tube beyond the commencement of the sigmoid flexure.

The introduction of a drachm or so of glycerin will frequently be followed by a copious secretion of fluid from the wall of the rectum, which may be sufficient to facilitate the expulsion of hardened feces. The glycerin may be injected with a small enema syringe, or the same result may be obtained by the use of one or more glycerin suppositories, which are now official. These suppositories are extremely convenient for children when it is desired to empty the lower part of the bowel; they can be easily introduced, and they act with comparative rapidity, but it must be remembered that, by these measures, we only obtain the evacuation of masses which may be obstructing the lower portion of the bowel, and that the peristaltic action of the whole length of the bowel is not directly affected.

Inaction of the bowel may result either from inefficient secretions or from inefficient contractions, and the class of remedy which should be employed must depend upon the estimate that has been formed of the relative importance of these two conditions. Many of the laxatives appear to stimulate secretion both of mucus and of intestinal juice, or sometimes, though more rarely, to favor the for-

mation of a larger amount of bile. When the fluid character of the contents of the intestine can be thus increased, there will naturally be a greater frequency of peristalsis, though it is possible, occasionally, to cause a very large increase in the fluid contents of the intestine without purgation; thus, if the salines are given at some inconvenient hour, a large quantity of fluid may be poured into the upper part of the intestine, and reabsorbed from the lower part. On the other hand, some purgatives and some laxatives appear to produce their action mainly by stimulation of the peristaltic movements, and thus the contents of the intestine will be hurried onward, without any necessary increase in the quantity of liquid.

Among the drugs which are commonly used to excite peristalsis, *cascara sagrada* occupies a foremost place; but others, such as manna, tamarinds, aloes, and podophyllin, are very often used, and are preferred by some patients. *Cascara sagrada* is credited with the power of acting as an intestinal tonic, and it has often been claimed for this drug that it is possible to gradually reduce the dose as the habit of regularity becomes re-established, and it is further held that it may, if necessary, be continued for a length of time without requiring any increase of the dose. *Cascara sagrada* may be given, either as the solid extract, in doses of from 2 to 8 grains, which may be combined with carminatives, in a pill; or as the fluid extract, which is administered in doses of from $\frac{1}{2}$ to 1 fluidrachm, also with carminatives. Although not official, there is to be found in the market various aromatic syrups, elixirs, and cordials with doses of from 1 to 4 fluidrachms; these preparations are much more readily taken and much less nauseous than the fluid extract.

When *cascara sagrada* was first introduced it was a somewhat unreliable preparation, the extract and fluid extract varying in strength, so that the same dose could not always be counted upon to produce the same results. But, apart from variations in the drug, there are also differences of temperament to be reckoned with, since the same dose of the same preparation will occasionally produce powerful purgation in some individuals, while it hardly seems to affect others. In my experience, *cascara sagrada* is a purgative of somewhat late action, and it is sometimes attended with considerable discomfort shortly before the evacuation of the bowel. I have frequently known moderate doses taken overnight without result until the following evening, when two or more copious reliefs have been obtained. The activity of this drug can, however, be

regulated for the individual by moderation of the dose ; and with habitual constipation, this remedy is perhaps the one which has given the greatest satisfaction, although the bitter, nauseous taste may cause some patients to rebel against the continued employment of the bitter liquid preparations.

Of the other laxatives above mentioned, manna is occasionally employed for children, but, on account of its sweet taste, it is a proverbially difficult drug to keep in museum collections, and equally so in dispensaries. Tamarinds possess laxative properties, and enter into the composition of the confection of senna of the *United States Pharmacopœia*, but they are not to be confused with the so-called tamar indien, which is a compound of several laxatives, and is sold as a proprietary preparation. Aloes is frequently employed as a laxative, although it is easy to obtain stronger purgative results with a slight increase of the dose. In all probability, aloes acts both by stimulation of the contractions of the muscular wall of the intestine and by exciting reflex secretion from the mucous membrane. It affects mainly the lower part of the large intestine—a fact demonstrated partly by the length of time before it acts, and partly by the degree of irritation and fulness of the hemorrhoidal system which follows its employment. This effect upon the hemorrhoidal system constitutes the chief objection to the frequent use of aloes, especially in elderly people who have any tendency to piles ; it therefore becomes necessary to remember that there are very few of the vegetable purgative pills in the *Pharmacopœia* that do not contain aloes. It is a remedy which, if given alone, is apt to produce considerable discomfort, and its effects require to be moderated by administration with less potent purgatives and with carminatives. The extract of aloes may be employed, when alone, in doses of from 1 to 4 grains, according to the effect desired ; but when mixed with other purgatives it is better to reduce the amount of the extract, and when made up into a pill, to administer it in the dose of $\frac{1}{4}$ grain ; this dose can be given with 2 or 3 grains of compound extract of colocynth, and with 1 grain of extract of hyoseyamus. Some patients find this pill unduly powerful, and it is then advisable to reduce the amount of colocynth and to substitute $\frac{1}{4}$ grain of extract of nux vomica, and perhaps to add $\frac{1}{4}$ grain of podophyllum resin.

Although several of these purgatives produce much griping and discomfort if used alone, when given in combination in small doses

their action is generally free from these disadvantages. Podophyllum resin, which is often termed podophyllin, is somewhat like cascara sagrada in the uncertainty of its action, small doses sometimes producing very disproportionate effects. Many patients, however, are in the habit of taking a small amount either of the resin or of the tincture whenever troubled with headache or "biliousness," which they attribute to inaction of the liver and deficient action of the intestine. This drug, although active even in small doses, is not often followed by constipation.

Among the unofficial preparations which are frequently used may be mentioned a compound podophyllin pill, consisting of $\frac{1}{4}$ grain of the resin of podophyllum, Barbadoes aloes 1 grain, capsicum $\frac{1}{2}$ grain, green extract of belladonna $\frac{1}{4}$ grain, made up with glycerin of tragacanth. Podophyllum, as a rule, is rather too active for frequent employment, but it has been used with aloes and quinine, forming a dinner pill for cases of habitual constipation. The proportions which have been found serviceable are the following :

R.—Quinine sulphate	gr. j.
Podophyllum resin	gr. $\frac{1}{2}$.
Milk sugar	gr. $\frac{1}{2}$.
Green extract of belladonna	gr. $\frac{1}{6}$.
Extract of aloes	gr. j.

Rhubarb is often employed in habitual constipation, and it is also used occasionally in the treatment of diarrhœa, dependent upon irritant substances in the alimentary canal. The amount of rhubarb to be employed for these two purposes will be very different. In the latter case, when it is desired to empty the intestine rapidly, and to induce constipation by the astringency of the rheo-tannic acid, a large dose is required ; but when it is desired to use rhubarb as a dinner pill, smaller proportions must be employed, and these are commonly combined with extract of hyoseyamus, which moderates the activity and favors the restoration of regular peristaltic contractions. Compound rhubarb powder, which contains magnesia and ginger, is often used as a laxative for children. More popular, perhaps, for adults, is the compound liquorice powder of the *Pharmacopœia*, whose activity is dependent upon the admixture of senna and sulphur. This is readily taken in doses of a teaspoonful and upward, and can be frequently repeated without any deleterious effects. Some practitioners prefer the confection of senna as a mild

laxative for general employment. This confection contains several simple laxatives of the *Pharmacopœia*, such as figs, tamarinds, and prunes, and some children take it readily. Most of the other preparations of senna are employed as occasional purgatives to clear the bowel rapidly, rather than as laxatives for the treatment of chronic constipation. Castor oil is also of service in the same class of cases, and it is credited with the power of continuous action along the whole length of the alimentary canal. It is a drug of considerable value for occasional employment, more particularly in children, but its utility is very greatly discounted by its nauseous taste and by the struggles which generally ensue when its forcible administration is attempted.

The employment of sulphur, as a laxative for habitual constipation, is most beneficial when this condition is associated with a rheumatic or rheumatoid tendency. In the constipation of rheumatoid arthritis, considerable relief is frequently experienced from the use every night of fairly large doses (60 to 120 grains) of confection of sulphur of the *British Pharmacopœia*; but inasmuch as this preparation may be objected to, either on account of its taste or its appearance, the sulphur lozenge is often preferred.

The efficacy of any of the above remedies is frequently increased by the admixture of *nux vomica*. The extract of *nux vomica*, in doses of $\frac{1}{4}$ grain and upward, may be added to most of the purgative pills, while the tincture in doses of from 5 to 15 minims may be given in combination with liquid purgative preparations.

The foregoing account by no means exhausts the list of laxatives or purgatives which are employed in the treatment of chronic constipation, and it also takes no account of the stronger purgatives which are used in the course of other diseases with the view of rapidly reducing the blood-pressure, or of altering the amount of fluid contained within the vessels, and thus favoring the reabsorption of dropsical or other effusions. Mention of these drugs will be found in connection with the various diseases for which they are especially adapted.

The following prescriptions for mixtures to be taken once, twice, or three times a day, are in common use in various London hospitals :

R.—Magnesii sulphatis	.	.	.	.	.	.	3ss.
Potassii citratis	.	.	.	.	.	.	gr. xx.
Tincturæ hyoscyami	.	.	.	.	.	.	℥v.
Aquæ	.	.	.	.	.	q. s. ad	℥j.

R.—Magnesii sulphatis	gr. xl.
Aquæ pimentæ	℥ ij.
Infusi rosæ acidi q. s. ad	℥ j.
R.—Magnesii sulphatis	℥ j.
Infusi gentianæ compositi	℥ j.
R.—Magnesii sulphatis	℥ i.
Acidi sulphurici diluti	℥ x.
Olei carophylli	℥ ½.
Aquæ destillatæ q. s. ad	℥ j.
R.—Magnesii carbonatis	gr. x.
Magnesii sulphatis	℥ j.
Aquæ menthæ piperitæ	℥ j.
R.—Magnesii sulphatis	℥ iij.
Magnesii carbonatis	℥ ss.
Aquæ menthæ piperitæ	℥ j.
R.—Potassii bicarbonatis	gr. xv.
Magnesii sulphatis	gr. xx.
Tincturæ hyoscyami	℥ xv.
Mucilaginis acaciæ	℥ j.
Aquæ q. s. ad	℥ j.
R.—Pulveris rhei	gr. v.
Magnesii carbonatis	gr. xv.
Aquæ menthæ piperitæ	℥ j.
R.—Pulveris rhei	gr. viij.
Magnesii carbonatis	gr. xv.
Sodii bicarbonatis	gr. x.
Pulveris ipecacuanhæ	gr. ¼.
Aquæ menthæ piperitæ q. s. ad	℥ j.
R.—Pulveris rhei	gr. x.
Sodii bicarbonatis	gr. xv.
Tincturæ zingiberis	℥ x.
Aquæ ammoniæ fortioris	℥ ij.
Aquæ menthæ piperitæ q. s. ad	℥ j.
R.—Pulveris rhei	gr. xv.
Magnesii carbonatis	℥ ss.
Spiritus ammoniæ aromatici	℥ ss.
Aquæ pimentæ q. s. ad	℥ j.
R.—Infusi rhei	℥ ss.
Tincturæ gentianæ compositæ	℥ ss.
Sodii bicarbonatis	gr. x.
Spiritus chloroformi	℥ x.
Aquæ menthæ piperitæ q. s. ad	℥ j.

R.—Sodii bicarbonatis	gr. x.
Spiritus chloroformi	℥x.
Spiritus menthæ piperitæ	℥v.
Tincturæ rhei	ʒj.
Infusi gentianæ compositi	ʒss.
R.—Potassii et sodii tartratis	ʒjss.
Potassii tartratis	ʒj.
Extractum sennæ fluidum	ʒss.
Aquæ q. s. ad	ʒj.

Tympanites. Tympanites is a symptom which occurs in connection with numerous diseases of different nature and of various origin, and as a rule it is dependent upon some form of obstruction in the course of the intestine. It may also frequently result from chronic dyspepsia, or it may occur in connection with chronic constipation, with peritonitis, and with other conditions indicative of atony of the intestine. This distention of the intestine may sometimes reach great proportions, and may cause interference with the freedom of respiration, and even with the action of the heart.

In the milder conditions the treatment is that of the cause; thus, any form of obstruction should, if possible, be dealt with before any strenuous efforts are made to interfere with the tympanites. In constipation and dyspepsia the indications can readily be followed, and have indeed already been mentioned in the foregoing pages; they include the employment of laxatives or of purgatives, and possibly the use of enemata of turpentine, which may favor the expulsion of flatus. It has been recommended that the flatus should be removed by the introduction of a long piece of soft, flexible rubber tubing, which, well oiled, should be passed as far as possible into the rectum. It has been thought that by this means the flatus might be drawn off, even though the intestine should be in an atonic condition and deficient in contractile force. I have never had occasion to employ this method, and although with a tube large quantities of liquid may be passed into the descending colon by suitable posture and by suitable pressure, I believe it is somewhat doubtful whether a soft rubber tube can ever be passed beyond the sigmoid flexure; for although a considerable length of the tube can be introduced, it is probable, I think, that it remains coiled up in the sigmoid flexure.

Another recommendation that has been made is that the flatus should be removed by puncturing the descending colon with a fine

trocar ; but, to be effectual, this proceeding demands some contractile force in the wall of the intestine, a force which is generally absent. Other observers advise that surgical measures should be adopted : that a small opening should be made through the middle line of the abdomen, and that the distended intestine, when reached, should be fixed to the abdominal wall and opened. Although I have seen considerable distention with flatus, I have never felt justified in recommending this proceeding, since the distention often occurs with extreme rapidity toward the close of some chronic diseases, as well as in connection with diseases of a septic type, and the condition of the patient then practically precludes the question of operation. When, however, tympanites develops rapidly in connection with obstruction in the intestine, not only can there be no objection to the adoption of surgical measures, but they are imperative on account of the cause of the tympanites ; at the same time, operation will be undertaken more with the view of relieving the obstruction than with the object of simply diminishing discomfort from tympanites. In these cases the tympanites affords an additional reason for avoiding further delay, and under such circumstances the use of the various carminatives given by the mouth, or the employment of rectal injections of turpentine, can naturally be of no avail.

CHAPTER X.

DIGESTION—*Continued.*

Diarrhœa: In Infancy—In Childhood—In Adult Life—Dysentery—Intestinal Obstruction, Acute and Chronic.

Diarrhœa. The importance of diarrhœa depends entirely upon the attendant conditions. Sometimes it is not to be considered as a disease, but only as a symptom of but little moment, while at other times it produces considerable weakness and defies all attempts to arrest it. The importance further largely depends upon the age of the individual. It is responsible for a very large proportion of the deaths occurring in infancy, more particularly during the later summer months, when numbers of infants brought to the out-patient room of a children's hospital are found to be suffering from this complaint.

Diarrhœa may also be a formidable trouble among those weakened by age, or by pre-existing disease, while it forms a frequent prelude to the termination of cases of general tuberculosis and of some forms of chronic kidney disease. This symptom is not, however, always dependent upon anatomical lesions, although in the great majority there is considerable enteritis, and in some of the diseases in which the symptom occurs there is also generally some ulceration, either of the solitary glands or of Peyer's patches, as in typhoid fever and tuberculosis. In many individuals chronic laxity of action appears to depend upon nerve irritation. Undue frequency of action of the bowels—that is to say, three or four motions daily of a loose nature—forms a common symptom in many nervous young women; while acute diarrhœa may also supervene with nervous excitement, as is seen so frequently in students at times of examination. In this class of cases the trouble appears to consist rather in undue rapidity of peristaltic contractions than in any alteration in the vessels or in the mucous lining of the intestine; the loose character of the motions depends upon the contents of the intestine being driven onward too rapidly to allow of the absorption of fluid. This form of nervous diarrhœa may not affect the health

prejudicially, although, when excessive, it leads to some sense of weakness and some impairment of nutrition. It is important, however, in practice, to avoid the error of attributing to chronic nervous diarrhœa the frequent inefficient action of the bowels, which forms a prominent symptom of malignant disease of the lower part of the intestine, since, in the early stages of malignant disease, patients very frequently believe that they are suffering from some chronic irritation, and may give very misleading accounts of their complaint.

Most of the non-nervous forms of diarrhœa depend upon direct irritation of the intestine, which may lead to acute or chronic enteritis, or intestinal catarrh, and the commonest cause of such irritation is to be found in the diet of the individual, or in some toxic substance introduced with the food or with the drinking water. As the treatment of diarrhœa depends largely upon the age of the individual, as well as upon the severity of the attack, it will perhaps be most convenient to describe the treatment of this symptom as it occurs (*a*) in infancy, (*b*) in childhood, and (*c*) in adult life. This classification is adopted for the convenience of description of the measures best calculated to treat the various conditions, but it must be remembered that the cause of the symptom may be frequently traced to the same group of agencies; thus, although diarrhœa in infancy and in childhood—for instance, diarrhœa in infants of five or six months old and diarrhœa as it occurs in school-boys—may both result from irritation produced by food, the treatment under these two conditions of age is necessarily different.

(*a*) In infants, diarrhœa is most likely to occur among those who are being artificially reared, instead of being fed at the breast, and it can frequently be traced to the administration of food which is unsuited to the age of the child, or to lack of adequate care and cleanliness in the preparation of food; thus, it may result from the administration of starchy food at too early an age, or from the irritation induced by overloading the alimentary canal by feeding the child too frequently, even though the food may be of proper nature. It is, of course, scarcely necessary to say that the symptoms may be directly attributable, among the poorer classes, to the bad habit of attempting to feed the infant on scraps of anything that may be on the table for the meals of the parents. Even when infants are fed with milk properly diluted, diarrhœa may often be traced to lack of care with the feeding-bottle, especially when using bottles with long

tubes, which are somewhat difficult to cleanse ; while even with the boat or slipper-shaped bottle I have known serious diarrhœa ensue from the use of milk which had become somewhat sour.

It is necessary, therefore, in every case of infantile diarrhœa to make careful inquiry as to the nature of the food, and to inspect closely the various articles employed in its administration ; thus possible errors may be rectified and all trouble may cease. Unhappily, it is often found that, although the cause of the diarrhœa is removed, the frequency of the motions may persist from a continuance of irritation in the course of the intestine, and it may be necessary to order a total change of the food before any improvement results. This is more particularly the case when, with hand-fed children, the milk has been given in too concentrated a form, so that it has produced large curds, of which some may have been rejected by vomiting, while others have been passed onward and have set up a form of catarrh. Under these circumstances, the further administration of milk, however dilute, may still cause irritation, and it may be necessary to withhold milk entirely, and to feed for a day or two with meat juice and with barley water, until the irritation has subsided.

The administration of milk may be facilitated by carefully sterilizing it with one or other of the numerous sterilizers which have been recently introduced. Of course, milk may be sterilized by boiling in an enamelled saucepan ; but this method is sometimes inconvenient, since milk froths up so readily that a large proportion may be lost, and, on the other hand, there is the danger of giving it an unpleasant taste of burning, which causes the child to turn against the bottle. With a sterilizer such as Arnold's, Hawksley's, Freeman's, or Soxhlet's, the milk can be raised to the boiling point, and thus the danger of introducing bacteria or their spores in an active form is averted. The milk can be sterilized at home with one or other of these forms of apparatus, but in most large towns sterilized milk can now be obtained, and it is sometimes possible, by the use of sterilized milk, properly diluted, to diminish the frequency and violence of diarrhœa.

When the power of digesting milk is impaired, it may occasionally be advisable to employ pancreatized or peptonized milk. The peptonizing powder should be added to the milk previously to heating it in a sterilizer, and the temperature should be moderately raised, that is, to between 120° and 140° F. This temperature should be

maintained for ten to twenty minutes, and the mixture should then be heated to 200° or to 212° F. If heated at once to this higher temperature the peptonizing process is arrested too soon. It is, however, necessary to avoid too prolonged action of the peptonizing powder, since, unless the action is checked at the end of from ten to twenty minutes, the milk acquires an unpleasant, bitter taste, and is then not readily taken by the infant. Even with these precautions it may, in severe cases, be necessary to discontinue the use of milk entirely, and to substitute a mixture of meat juice with barley water, or of barley water with yolk of egg. Half an ounce of yolk of egg may be beaten up with 10 ounces of barley water, with the addition of a small teaspoonful of white sugar; sometimes a mixture of 2 ounces of arrowroot with 2 ounces of whey, sweetened with a teaspoonful of white sugar, is more readily taken. These substitutes for milk should be used for only two or three days, when efforts to administer milk should again be made. When the diarrhœa has been associated with much vomiting, it is always advisable to commence with peptonized milk in small quantities.

In milder cases the more liberal employment of lime water will often prove beneficial, a tablespoonful or more of lime water being added to every five ounces of milk. It is often possible to keep a moderate attack of diarrhœa in check by increasing the amount of lime water administered, but it must be remembered that the lime water is itself sometimes a cause of diarrhœa; it should therefore be tested from time to time, more particularly if it becomes unduly turbid. A mere trace of acidity may be sufficient to excite diarrhœa, which may be difficult to control. When lime water is inoperative, a little liquor potassæ may be substituted, 10 minims of liquor potassæ being added to 5 ounces of milk. Whenever diarrhœa occurs it is desirable to reduce the amount of milk given at each meal, and, when the symptom is severe, it may also be advisable to reduce the frequency of the administration of food. Very often, especially when the symptom is the result of the non-digestion of milk and the formation of large curds within the stomach and the intestine, it will be found that benefit results from diluting the milk, and giving a small quantity only in the twenty-four hours. Occasionally, when the pulse is feeble and rapid, and when the child shows much depression as the result of the diarrhœa, it is advisable to employ stimulants. There are two methods for the administra-

tion of brandy in vogue among practitioners. The one consists in giving an occasional dose of from 10 to 20 drops of brandy with a teaspoonful of milk and water, and the other in using a somewhat smaller proportion, 5 drops or so, every time that the child is fed. Of these two methods I prefer the latter, since the small quantity of brandy thus given is scarcely noticed by the child. When the diarrhœa has been severe, and there is much collapse, I have seen very marked improvement from the employment of *mistura spiritus vini gallici* of the *British Pharmacopœia*, in drachm doses, every four hours. The composition of this mixture is as follows: brandy, 4 fluidounces; cinnamon water, 4 fluidounces; refined sugar, $\frac{1}{2}$ ounce, and the yolks of two eggs. This appears to stimulate the circulation, to strengthen the pulse, and to remove the troublesome coldness of the extremities which is so often present in these cases.

It may be advisable to mention here that, in every case of diarrhœa occurring in infancy, the practitioner should satisfy himself that the child is properly clad. Sometimes, after all other sources of irritation have been sought for unavailingly, there may be reason to believe that the diarrhœa is the result of cold, although the exact method by which cold produces the diarrhœa is not very easy to understand. Still, it is a fact, which must occur within the experience of most practitioners, that the application of an additional broad flannel binder over the abdomen is followed not only by an increase of comfort and warmth in the extremities, but also by a diminution of diarrhœa. As a matter of routine, it is desirable that infants with diarrhœa should be kept in bed, lightly but warmly clad, and the tendency to coldness of the extremities should be counteracted by the use of hot-water bottles, covered with flannel, and placed within the bed at a safe distance from the child.

It is often recommended that opium, in some form, should be administered in severe cases, and elaborate calculations have been made to show that the amount of opium present in the compound kino powder, or in the aromatic chalk and opium powder of the *British Pharmacopœia*, is so small that it is possible, and even desirable, to employ this remedy, trusting to the kino and the aromatic chalk powder to exert a beneficial astringent action, which is to be aided by the sedative influence of the opium. In compound kino powder there is 5 per cent. of opium, and in aromatic chalk and opium powder $2\frac{1}{2}$ per cent. of opium. I have rarely employed opium in this way for infants, nor do I think that it is a safe

remedy to use when the child is already suffering from extreme weakness and collapse. These conditions appear to result far more from the drain of liquid from the system than from pain, and it is, therefore, hazardous to employ a drug which entails further risk.

One curious condition frequently noticed in the diarrhœa of infancy is the bright green coloration of the motions. This appears to depend upon the development of micro-organisms within the intestine, the green motions being commonly extremely offensive. When these green motions are being passed, it is necessary to employ some form of antiseptic. Small doses of mercury are frequently very beneficial. The gray powder of the *Pharmacopœia* may be mixed with milk sugar, to enable the small dose necessitated by the age of the child to be conveniently administered. I have sometimes employed, in lieu of this, a powder of sodium bicarbonate and rhubarb. The sodium salt is useful in counteracting the undue acidity of the contents of the intestine, while the rhubarb tends to remove the sources of irritation, and its action is followed by some astringent effect. In place of the sodium bicarbonate, small doses of sodium salicylate may be given, combined with carminative preparations. The salicylate appears to be split up in the alimentary canal, so that, with this salt, we obtain the benefit of an alkaline sodium compound with the antiseptic action of salicylic acid. Numerous other preparations have been highly recommended in the treatment of infantile diarrhœa for their power of favoring intestinal antisepsis. Salol (phenyl salicylate) has been strongly recommended, but it does not appear to me to be altogether devoid of risk in the diarrhœa of infancy, since it contains a large proportion of carbolic acid (40 per cent.), which may induce toxic symptoms. Resorcin, a derivative of benzene, or phenol, has also been somewhat largely used, but in my hands it has altogether failed to relieve the urgency of the symptoms, and I have long since ceased to employ it. I have carefully tested this drug repeatedly in my hospital practice, and I have invariably found that it was necessary to discontinue its administration in favor of other remedies.

It is to be remembered that much restlessness and discomfort result from thirst, owing to the great drain of liquid from the system. This may sometimes be relieved by the administration of bismuth subnitrate in sterilized water, from 2 to 5 grains to the drachm. This may be given in doses of a teaspoonful or so every hour, so long as the restlessness persists. At one time it was recom-

mended that the loss of liquid should be met by the transfusion of a saline solution. Although theoretically attractive, this treatment has not, in my practice, appeared to give very satisfactory results.

(*b*) In childhood diarrhœa most commonly results from injudicious experimentation on the part of the child—that is, it is nearly always caused by eating some highly indigestible or acid substance: unripe fruit, imperfectly masticated, is perhaps the commonest cause among country children; while in large towns, among the poorer classes, although diarrhœa may ensue from the same cause, it also often follows the ingestion of over-ripe fruit, which is already undergoing fermentative changes. The symptom is no doubt the result of irritation of the intestine, not only by vegetable acids, but also by irregular, hard, indigestible masses. Apart from this, however, diarrhœa may occur in childhood in epidemic form, more particularly during the summer months, and it may then be due to irritation induced by water infected with some specific organism. It is certain that, during the summer months, epidemic diarrhœa is more likely to occur after the continuance of hot, dry weather than when the heat is alternated with cooling winds and rain. Diarrhœa may also, in childhood, form the premonitory symptom of more serious specific disorders, such as typhoid fever, or it may occur, as already indicated, in connection with general tuberculosis, more particularly with tuberculosis affecting the mesenteric glands.

Since diarrhœa due to irritation is likely to be increased by exposure to cold, it will generally be found advisable to insist on the child remaining in bed, even though the symptoms may not be very severe; for apart from the benefit resulting from rest and warmth, there is also less likelihood of the child obtaining access to any fresh source of irritation when its movements are thus limited.

When a sharp attack of diarrhœa in a child can be distinctly traced to unripe fruit or other form of irritant, the symptom is best treated by favoring the eliminative action of the bowel by castor oil, since the use of astringents or sedatives can only be harmful so long as any irritating particles remain in the course of the intestine. It is desirable, therefore, to increase the rapidity of peristaltic contractions by using half-drachm or drachm doses of castor oil, unless the patient only comes under observation at a sufficient length of time after the onset of the attack, or after frequent diarrhœa renders it probable that the source of irritation has already been eliminated. Speaking generally, it is, however, so uncertain whether this desirable result

has been attained, that it is almost invariably well to commence the treatment of irritative diarrhœa in childhood with the administration of castor oil, or of some other mild but brisk purgative. The rapid evacuation produced as a rule by castor oil is ordinarily followed by an arrest of action; but, to insure a quiescent condition of the intestine, preparations of rhubarb are often used in place of castor oil, the rheotannic acid producing an astringent effect upon the vessels of the intestine. The compound rhubarb powder of the *Pharmacopœia* will often give satisfactory results, but its subsequent astringent effect should be assisted by the use of aromatic chalk preparations, which will relieve the pain so often left after acute diarrhœa. Most of the pain is due to the distention of the lax walls of the intestine with flatus, and the rumbling movements of this flatus, with the consequent spasm of different portions of the small intestine, will often produce almost more discomfort and complaint than the original attack of diarrhœa.

During the early part of the treatment it is advisable that the diet should be as simple and unirritating as possible. Food should be given in the liquid form, and should be of such a nature that it is readily digested with the minimum of insoluble residue. Milk, which may with benefit be diluted, is generally readily taken, and its employment may be facilitated by its administration with arrow-root or with boiled bread. In severe cases the milk should be given cold, since the introduction of a warm fluid into the stomach is apt to be followed by increase of peristalsis. Astringents are not often required when diarrhœa is due to simple irritation, but if it persists after the substitution of liquid for solid food, and after the castor oil or rhubarb powder has acted freely, it may be desirable to employ some intestinal sedative, or even an intestinal sedative combined with an astringent. Bismuth preparations are often extremely beneficial in the later treatment of the diarrhœa of childhood, since the sedative action of bismuth compounds is not limited to the effect upon the stomach. In the summer diarrhœa of children, Solis-Cohen gives—

R.—Bismuthi salicylatis gr. ij.
 Benzonaphthol gr. ij.
 Pulveris ipecacuanhæ et opii gr. ss.

Ft. pulv. For a child of two years.

In place of bismuth, the chalk mixture of the *Pharmacopœia* may be given in doses of half an ounce or less, according to

the age of the child, and the efficacy of this mixture is often increased by the administration of an equal amount of the decoction of logwood, or by the addition of appropriate quantities of tincture of catechu or tincture of krameria. The compound powder of catechu of the *British Pharmacopœia*, which contains kino, krameria, cinnamon, and nutmeg, is often used when the diarrhœa proves rebellious, but this powder is perhaps more serviceable in those forms of diarrhœa due to more chronic changes in the walls of the intestine.

When there is much complaint of pain, with much restlessness, it is sometimes advisable to use moderate quantities of opium; but it must be remembered that, if employed at all for children, this drug is to be used in relatively small proportions. If needed, there is no objection to the use of compound kino powder, which contains 5 per cent. of opium; while the aromatic powder of chalk and opium, although the proportion of opium is only one-half that contained in the compound kino powder, will sometimes give even greater comfort, on account of the large proportion of aromatic substances present.

Since the pain connected with attacks of diarrhœa is so frequently the result of spasmodic contraction of some portion of the intestine, it may often be relieved by warm applications over the surface of the abdomen, and indeed this treatment may sometimes render the use of opium unnecessary. Hot fomentations may be thus used, or spongiopiline, moistened with hot water, may be placed over the abdomen, and the relief is sometimes greatly increased by sprinkling the flannel or spongiopiline with laudanum, or with oil of turpentine, oil of cajuput, or some other volatile oil, and in severe cases there is no objection to employing these measures at the same time that opium is being administered internally. The treatment of forms of diarrhœa which occur in children as the result of definite diseases does not differ materially from the treatment of similar conditions occurring in adults, although the doses of the various remedies must necessarily be adapted to the age of the child.

(c) Diarrhœa, as it occurs in adults, may also be due to irritation, though the causes of irritation are perhaps rather more various than in children; thus, during the summer months, beer that is a little sour, or milk which has been kept too long, may start a violent attack of diarrhœa, which may seem out of all proportion to the small source of irritation. Diarrhœa occurring under these conditions is in all probability due to microbic action, which has produced fermentative changes of an irritant character, and the irritation in

the wall of the intestine, when once started, may continue long after the elimination of the exciting cause. Such forms of irritative diarrhœa in adults are to be treated on the same principles as in childhood, but opiates may generally be employed early with the view of relieving pain, and also of checking the rapidity of peristaltic contractions. In adults this form of diarrhœa will also more frequently call for the administration of stimulants to counteract the depression of the circulation; brandy may be given with milk throughout the day, or occasionally port wine is preferred, since it possesses not only stimulant but also astringent properties.

The need of warmth and of rest is determined by the severity of the attack. In mild cases, patients commonly continue their ordinary vocations; but with a severe attack, more particularly when it occurs during the summer months, and especially if there is an epidemic of diarrhœa, it will be desirable to keep the patient in bed and to observe the same precautions that are adopted in infancy, since during epidemics of diarrhœa exertion and exposure may speedily be followed by extreme collapse. During times of epidemic, especially if many cases of typhoid have occurred in the neighborhood, it is well to treat every case on the supposition that it may eventually prove to be typhoid—that is, the diet should consist entirely of liquids, and unless the diarrhœa is profuse and exhausting, it is better not to employ any active remedies to check this symptom. To some extent the temperature-chart will assist in the diagnosis, but to be of any marked service this chart must be kept over a succession of days, since even in irritative diarrhœa there may be a rise to 100° , 101° , or even higher; while, at the commencement of typhoid fever, the temperature in exceptional cases may remain but little above the normal, so long as the diarrhœa is very profuse. When it is certain that the attack is one of simple irritative diarrhœa, and the source of irritation has been removed, various astringents may be employed with a free hand. Some practitioners prefer to use mineral acids, while others prefer one or other of the drugs rich in tannic acid, or in modified forms of tannic acid. The following prescriptions are used at some of the London hospitals:

R.—Acidi gallici	gr. x.
Acidi sulphurici diluti	℥ _{xx} .
Tincturæ opii camphoratæ	℥ _{xx} .
Aquæ	q. s. ad ʒj.

R.—Acidi gallici	gr. x.
Acidi sulphurici diluti	℥x.
Tincturæ opii	℥v.
Aquæ	q. s. ad ʒj.
R.—Glyceriti acidi gallici	gr. x.
Acidi sulphurici diluti	℥x.
Tincturæ opii	℥v.
Aquæ	q. s. ad ʒj.

Preparations of cinchona may be employed to exert an astringent effect, and also to increase appetite ; but more commonly logwood, catechu, and kino are the drugs which are given, and these may be employed with aromatic chalk powder, or the chalk mixture of the *Pharmacopœia*. The following is often employed :

R.—Vini ipecacuanhæ	℥xx.
Tincturæ catechu	℥xx.
Tincturæ krameriæ	ʒj.

Coto bark has been highly praised for diarrhœa, but it is not yet official. This bark is rich in resinous principles, and the tincture therefore requires to be administered with mucilage. The tincture may be used in doses of 5 to 10 minims, administered every two hours so long as the diarrhœa persists.

A form of diarrhœa which requires some special treatment is that which follows upon continuous indulgence in alcohol. To these cases the term "diarrhœa" is perhaps scarcely applicable, although they are marked by the passage of three or four loose, unformed motions in the twenty-four hours. They may be regarded as primarily due to irritation, but the mere abstinence from alcohol is commonly insufficient to effect a cure. Frequently the irritation of the intestine is associated with similar gastric disturbance, producing symptoms of chronic gastritis ; but sometimes these symptoms, or at least the more urgent of them, will pass off, while the enteric symptoms may persist. These cases are to be treated on the principles already detailed in connection with chronic gastritis. They call for the administration of preparations of bismuth and of other sedatives rather than for the employment of more active astringents. Commonly the lax condition of the bowel is associated with much accumulation of flatus, and this may cause considerable discomfort and indicates the need of carminatives. Occasionally, when an attack of diarrhœa ensues after a prolonged bout of drinking, the treatment may be commenced with the administration of a saline purgative,

which may be repeated for one or two days ; it is then well to resort to the employment of bismuth subcarbonate or subnitrate, and to give either of these drugs in conjunction with diluted hydrocyanic acid. *Nux vomica* is also frequently of great service in these cases, since it increases the appetite and digestive powers, but it is not to be trusted alone, the irritation of the intestine demanding the use of sedative measures. When dealing with mild cases of intestinal catarrh due to alcoholism and devoid of pain, opiates are not generally required ; but when the symptoms are severe, and persist in spite of the administration of preparations of bismuth and of tonic remedies, the camphorated tincture of opium is often found to be extremely serviceable.

Intestinal catarrh, as the result of alcoholism, may not always lead to any complaint on the part of the patient ; indeed, it may be asserted that the bowels are acting regularly, even though further inquiry shows that the supposed regularity consists in frequent excessive action. Such irregularity of action in these cases is often regarded by the patient as more satisfactory than constipation. In dealing with alcoholic cases, however, it is well to remember that the cause of the symptoms may depend upon changes outside the intestine, and that excessive frequency of action may arise in consequence of hepatic engorgement, which may itself be due to alcoholism.

Hepatic engorgement from other causes may, however, be followed by diarrhœa. Even when the engorgement is due to temporary alterations, as with the acute hepatitis induced by cold, there may be some increased frequency of action ; this is in part due to interference with the portal circulation, and in part no doubt to diminished supply of bile. When the body has been chilled after having been previously heated, as, for example, with bathing on a hot day after exertion, the motions are very apt to become loose and devoid of bile-coloring matter, even though the interference with the functions of the liver may be insufficient to produce any other obvious indications. When due to chill, this form of diarrhœa commonly subsides in a few days without requiring any special treatment ; but the recovery may be assisted by the avoidance of fresh exposure, by early hours, and by a saline purgative. When, however, the obstruction to the portal circulation is induced by more chronic causes, the symptom may be more persistent and may call for the occasional administration of mercurial purgatives, such as small doses of gray powder, or of calomel.

Sometimes this symptom occurs in connection with cirrhosis, but, as a rule, it is more likely to arise with diseases which indirectly obstruct the portal system; thus, it is not uncommon for it to be associated with chronic pulmonary complaints, or with chronic forms of heart disease, in which the compensation is commencing to fail. When diarrhoea occurs under such circumstances, it is rarely sufficiently profuse to call for much active treatment. Measures must be adopted for removing the cause, and these will commonly include the administration of drugs which, like digitalis or strophanthus, increase the contractile power of the ventricle, and thus diminish the venous engorgement. Sometimes, however, it may be necessary to check undue frequency of action by the employment of enemata containing opium, and if there is much weakness induced by excessive purgation, it will be advisable to give astringent preparations by the mouth, together with stimulants. Should the symptom arise while the patient with heart disease is already under treatment for this complaint, it is always desirable to reduce the amount of digitalis administered, and even to substitute strophanthus for digitalis, since diarrhoea may, in some constitutions, result from the employment of the latter remedy. I have frequently seen the discontinuance of digitalis followed by a cessation of diarrhoea, even without the use of any other remedies.

Undue frequency of action, the consequence of malignant disease of some portion of the intestine, has already been mentioned. In these cases the motions are passed with difficulty and often with pain, and their frequency is an indication of obstruction rather than of irritation; hence, the mere frequency is a fallacious indication, and calls for the administration of laxatives prior to the probable adoption of surgical measures.

The forms of diarrhoea associated with lardaceous disease, with tuberculosis, with dysenteric conditions, and with typhoid fever, will be more appropriately considered under those separate headings, though it may be here indicated that both the lardaceous disease and in tuberculosis, benefit will sometimes result from the employment of small doses of alum, even when other astringents appear to give but little relief.

Severe attacks of diarrhoea occasionally ensue after prolonged constipation. The hardened masses of feces, which have been retained within the bowel, serve as irritants which cause the evacuation of small scybalous masses together with much mucus. An

inspection of the motions will suffice to indicate the appropriate treatment under such conditions, though the nature of the trouble may be suspected when complaint is made of dull pain which is referred to one portion of the abdominal wall, and is occasionally greatly increased whenever any hard masses of feces pass over the inflamed surface. The risk of constant repetition of irritation may usually be obviated by alterations in the diet which will reduce the bulk and the firmness of the intestinal contents. This may be effected by recommending a diet consisting largely of milk, which may be thickened with arrowroot, tapioca, or flour ; and if this seems insufficient, simple custard puddings may be given, or occasionally eggs beaten up with milk may be taken. All forms of food that may induce irritation should be avoided. The use of figs, or of other fruit containing hard insoluble material, is distinctly contraindicated so long as any tenderness persists. The further treatment consists in the use of laxatives and of enemata, though in severe cases it may be necessary to remove the scybalous masses from the lower portion of the bowel by mechanical agencies. When it appears probable that prolonged constipation is the cause of the diarrhœa, it will be advisable to treat the case on the principles already laid down for the treatment of diarrhœa due to irritation—that is, purgatives, such as castor oil or senna, may first be used to clear the alimentary canal of any source of irritation, and after these have acted efficiently, astringents may be administered if diarrhœa persists. Frequently, however, after the alimentary canal has been thus emptied, small doses of belladonna and nux vomica, constantly repeated, will serve to re-establish the normal regularity of contraction, and will thus counteract the tendency to constipation and remove the liability to diarrhœa from this cause.

Several new remedies have been recently introduced with the view of exerting local action upon the intestine, while they pass through the stomach unchanged. These remedies are commonly substances which are insoluble in acid, but soluble in alkaline fluids. Among them may be mentioned preparations derived from tannin, such as tannoform, a condensation product of nut gall, tannin, and formaldehyde. Tannoform is stated to have been used with satisfactory results as an intestinal antiseptic and as an astringent in cases of infantile diarrhœa. Tannalbin is the albuminate of tannin, which contains 50 per cent. of tannic acid. This drug is tasteless, and it has been employed in doses of from 5 to 15 grains, four times

a day in water or in milk, in cases of subacute or chronic intestinal catarrh. Tannigen, a compound of tannin and diacetyl, is stated to pass through the stomach unchanged and to decompose in the duodenum, where it liberates tannin in the nascent condition. Moncorvo¹ has found that its action is generally prompt, certain, and effectual, both in acute and chronic diarrhœa. He also states that the activity is no way reduced when it is associated with antiseptics, such as salol, or bismuth salicylate, and he therefore recommends that it should be used in conjunction with these when there are indications of active fermentative processes in the large intestine. Tannigen can also be given in milk, in doses of from 2 to 16 grains, three or four times a day.

Dysentery. In the foregoing section, the laxity of the action of the bowels is not necessarily attributable to changes in any special part of the intestine. The symptom of diarrhœa may be the result of changes in the upper part of the small intestine, especially when it is due to irritation; sometimes, on the other hand, when due to prolonged constipation and the irritation produced by a mass of impacted feces, it may be the result of inflammatory changes in the large intestine, more particularly in the cæcum. It remains in the present section to consider a form of diarrhœa in which the anatomical changes are primarily, if not entirely, located in the large intestine. These changes are sometimes those of simple inflammation, but in more advanced cases the mucous membrane may be greatly denuded, and in the most severe type deep ulcerations may be formed in the course of the large intestine.

The treatment to some extent depends upon the stage of the disease. As seen in this country, dysentery is generally chronic; but it occurs in an acute form, more particularly in tropical countries and in malarial districts, and the treatment of the acute malady is necessarily more energetic than that of the chronic. The acute form may arise under conditions of overcrowding, especially when the sanitary arrangements are bad and individuals are subjected to much muscular exertion with a deficiency of food; thus, for example, the acute form of dysentery frequently occurs in armies in the field, especially if exposed to rain and to rapid alterations of temperature. Under these conditions severe diarrhœa may commence, and violent symptoms may arise as the disease spreads. In an epidemic

¹ Bull. de l'Acad. de Méd., December 3, 1895.

form it has frequently, also, been attributed to the use of impure water, especially when contaminated with sewage. In all probability, however, the worst forms of dysentery depend upon the action of septic organisms in addition to that of a specific virus.

In the acute stage, the patient should be kept in bed, and should be encouraged to lie upon his back and to avoid all unnecessary movements. If the conditions permit, he should not even be allowed to get up to attend to the calls of nature, since exposure to cold and all movements are likely to be followed by an increased severity of the symptoms. The abdominal pain may be relieved, to some extent, by the application of hot fomentations, poultices, or mustard plasters, though frequently it will be necessary to assist the operation of any of these measures by employing small doses of opium, or of morphine. It is well to remember that these remedies are to be used only for the temporary relief of pain, and that the dose must not be pushed with any hope of checking the frequency of action of the bowel ; indeed, many practitioners prefer to treat cases of acute dysentery without employing opium. Since the pain of dysentery is chiefly of the nature of tenesmus, the local application of opium will be more beneficial and less harmful than its administration by the mouth. Suppositories of morphine or of acetate of lead and opium may be employed ; but the latter are frequently somewhat irritating, and it is better either to make up a suppository of opium and oil of theobroma (1 grain of opium in each), or to administer small enemata of opium, as, for example, half a fluidrachm of tincture of opium with 2 fluidounces of mucilage of starch. A greater bulk of liquid would be likely to be rejected, owing to the extreme sensitiveness of the rectum ; while, if the laudanum is used in more concentrated form, the spirit present would be apt to promote an action of the bowel. It is better therefore to use the mixture in the above-named proportions, or even to employ repeatedly an enema of half the amount until the tenesmus is relieved. It is often found, however, that after the passage of a motion the tenesmus is considerably less ; hence, it is advisable not to be too precipitate in employing opiates, nor to be misled by the symptoms of relief, which may not necessarily be due to the drugs employed. If it is decided to administer an enema, or a suppository, the tenderness of the anus and of the rectum should be borne in mind, and the introduction of the suppository or of the rectal tube, should be made with the utmost gentleness. Although the employment of opium by

the mouth may be followed by some immediate relief of pain, this is frequently attained at the expense of very great subsequent discomfort, since the temporary inaction of the large intestine, due to the opium, will in all probability be followed later by a great increase of tenesmus.

Most authorities are agreed upon the benefits of ipecacuanha in the treatment of dysentery, though the exact method of its employment has given rise to much divergence of opinion. It may be stated, however, that there is a consensus of agreement against the use of astringents to arrest the frequency of diarrhœa. The disease is infectious, contagious, and due to the presence of a specific germ, and it is therefore unscientific to attempt to undermine the action of this germ by ordinary astringent measures. It is somewhat difficult, however, to afford an explanation of the mode of action of ipecacuanha, although there is very little doubt about its efficacy. Some authors speak of it as a specific cholagogue ; possibly the drug may be beneficial through its influence upon the secretion of the liver, which is rendered more fluid and perhaps more abundant, and in this connection it is worth remembering that in some cases of dysentery hepatic symptoms are present, with frequent bilious vomiting. It is commonly recommended that doses of from 20 to 30 grains or more of the powdered root should be given twice a day, and since this dose is liable to promote vomiting, its administration is frequently preceded by a small dose of opium, or by 30 grains of potassium bromide ; and further, with the view of diminishing the risk of vomiting, or of allaying vomiting if this has already occurred, small pieces of ice may be sucked frequently, both before and after the use of ipecacuanha. Moreover, it is desirable to keep the patient without food for some hours, or only to administer small quantities of nourishment in a liquid form. A little milk, or an egg beaten up with milk, will sometimes serve to tide over difficulties during the commencement of the treatment with ipecacuanha. The large dose above mentioned may be given in wafer paper, or in cachets, or it may be made up into a mass with a little syrup. It has been suggested that this drug should be given in the form of pills ; but these would require to be unduly bulky to admit so large a dose, or else it would be necessary to give an inconvenient number, and, since many patients find it almost impossible to swallow a pill without a draught of water, the amount of fluid thus taken might provoke vomiting. Brunton recommends that a dose of laudanum should

be given half an hour before the administration of ipecacuanha, and that after the latter has been taken the patient should be kept in the recumbent posture, with his head low.

When vomiting forms a prominent symptom from the commencement of the attack, the administration of these massive doses of ipecacuanha is generally inadvisable. Sometimes it has been recommended that efforts should be primarily directed to arrest the vomiting, and minim doses of tincture of iodine have been given every half-hour with this object. If, however, there is much rise of temperature, $\frac{1}{8}$ -minim doses of tincture of aconite have been used, repeated every half-hour until the temperature falls; but even under such circumstances it is generally considered to be advisable to give ipecacuanha also in small doses frequently. According to the urgency of the symptoms, from 5 to 10 grains of ipecacuanha may be administered every four or every six hours, and if given with sedative remedies this dose can frequently be tolerated when larger doses are rejected. The ipecacuanha may be made up into a mixture with from 10 to 15 minims of laudanum and 10 to 15 grains of bismuth subcarbonate and the same amount of sodium bicarbonate.

The following prescription has been used with marked success in the Mandoli Regimental Hospital at Bhurtpore in cases of acute dysentery :

R.—Quininae sulphatis	gr. ij.
Pulveris ipecacuanhae	gr. v.
Ammonii chloridi	gr. x.
Tincturae opii	℥ xij.
Aquæ	q. s. ad ʒj.

To be given every four hours.

Another remedy that has been much used is calomel. Fairly large doses of this drug have been given at the commencement of an attack of dysentery, with the object of exerting intestinal antiseptics, and also of eliminating the specific germ upon which the disease depends. Calomel is, however, of more service for chronic dysentery than for the acute form.

The above treatment is that which is perhaps most generally approved by those with tropical experience, but in different localities and under different climatic conditions various modifications have been made; for example, in India, many are in favor of using bael fruit, the liquid extract of which is given in doses of from 1 fluidrachm to $\frac{1}{2}$ fluidounce. This drug is mucilaginous in the fresh

state, and in health it appears to act as a laxative, although in dysentery it undoubtedly lessens the evacuations to some extent, this action being, by Brunton, referred to an influence on the vessels of the intestine. The statements made concerning bael fruit are, however, extremely contradictory, and in England it appears to be devoid of active properties.

When dysentery arises in a malarial district, it is necessary to employ quinine, particularly if the patient exhibits any indications of fever. It is best to give quinine in the middle of the day, in a large single dose of 15 to 20 or 25 grains; but ipecacuanha should also be administered, the latter drug being most conveniently taken in the early morning and at night-time.

During the course of an attack of acute dysentery there is often considerable depression and collapse, on account of the frequency and amount of the diarrhoea. Symptoms of collapse call for stimulant remedies, but the stimulation is better effected by diverting the blood to the cutaneous vessels than by the administration of alcohol or other stimulant drugs. With much collapse it will be desirable to employ a hot bath, and after the pulse has somewhat regained its force the circulation in the extremities should be maintained by the use of hot-water bottles and blankets.

When the immediate urgency of acute dysentery has passed away, smaller doses of ipecacuanha may be given daily until the motions return more nearly to their normal condition; the patient also may be allowed to have a more liberal diet so far as quantity is concerned, although, until convalescence is established, milk should form the chief article of food.

During an attack of dysentery, it is stated that most of the secretions are either in a state of abeyance or in a perverted condition; thus the saliva is said to become acid, the gastric juice alkaline, and the secretion of bile to be generally arrested. Under these circumstances, it is obviously impossible to administer solids, or indeed liquids, which make any great call upon the digestive functions, and inasmuch as it is known that the large intestine is in a state of inflammation, if not of ulceration, it is most desirable to allow those forms of food only which leave but little insoluble residue. Some practitioners are in favor of a milk diet throughout, and in some chronic cases I have witnessed considerable benefit from this abstention from solids. I remember one case in King's College Hospital in which milk was exclusively persisted in for three months, earlier

efforts to change to a more liberal diet being attended with a return of dysenteric symptoms.

It remains to say that, on theoretical grounds, dysentery has frequently been treated with creosote, eucalyptus, corrosive sublimate, and naphthalin, all of which are administered with the view of controlling the influence of the specific germ of dysentery, but the results obtained do not appear to be sufficiently certain to encourage the general adoption of any of these remedies.

Reference has already been made to the use of enemata of opium in cases marked by much tenesmus, but enemata sometimes are also of especial service when the character of the motions or the nature of the pain indicates that considerable anatomical changes are present in the lower part of the intestine. The enemata may be employed, either with the view of diminishing the frequency of the diarrhœa, or for the purpose of introducing a fairly large supply of warm liquid, which, for the time being, whether absorbed or not, frequently increases the patient's comfort. With the former object, various astringents have been recommended, as, for example, alum and lead acetate. To be of any benefit, these enemata should be introduced high into the intestine, with as little force as possible, the introduction being facilitated by raising the patient's hips, so that the fluid tends to gravitate along the descending colon. Dilute solutions of silver nitrate, 8 grains to the pint of warm distilled water, have been employed to wash out the rectum; and various antiseptics, such as creolin (1 in 200), have been given, with the view of controlling amœboid movements. Osler recommends the injection of quinine in cases of dysentery associated with amœbæ. He employs solutions varying in strength from 1 in 1000 to 1 in 5000.

In the treatment of chronic dysentery it is advisable, in the first place, to insist upon change of air and surroundings. Many severe cases of chronic dysentery improve materially during the journey to temperate climate, and gain still further benefit on being put under sanitary conditions either in their homes or in a well-appointed hospital. As in other forms of chronic diarrhœa, it is necessary to insist upon the importance of warm clothing, particularly when the patients are sufficiently well to be able to keep on a sofa, instead of being obliged to remain in bed. The value of a broad strip of flannel around the abdomen is well known to all who have worked in tropical climates. In some chronic cases it is desirable to maintain the purely milk diet above mentioned, but occasion-

ally an egg may be beaten up with it. In chronic cases astringents may prove beneficial, but it is generally desirable to use sedative measures, especially if drugs other than ipecacuanha are being given by the mouth. I have seen much benefit result from the administration of bismuth salicylate. This I have prescribed in cachets, in doses of 20 grains, twice daily, and marked diminution in the number of motions passed, with considerable relief of discomfort has ensued. Sometimes the bismuth salicylate has been followed, by flatulence, a trouble that speedily yielded when 2 grains of ammonium carbonate were given with each dose of bismuth salicylate.

In these chronic cases it is sometimes desirable to use simple purgatives occasionally, especially when the motions are unduly offensive. Castor oil is of extreme value under such conditions, though it is well to use only moderate doses of a drachm or so, since larger doses may excite fresh symptoms of irritation. In these chronic cases calomel may sometimes be substituted for castor oil, though this remedy has to a great extent passed out of fashion. The objections to the use of astringents as well as to that of preparations of opium do not hold good with cases of chronic dysentery. After ipecacuanha has had a fair trial and has been given for a length of time, astringent preparations—for example, cinchona, kino, and catechu—are sometimes of great service, and the administration of a powder containing kino, 75 per cent.; opium, 5 per cent.; and cinnamon, 20 per cent., is often attended with success.

In chronic dysentery considerable anæmia frequently results, and this symptom is best treated, according to Dr. Maclean, with a solution of pernitrate of iron. He states that during the administration of this drug the color speedily improves, while the stools become more natural and less frequent, and the digestion is more perfectly performed. When the extreme urgency of symptoms has subsided, further restoration may be effected by the employment of citrate of iron and quinine. When associated with symptoms of scurvy, or of purpura, antiscorbutic remedies must be adopted, and foremost among these lies the frequent administration of lemon juice. As appetite is restored, and the frequency of the stools become less, the diet may be rendered more liberal, concentrated soups being given in addition to milk; and if these are well tolerated, solids may by degrees be added, as, for example, boiled chicken, lamb, or mutton.

The treatment of dysentery¹ was under discussion at the meeting of the British Medical Association in 1898, and considerable difference of opinion was elicited.

Sandwith (*British Medical Journal*, September 24, 1898), as the result of experience at Cairo, is inclined to discard the use of ipecacuanha, even when prescribed in the de-emetinized form. He prefers to use magnesium sulphate in doses of 1 drachm every hour until the bowels are well emptied. Latterly he has trusted largely to enemata, especially to those containing copper sulphate, and he employs these even in acute cases.

Major Davidson, on the contrary, is of opinion that ipecacuanha is useful in checking the disease in its early stage by causing exudation from the mucous membrane, and thus allaying tension and inflammation. Lieut.-Colonel Crombie also believes that ipecacuanha is of great service in true acute dysentery. He gives it in large doses, having previously administered chloral.

Captain Johnston (*British Medical Journal*, April 16, 1898) testifies, on the other hand, from his Indian experience, that ipecacuanha has not the effect with which it was formerly credited. He, like many others, strongly recommends magnesium sulphate. He says that patients may come into the hospital passing fifteen stools a day containing blood and slime, and that when treated in the following manner the average duration of the attack is only two or three days, even for those on field service. The patient is at once put on a purely milk diet, and is given 2 drachms of magnesium sulphate every four hours, combined with aromatic sulphuric acid, 5 minims (to counteract any severe griping that may be caused), till the flow of bile is well established, as seen in the stools.

In Great Britain, however, where chronic dysentery alone comes under observation, the general consensus of opinion points to absolute rest, a milk diet, and treatment by large slow irrigation with boric, quinine, or silver nitrate solutions, with or without the internal administration of bismuth salicylate and salol.

Intestinal Obstruction. The symptoms of intestinal obstruction to some extent depend upon the cause of obstruction, and they vary greatly according to whether the cause is one which acts suddenly or gradually. It has already been indicated that in some cases diarrhœa may result from obstruction of the course of the

¹ Year Book of Treatment, 1899.

intestine by a fecal mass, which produces irritation at the site of impaction, and reference has already been made to the spurious form of diarrhœa, or rather the condition which is frequently described by the patient as diarrhœa, when the obstruction is partial and leads to the passage of small scybalous masses, or tape-like motions, together with much mucus and blood, as, for example, in many cases of malignant disease of the lower part of the intestine. But, in addition to these, we are frequently called upon to deal with intestinal obstruction, which may occur with comparative suddenness, while at the same time the cause of obstruction may not be very obvious.

The course to be adopted depends to a very great extent upon the diagnosis, though frequently the treatment, if surgical, is to be regarded in the light of an exploratory operation to ascertain and to remove, if possible, the cause of obstruction. It may be well, therefore, to classify briefly the chief conditions under which intestinal obstruction may arise.

In early life the commonest cause is undoubtedly intussusception, which occurs most frequently at the ileo-cæcal valve with the invagination of a portion of the small intestine into the cæcum; this invagination may involve not only the ileum, but a portion of the large intestine may be forced onward, partly by straining efforts, and partly by the contractions of the ascending colon. This condition is associated with considerable evidence of pain and of collapse, the appearance of a child with intussusception being extremely characteristic, even when the condition is of recent development. Intussusception may be suspected when a child, previously in good health, or perhaps suffering from diarrhœa, becomes suddenly collapsed, and passes motions containing blood. In extreme cases, examination by the rectum may disclose the presence of a tumor consisting of the invaginated intestine. Frequently, however, this cannot be reached, and the diagnosis has to be based upon the nature of the stools, the tenesmus, and the existence of a tumor, which is generally in the position of the transverse colon. This tumor may sometimes be made out with comparative ease, but occasionally the exact limitations can only be ascertained during the administration of an anæsthetic.

The treatment of intussusception is mainly surgical, though numerous measures have been recommended for adoption while the diagnosis remains uncertain, or pending the opportunity of securing

surgical assistance ; thus, the pain may be relieved by the hypodermatic administration of morphine, or hot fomentations may be applied over the surface of the abdomen, to relieve spasm. Copious injections of water have been said to be beneficial, and at one time it was advised that the colon should be distended with air, with the view of forcing back the invaginated portion of the intestine. This proceeding, although stated to have occasionally given satisfactory results, is not now generally recommended, since, although it is undoubtedly possible thus to force back the greater part that has become invaginated, there is great probability of a portion of the intestine remaining unreduced, and so long as this is the case, there is extreme likelihood of the return of intussusception, and also great risk of the invaginated portion undergoing necrotic changes. The plan, therefore, which is now commonly followed, is the examination of the child by the rectum, as well as through the abdominal wall, under an anæsthetic ; and if this indicates intussusception, an attempt may sometimes be made to return the invaginated bowel by injection or by inflation ; but if these fail, no time should be lost before the early performance of an operation. The injection of fluid is preferable to inflation, since the force employed can be more readily estimated. Normal salt solution at a temperature of 100° to 105° F. may be used by an irrigator which should not be raised more than three feet above the level of the bowel, to avoid the risks of sudden overstrain. Steady, long-continued distention under a low pressure is more safe and more efficacious than rapid dilatation under a high pressure. The chance of recovery depends greatly upon early reduction, since the development of peritonitis is favored by delay, and there is also the risk that strangulation of the invaginated intestine may lead to ulceration and perhaps perforation.

When acute intestinal obstruction is due to the presence of malignant changes in the wall of the intestine, the symptoms will arise later in life. The history will in all probability disclose the fact that, previous to the urgent symptoms of obstruction, the patient has for some months been troubled with frequent motions, passed with considerable straining and difficulty, and sometimes attended with the passage of mucus and blood. Under such circumstances, prior to symptoms of complete obstruction, considerable benefit may sometimes ensue from the use of simple laxatives, such as the confectio of senna or of sulphur, or the compound liquorice powder. With severe pain and complete arrest of action, vomiting will gener-

ally be superadded, and, as a rule, it is possible to detect the presence of a tumor consisting mainly of fecal accumulations above the site of obstruction. These fecal masses usually occupy the sigmoid flexure, and are therefore to be found in the left iliac region ; but I have known cases in which the tumor, resulting from fecal accumulation in the sigmoid flexure, extended across the abdomen to the right of the middle line and occupied the position of the cæcum, thus simulating the condition generally met with in obstruction at the ileo-cæcal valve, or in appendicitis.

With such symptoms, medicines can be of little service, the utmost that can be hoped for from the administration of drugs being the temporary relief of pain, pending the adoption of more radical measures. As the diagnosis is, however, occasionally extremely obscure, it is necessary to examine by the rectum, and to determine, if possible, whether the impaction of feces results merely from chronic constipation, in which case the fecal mass may probably be reached by rectal examination ; or whether the rectum is empty, in which case the malignant growth may frequently with some difficulty be reached. If it is clear that the obstruction is due to malignant disease, purgatives will be of no service, and may indeed be dangerous. Enemata may be employed with caution ; but in all probability it will be impossible, by means of enemata, to effect any dislodgement of the accumulation, and, pending the adoption of surgical treatment, palliative measures must be used, such as the hypodermatic injection of morphine, or the administration of opium or morphine by the mouth, while fomentations over the site of pain will also occasionally give much relief.

To check vomiting, it has been recommended that the stomach should be washed out with a stomach tube, and it will always be found necessary to minimize the probability of the occurrence of further vomiting, partly by allowing the patient to suck ice frequently, and partly by the administration of nutriment in the form of liquids. With definite acute obstruction arising from malignant disease, operation is imperative, if the strength of the patient will permit. Symptoms of intestinal obstruction may frequently arise in connection with other causes than those above named, as, for example, with constriction of the intestine by peritoneal bands, the result of previous attacks of peritonitis. In these cases, also, although the diagnosis is generally somewhat uncertain, surgical aid should be sought, though sometimes the administration of

opium and the use of belladonna may be followed by some improvement.

More hopeful are the cases of obstruction due to the presence of abdominal or pelvic tumors pressing upon, or dragging upon, some portion of the intestine. Occasionally we may meet with cases where the existence of a tumor has long been known to the patient or to the medical attendant, and in which the symptoms of obstruction have arisen either gradually or suddenly from some alteration in the position or in the size of the tumor. Ovarian cysts are perhaps the most frequent causes of this condition, but obstruction has been known to result from gradual enlargement of the uterus, especially when displaced, or from gradual enlargement of the kidney, if the seat of tubercular or malignant disease. Under such circumstances it is occasionally possible to afford relief by manipulation of the tumor, and thus to diminish the amount of pressure which it may be exerting upon the intestine. When an ovarian cyst is present, the immediate danger will be largely reduced by the removal of liquid by tapping, although the question of more radical measures for affording permanent relief should be discussed with the patient or her friends. Pending the decision on this matter, efforts should be made to reduce the fecal accumulation by the use of copious enemata, the introduction being facilitated by the position of the patient and by the use of a long, flexible tube.

In connection with chronic constipation, symptoms of obstruction may arise, and the condition must be dealt with by enemata of quantities of warm soap and water, to which an ounce or more of olive oil may with advantage be added. When the direct pressure upon the intestine has been relieved, it will be advisable to employ purgatives or laxatives, such as castor oil, or the compound senna mixture, or, as already mentioned, the confection of senna or of sulphur may be used. If the fecal mass has become very firm, it should be softened, previous to the employment of these laxatives, by the rectal injection of 3 or 4 ounces of olive oil, and if no relief follows within twelve hours or so, it will be advisable to use a copious warm enema of soap and water. When the obstruction results from simple accumulation of feces in the rectum or in the sigmoid flexure, it will be necessary to remove the mass, or as much of it as can be reached, by breaking it down with the finger, or by using a metal scoop or the handle of a spoon, to facilitate the disintegration of the fecal mass. When the lower part of the bowel is thus dis-

tended, enemata are of very little use, as the bowel has lost its contractile power.

When the obstruction is due to chronic constipation, it is necessary to be extremely cautious in the use of opium, since this remedy will greatly favor a continuance of constipation ; if used at all under such circumstances, small doses should be given sufficient only to allay pain, or to diminish its acute character. Occasionally considerable relief may follow from careful manipulation of the bowel over the site of obstruction, and the chances of relief may be increased by the adoption of this method during the use of a warm bath, or during the administration of an anæsthetic, either of which will favor the relaxation of any obstructing spasm. To be of any service, these measures must be adopted soon after the onset of the symptoms of obstruction ; at a later period, if employed in the presence of inflammatory changes in the wall of the intestine, abdominal taxis might be dangerous. In conclusion, it must be repeated that as the diagnosis in intestinal obstruction is so frequently obscure, and the measures for relief are so largely surgical, it will be advisable in all cases of doubt to obtain the co-operation of a surgeon at an early date.

CHAPTER XI.

DIGESTION—*Continued.*

Appendicitis—Typhlitis and Perityphlitis—Acute Peritonitis—Chronic Peritonitis—Tuberculous Peritonitis—Animal Parasites Affecting the Intestine—Thread-worms—Round-worms—Tape-worms—Hydatids of the Liver—Trichinosis.

Appendicitis. Appendicitis is always associated with pain in the right iliac region ; the pain occurs suddenly, with an increase of temperature, and perhaps with considerable sickness, though the last symptom may occasionally be absent. It usually arises first in comparatively early life, and even when the acute attack has passed off it is extremely likely to be followed by subsequent attacks. The inflammation of the appendix may be dependent upon the presence of foreign bodies, such as apple pips, but far more commonly the solid body within the appendix consists of inspissated mucus and feces which have undergone changes with deposition of lime salts. The inflammation of the appendix often leads to ulceration, and this in turn may cause perforation with severe suppurative peritonitis. More frequently, however, the ulceration causes a localized peritonitis, and the pus that is formed may burrow in almost any direction ; thus it may occasionally pass forward and point midway between the umbilicus and the anterior superior iliac spine. But I have seen two cases in which the pus accumulated in the retro-peritoneal tissues behind the cæcum, and passed upward and backward in the lumbar region.

The treatment of appendicitis necessarily involves the adoption of measures calculated to diminish all abdominal movements and to reduce the intestinal contractions ; in other words, the patient must be kept in bed so long as there are any indications of pain or of tenderness in the region of the appendix, and the diet should be confined to the use of liquids given in small quantities and repeated frequently, if need be. Considerable difference of opinion has been expressed concerning the use of opium in appendicitis, although the pain is so great that the administration of this drug appears almost imperative. The use of opium is objected to by surgeons, since it may produce a false feeling of security by masking the symptoms. It is held, for example, that if the patient is kept

fairly free from pain by the use of opium, indications of suppuration may be obscured, and the chances of successful operation at an early date may thus be reduced. While this objection holds good against the use of large doses of opium, physicians generally consider it to be good practice to use small doses enough to give at least some degree of relief, although not sufficient to cause complete narcosis. Pain may also be relieved locally by the employment of hot fomentations, of turpentine stupes, or of poultices sprinkled with laudanum or with belladonna. It is also well to commence treatment with the use of enemata of warm soap and water, so as to relieve the lower bowel of its contents with the minimum of muscular exertion. This measure is the more necessary, as appendicitis most commonly occurs in connection with chronic constipation, and the comfort will be greatly increased by such removal of fecal accumulations, which might otherwise entail considerable headache or involve the risk of straining efforts.

It has been urged that at the commencement cases of appendicitis should be treated with saline purgatives; the arguments in favor of this course being in the first place the frequency of constipation, and in the second place the possibility of diminishing inflammatory processes by temporarily depleting the vessels of the intestine; but in general it is not only unnecessary, but indeed unsafe, to resort to purgatives of any kind, since the severe pain of appendicitis is most commonly an indication, not so much of inflammation of the appendix, as of inflammation of surrounding tissues. Indeed, it may be questioned whether any case of appendicitis is ever wholly free from some degree of peritonitis, or from some inflammation in the tissues outside the peritoneal cavity. Under such circumstances, it is obviously undesirable to employ any measures which, by causing increased peristalsis of the intestine, will necessarily involve increased disturbance of the peritoneum. The peritonitis of mild cases of appendicitis is happily generally localized, and the safety of the patient will to a large extent depend upon the limitation of the peritonitis to the small area primarily involved. By the use of saline purgatives, or indeed of any purgatives, there is considerable risk of so far disturbing the viscera as to convert a localized into a generalized peritonitis. Further, if the peritonitis is associated with ulceration and perforation of the appendix, the form of peritonitis which may follow the use of purgatives will necessarily be very severe. On all grounds, therefore, it appears wiser to be content with the admin-

istration of the minimum quantity of liquid nourishment required, and with emptying the lower portion of the intestine by the use of enemata, pending the subsidence of the inflammation and the formation of adhesions of a protective nature. In a comparatively large proportion of cases, whether ulceration has occurred or not, recovery will follow with gradually subsiding symptoms. This pain will diminish and the rigidity of the abdominal muscles will relax, while the temperature will return to the normal.

Should symptoms of abdominal pain increase suddenly and be accompanied by indications of collapse, the occurrence of perforation must be suspected, and the dangers of the condition must be represented to the patient and to his friends, and the chance of operation should be offered. Even when the operation has been refused, the case is by no means hopeless. The treatment adapted to early perforative peritonitis will be required, entailing the use of opium in repeated doses, and the application of fomentations or poultices over the abdomen.

In the milder form of appendicitis, when the inflammation is subsiding, the question of the administration of laxatives must again arise, and considerable discretion must be shown in selecting the right time for their employment. If possible, it is desirable to obtain evacuation of the intestine, either by natural efforts or by enemata, within the first few days of the subsidence of the attack; but when the abdominal pain has practically ceased, a tumor may often be felt in the region of the appendix, and the size of this tumor may generally be reduced under the judicious administration of repeated small doses of calomel.

Even after convalescence has appeared to be fully established and the patient no longer complains of any discomfort, and indeed considers himself well, the risks of a return of the inflammation must be borne in mind. One attack of appendicitis is frequently the forerunner of several others, and when appendicitis recurs, the interference with work and comfort, and the risks involved with each attack, render it the more necessary to urge the advisability of operative measures for relief. Recurrent appendicitis very often depends upon a small focus of inflammation. Pus may have formed during the first attack, and if not evacuated, either through natural channels or by means of operative measures, the amount of pus around the inflamed appendix may increase and may at any time cause alarming symptoms.

In the course of operation for the relief of this condition, the use of a trocar for diagnostic purposes has been recommended, and it has been suggested that, if pus is discovered either with a trocar or with an exploring syringe, the site of the collection should be freely incised with appropriate precautions. Most surgeons are at present averse to the use of the trocar or of any such interference with a possible abscess cavity, since, although an uncertain diagnosis may thus be confirmed, there is the attendant risk of allowing some of the contents of the abscess cavity to escape into the peritoneum and to excite peritonitis.

In conclusion, it may be well to summarize the general indications for operative interference :

1. During an acute attack an operation may be called for on account of the severity of the general symptoms ; for instance, when the pain is extremely distressing and seems to be increasing ; when the temperature is high and appears to be rising ; and when the pulse is rapid and weak. These symptoms will indicate the desirability of operating, even in the absence of any definite tumor, since it must be remembered that sometimes the tumor of appendicitis is comparatively small, and that frequently it is masked by the rigidity of the abdominal walls.

2. Operation will be indicated if there is a tumor and the severity of the symptoms appears to be on the increase. The mere presence of a tumor is not always sufficient indication for operation, since, as already mentioned, tumors may form and may gradually diminish in size while the general symptoms abate. If, therefore, there are any indications of improvement, if the tumor either remains the same size or gradually diminishes in size, operative measures may be deferred.

3. The question of operation should be considered with recurrent attacks of appendicitis. In general, in recurrent attacks it is better for the operation to be performed during an interval of relative freedom from pain.

In such a work as the present it is unnecessary to describe the nature of the operative measures to be adopted. It must suffice to remind the reader that since the introduction of the antiseptic method of dealing with abdominal surgery, the risks of such operations are infinitely less than the dangers that might be incurred by delay.

Typhlitis and Perityphlitis. These terms have been employed to indicate inflammation in the cæcum or in the tissues around the

cæcum—conditions which may undoubtedly occur from the retention of fecal masses in the cæcum, though in all probability a large number of cases of so-called typhlitis and perityphlitis include the milder forms of appendicitis.

As a rule, these cases are to be treated on the principles above described in connection with appendicitis, and indeed the diagnosis is frequently so uncertain that, although it may be hoped that the case is one of simple typhlitis, it is advisable to adopt all the precautions suitable for a case of appendicitis. In these conditions it has been recommended that efforts should be made to remove from the cæcum fecal accumulations which may be the source of irritation, and that, therefore, saline purgatives, such as magnesium sulphate, or sodium sulphate, should be given repeatedly with the view of completely evacuating the large intestine, and also that this method of relief should be assisted by the use of copious enemata of warm soap and water. The uncertainty of diagnosis appears to me to preclude this course of treatment, and I prefer the employment of moderate doses of opium and the adoption of local sedative measures, such as warm fomentations and the application of opium or belladonna over the site of pain, pending the elucidation of the case by more definite indications. It is not advisable, however, to trust too implicitly to these palliatives. The practitioner must be constantly on his guard against the probability of suppuration and against the danger of symptoms of general peritonitis, and while waiting anxiously for symptoms, it is essential not to be too energetic in endeavoring to make out the exact limitations of a tumor by manipulation. If opium is used in moderate doses, sufficient to relieve the acuteness of pain, the other indications, such as oscillations of temperature or alterations in the character of the pulse, will in all probability serve to indicate the need of operative interference. Of recent years the opinion has been gaining ground that typhlitis and perityphlitis independent of appendicitis are rare conditions, if indeed they ever occur.

Peritonitis. Peritonitis occurs under many forms and under various conditions. The treatment of peritonitis must greatly depend upon the cause of the affection and upon the extent to which the peritoneum is involved. Partial or localized peritonitis must frequently be treated by measures mainly directed against the cause of the local inflammation. Chronic peritonitis—which may occur in connection with new growths, such as carcinoma or tubercle within

the peritoneal cavity—and acute general peritonitis will both require separate detailed consideration.

A. *Acute general peritonitis* occurs under two conditions : First, as a primary idiopathic disease, the result of exposure to cold or wet, or in connection with the termination of some forms of Bright's disease. Secondary peritonitis results either from perforation of one of the abdominal viscera into the peritoneal cavity, or from the extension of inflammation from one or other of the organs covered with the peritoneum. Hence, it may occur with diseases of the stomach or of the intestine, involving inflammation, ulceration, or perforation ; or it may depend upon suppurative processes in connection with the appendix, or with the Fallopian tubes ; it may also be due to direct injury of the peritoneum, either from wounds or from other forms of external violence.

The indications of acute peritonitis are sufficiently well marked. They consist in the more or less sudden development of pain, commencing perhaps over the site of injury, but speedily radiating through the whole of the abdominal cavity, and increased immensely by the slightest pressure over the abdominal wall. This pain is quickly followed by distention of the walls of the abdomen, due mainly to the accumulation of gas in the intestine. The tympanitic condition of the intestine appears to be the direct consequence of a partial or complete paralysis of its walls. This paralytic condition is speedily followed by constipation, which in turn contributes to increase the tympanitic distention. From the commencement of the attack respiration is hurried, though shallow, the respiratory movements being effected entirely or almost entirely by the thorax, the movements of the diaphragm being in abeyance, owing to the intense pain excited by any alteration in its position. With the onset of the attack the temperature commonly rises, gradually reaching 104° or 105° F. in the course of a few hours ; meanwhile the pulse increases in rapidity, and though as a rule it is wiry, in cases due to perforation it may be almost imperceptible. Very often vomiting ensues within a short time, and if prolonged may speedily become green and bilious. The patient suffers greatly from thirst, the appetite fails entirely, the tongue commonly becomes dry, and though it is rarely coated, it frequently becomes red and raw in appearance.

In the above brief account of the leading symptoms of acute peritonitis we obtain abundant indications for treatment, though it is often necessary to modify the treatment in accordance with the cause.

In every case of acute peritonitis the pain is so severe, and the patient feels so ill, that he instinctively keeps in bed, and unconsciously maintains a rigid position, so as to avoid any movements of the abdominal muscles. In perforative cases the patient has probably been already kept in bed on account of the disease which has led to perforation.

With the commencement of the affection it is well to direct attention in the first place to the relief of pain, and accordingly, in acute primary peritonitis, it is essential to administer opium or morphine, and to employ local measures for controlling inflammation and allaying pain. It will be convenient, for the present, to consider cases of primary peritonitis only, or at any rate those cases of peritonitis in which operative measures do not appear to be demanded. Under these circumstances some relief may be afforded by applying leeches over the abdomen, and, after they have been removed, a large linseed-meal poultice, to increase the amount of hemorrhage. Should leeches be unavailable, the linseed poultice should be at once employed, and pending its preparation, warm fomentations sprinkled with laudanum will be of service. In the use of poultices for peritonitis the utmost care must be taken by the nurse to make them as light and as warm as possible, and to be very gentle both in the removal and the reapplication of poultices. Even with the greatest care, however, complaint is likely to follow the first application of the poultice, since the slight weight tends to disturb the relation of the abdominal viscera. The patient, however, soon learns that the relief afforded by the poultice is so great that it is worth enduring the momentary increase of pain.

With regard to the employment of narcotics, although the treatment may be commenced with the hypodermatic administration of morphine, it is advisable to give opium by the mouth if possible during the later stages of the disease. Sometimes the frequency of vomiting not only precludes the administration of any drug by the mouth, but may even be violent enough to call for the use of nutrient enemata. When, however, the vomiting is not so severe, $\frac{1}{4}$ or $\frac{1}{2}$ -grain doses of opium may be given in pill form every hour, or oftener if employing smaller doses, and these should be continued until there is well-marked relief of pain. It must be distinctly remembered that in advising the frequent use of opium or of morphine, I am only alluding to cases where the acute peritonitis is not dependent upon perforation.

In perforative cases, as, for example, in those due to appendicitis, it is undesirable to use opium to this extent, since subsequent symptoms may be thus masked, and indications for operation may be concealed until the case has become almost too serious for operation. Another objection to the lavish use of opium is that it greatly depresses the secretions of the intestine and impairs its contractile powers. The object of the administration of opium is to restrain excessive peristaltic movements, and thus to attack the cause of the pain, as well as to influence the patient beneficially through the nervous system.

One further word of warning is necessary with regard to the employment of opium or of morphine. It is well known that, with symptoms of chronic kidney disease, there is some risk in using these drugs; hence, whenever the cause of the peritonitis is at all obscure, it is well to examine the urine before employing opium freely, since there is always the possibility that the peritonitis may be a late symptom of Bright's disease. In cases marked with high temperatures, small doses of quinine may be combined with the opium, and during their employment not only will the temperature frequently fall, but the pulse may improve in character.

After the pain, the most important symptom calling for treatment is the frequency of vomiting; vomiting and retching may often be controlled by the application of an ice bag over the epigastrium, and by allowing the patient to suck small pieces of ice repeatedly. Diluted hydrocyanic acid may sometimes be administered alone, but it is often more beneficial if given with an effervescing mixture. Its sedative action may be increased by combination with opium; but more commonly, when vomiting is very severe, it is intensified by the nausea which frequently follows the use of opiates. When, in spite of the above measures, vomiting persists, it will be necessary to check the administration of drugs or of food by the mouth, and for forty-eight hours to maintain strength by nutrient enemata, and at the same time to control pain by the repeated use of the hypodermatic syringe, or by the occasional employment of small enemata of opium or morphine.

It must not be forgotten that vomiting often depends upon fecal accumulations in the lower part of the bowel; hence, it is always desirable to use, at an early stage, warm soap-and-water enemata to clear the lower bowel; indeed, independently of the vomiting, the early use of a simple enema is frequently beneficial. Although it

is undesirable to promote peristaltic movement of the upper part of the intestine, the comfort of the patient may be greatly increased by the occasional use of enemata. These to some extent serve to relieve constipation, and they certainly tend to remove an additional source of discomfort—namely, the accumulation of gas within the intestine. It was at one time recommended that the constipation of peritonitis should be dealt with by a rather large single dose of magnesium sulphate, or by repeated smaller doses. The prospect of thus producing increase of pain appears to be more certain than the hypothetical relief of pain by depletion of the bloodvessels and diminution of inflammation, the arguments urged in favor of this practice. As a whole, it appears to me to be better to refrain from using salines or other purgatives until the peritonitis has considerably subsided.

Another form of treatment less open to objection, though perhaps not very frequently employed at present, consists in the administration of small doses of calomel. If this drug is prescribed, the object of its employment should be fully realized—that is to say, it is to be regarded as an intestinal antiseptic, and not as a purgative. If used at all in connection with peritonitis, it is best to employ it frequently and in small doses in conjunction with opium, which will tend to diminish the laxative action of the calomel; it is, on the other hand, generally bad practice to push the employment of calomel to the production of liquid stools. Calomel undoubtedly can control inflammation, but the control is exerted far more through its action as an antiseptic than through its influence on the size of the vessels of the intestine.

It has been already mentioned that tympanites is frequent in peritonitis, and when this symptom causes much distress it may be relieved by the use of enemata containing turpentine, and by the application of poultices and fomentations containing the same drug. In many cases of peritonitis the employment of the ordinary carminatives so commonly given in connection with purgatives will scarcely be appropriate, but the compound tincture of camphor occasionally gives great relief, even though it favors constipation. The other measures adapted for the relief of tympanites, as, for example, the introduction of a long, flexible tube, or the puncturing of the distended intestine through the abdominal wall, can scarcely be adopted in the majority of the cases of peritonitis, since the distention of the intestine is so greatly the result of partial paralysis of the muscular coat.

The thirst of peritonitis is frequently merely the thirst of the febrile state, and it is accordingly to be relieved by dilute acid drinks, or by the use of ice; and it is well to remind the patient and the nurse that this symptom can be controlled better by frequent sipping than by the use of copious draughts.

With regard to the rapidity of respiration, this symptom can rarely be dealt with satisfactorily apart from the general treatment of the disease. The rapidity of respiration is often suggestive of some form of lung trouble, but on auscultation the lungs are found to be clear, or at most to have but a few loose râles at the bases; the symptom is an indication of the shallow breathing involuntarily adopted by the patient so as to minimize the movements of the diaphragm. Under these circumstances discomfort is always greatly increased whenever the patient is persuaded to take a deep breath, and the rapidity of respiration is, therefore, to be regarded as a conservative process with which it is undesirable to interfere.

The dietary of patients with peritonitis must be modified in accordance with the symptoms. It has already been indicated that, with frequent uncontrollable vomiting, it is desirable to use nutrient enemata for some hours, but even in cases uncomplicated by this symptom the dietary of the patients demands consideration. Instinctively the patient refuses to take much food, the appetite fails from the beginning of the attack, and the utmost that can be done is to administer very small amounts of nutriment in liquid form.

As in other forms of inflammatory disease connected with the peritoneum or with the intestine, it is desirable to leave the intestine as little work as possible to perform; hence, all forms of vegetable fibre must be rigidly excluded from the dietary, though farinaceous food in small quantities may be given with the milk and eggs, which should form the principal articles of nutriment. The discomfort of thirst may be relieved, not only by sucking ice, as before mentioned, but also by allowing, unless the case is very severe, small amounts of lukewarm or cold tea. It is necessary to be careful about the temperature at which this is taken, since if the tea is too hot it is not unlikely to provoke vomiting, or it may at least increase the rapidity of peristalsis. During the day small quantities of dilute acid drinks may be sipped. When there is any tendency to vomiting, iced milk may be given in doses of a tablespoonful or so, and the tendency may be further allayed by a mixture of milk with an equal quantity of lime water or of any effervescing mineral

water. Small quantities of beef-tea, or one or other of the concentrated meat juices so frequently recommended to the medical profession, may be taken with comfort when milk disagrees, and the administration of these may often be facilitated, or their use prolonged, by allowing them to stand in ice some hours.

During convalescence it is still necessary to observe great caution, so as to avoid overloading the intestine with insoluble material, and it is advisable to lay down a rule that everything should be finely minced and even reduced to a semi-fluid condition by being pounded in a mortar. All solid particles which might present any difficulty of digestion should be carefully removed. Stimulants are not always required; they should, as a rule, be reserved for cases marked by collapse, which is shown both by the appearance of the patient and by the nature of the pulse. They may also be required whenever convalescence is protracted, since under these circumstances the patient is apt to be weak, partly as the result of the high temperature inseparable from his condition, and partly in consequence of the strict limitation of food which has been an essential part of the treatment. When used to avert collapse, good brandy diluted with warm water is perhaps the best form of stimulant; but if the collapse is dependent upon frequent vomiting, some form of effervescing stimulant will probably be preferred. Good sparkling hock or champagne will often be found to be of great service, and, as with other beverages administered by the mouth in cases of vomiting, they are usually taken better when previously allowed to stand in ice.

B. Chronic Peritonitis. This condition deserves separate mention, although the treatment in many respects resembles that of acute peritonitis. It is necessary to ascertain and to treat the cause of the peritonitis. The treatment, however, cannot always be effected as readily as in the acute condition, since in the latter it is often possible, in perforative cases, to adopt surgical measures. In chronic peritonitis, on the other hand, although perhaps dependent upon similar causes, the call for surgical interference is less imperative, since the symptoms may develop more gradually, though they still may indicate dangers of perforation from the extension of inflammatory processes due to ulcerations in the stomach, duodenum, or intestine. Still, under such circumstances, if there are reasonable grounds for believing that ulceration is present, this condition should be treated by appropriate remedies. Although it has been laid down as a general principle that efforts should be made to effect the absorption of

lymph and of effused fluid in chronic peritonitis, the early treatment should not be unduly energetic, since the lymph frequently affords a protective covering by which perforation is prevented. It is not uncommon to find the walls of the stomach united to some adjacent organ, as the result of chronic peritonitis, and under these circumstances rapid absorption of effused lymph would in all probability have led to the urgent symptoms of perforation.

The first indication is the employment of measures to relieve pain; but, as in cases of appendicitis, if opium is employed for this purpose, it should be administered only in frequently repeated small doses, sufficient to soothe without being absolutely anodyne. When pain is very urgent, it will be necessary to employ poultices, as in cases of acute peritonitis; but usually the pain is scarcely sufficiently severe to call for repeated poulticing, and can be controlled by the application of iodine over the painful site. The iodine should be repeated daily until the skin begins to crack. Occasionally it is beneficial to use the mercurial ointment over the tender part. Scott's dressing may also be applied with advantage. In chronic cases there is frequently effusion of fluid into the peritoneal cavity, and this effusion may require to be dealt with by surgical measures if it increases quickly in amount. Before withdrawing the fluid, however it is well to use continuous efforts to promote its absorption by counter-irritant measures. A line of small blisters may be applied over the abdomen, and the stimulation they afford will sometimes favor the disappearance of the fluid. It has often been recommended that the absorption of the fluid of chronic peritonitis should be promoted by diuretics or by purgatives, the case being dealt with as though it were one of chronic effusion comparable with that which occurs in connection with chronic renal or hepatic disease. Although these measures may be tried, they are not generally attended with success, and it is commonly necessary, sooner or later, to perform paracentesis.

The other drugs which have been most highly recommended to favor the reabsorption of this chronic effusion are the non-official diuretin and apocynum cannabinum. A tincture of the latter is official in the *United States Pharmacopœia*, where it has been prescribed in doses of from 5 to 60 minims. It is credited with a powerful diuretic action, and it has been used not only in the dropsy of Bright's disease, but in almost every condition associated with passive effusion into serous cavities.

In chronic peritonitis the symptoms are not always sufficiently urgent to require the patient to be kept in bed. Sometimes, indeed, after patients have been kept in bed for a prolonged period with but little improvement, much benefit will ensue from a change of air and from exercise by the seaside. Further, in these chronic cases, when pain is not very severe, it is quite unnecessary to insist on any rigid modification of diet. The diet should be highly nutritious, and solids may be given, unless the peritonitis is dependent upon ulceration of the stomach or of the intestine. Indeed, in chronic peritonitis the general health must be maintained by every possible means.

There are certain symptoms of chronic peritonitis which may require separate treatment, as, for example, constipation, which is to be dealt with by enemata and by mild saline purgatives. Diarrhoea also occasionally occurs, more particularly in cases associated with intestinal changes, and this symptom will call for the administration of astringent and sedative remedies, small doses of opium being frequently very beneficial. Both with constipation and diarrhoea, and sometimes independently of these conditions, tympanites may arise and may call for the employment of carminatives and antispasmodics, as already described under the heading of Tympanites.

C. Tuberculous peritonitis is an affection which frequently occurs in early life, and it is common with mesenteric and intestinal disease in tuberculous children. Osler states its greatest frequency of occurrence to be between the ages of twenty and thirty, and gives but a small percentage under the age of ten years. It is, however, a condition which one has frequent opportunities of observing in a children's hospital, and I suspect that his numbers are somewhat misleading. Of the prominent symptoms in connection with tuberculous peritonitis the distention of the abdomen is perhaps the most striking. This distention is frequently tympanitic, and in early childhood it is often difficult without the use of an anæsthetic to distinguish the distended abdomen of tuberculous peritonitis from the distention of chronic rickets. Sometimes this distention is associated with a fairly large effusion of fluid, but the fluid rarely gives the satisfactory thrill or impulse on percussion, and its presence is to be recognized more by dulness and by a peculiar dough-like sensation. Under an anæsthetic, enlarged glands or alterations of the omentum may be recognized; the enlarged glands may form irregular nodular masses which are generally somewhat deeply situated. The omental tumor more commonly forms an elongated firm

mass, which may lie above or below the umbilicus. Occasionally adhesions will form between the separate portions of the intestine, and will lead to the inclusion of fluid. This fluid may sometimes remain clear, but it frequently becomes opaque and even purulent, and the purulent collection may point either in the umbilical region, or in one of the iliac fossæ, more commonly in the right.

The special symptoms connected with tuberculous peritonitis are those due to the presence of fluid and to the interference of the normal function of the intestine. Pain is sometimes complained of, but more commonly complaint is elicited only during examination.

The treatment of tuberculous peritonitis has recently passed largely into the hands of surgeons. When fluid has definitely formed, it may be relieved by free abdominal incision and drainage; even when, during operation, the intestines are found to be firmly matted together with adhesions, and when tubercles have been seen on the peritoneal surface, the case is by no means helpless. Short of surgical measures, the abdomen may be covered with Scott's dressing and with bandages firmly applied, and the medicinal treatment must then be adapted to the special needs of the individual. Occasionally cases of tuberculous peritonitis are associated with severe constipation, the intestine appearing to lose its muscular tone in presence of the inflammation of its serous covering. Under such circumstances the administration of purgatives may be of little avail, and the fecal accumulations may require removal, either by enemata or by digital manipulation. More frequently, however, diarrhœa forms a prominent symptom, especially when the peritoneal changes are connected with ulceration in the course of the intestine. For the relief of diarrhœa the ordinary astringents may be of service; sometimes, however, it is necessary to relieve the diarrhœa of tuberculous peritonitis by the use of opium in enemata, and even when these measures have failed, I have occasionally found benefit result from the administration of small doses of alum, in conjunction with carminatives. Five grains of alum may be given to a child of eight to twelve years of age, or smaller doses of 2 or 3 grains may be given at first for a few days, gradually increasing the dose as toleration is established.

Tuberculous peritonitis is not necessarily fatal. Reabsorption may occur even after considerable effusion, and the glands may caseate and undergo further degeneration. I have frequently met with adults who have given me a history of undoubted peritonitis during

their childhood. This fortunate result, however, cannot always be depended upon, though it sometimes ensues after the use of Scott's dressing. Having had a very large number of these cases under observation, I am convinced that those in which early operations were performed did better, as a rule, than those in which the operation was delayed. Some surgeons appear to wish for definite indications of fluid, or even for definite pointing of the collection of pus, before making any abdominal incision; but when one has been able to have an operation performed early, even though no fluid may have been removed from the abdomen, the alteration of tension often appears to be followed by great amelioration in the general symptoms.

Animal Parasites Affecting the Intestine. Three chief varieties of intestinal parasites are found in the intestine—thread-worms, round-worms, and tape-worms. Of these parasites thread-worms are by far the commonest, and they occur most frequently in young children, although they have been known to affect adults also. They are especially found in the large intestine, but they may occur as high as the jejunum, and they are often very numerous in the neighborhood of the cæcum. They migrate from this site toward the sigmoid flexure and the rectum, depositing their ova in the rectum, where they produce their greatest symptoms of irritation. The symptoms are most observable at night-time, when the worms may move about from their original site, may make their appearance externally, and may pass, in females, into the vulva or the vagina. They may cause intense irritation, and may often lay the foundation of bad habits. For their removal numerous remedies have been employed, and although the adult worm is sometimes found high up in the intestine, it is frequently found sufficient to destroy, and to effect the removal of, the ova and the worms which infest the sigmoid flexure and the rectum. This is generally effected by means of injections into the rectum. Of the numerous substances recommended for injection, that most commonly employed is the infusion of quassia, freshly prepared. When dealing with children of from two to five years of age, the amount of this infusion to be used should be at least a small teacupful, for some four or five nights in succession. Occasionally it is well to commence the treatment with a simple injection of salt and water, two teaspoonfuls of salt to the pint, so as to empty the rectum of its contents. This simple saline solution may occasionally be sufficient without the employ-

ment of quassia, or any of the numerous other remedies that have been recommended for this condition. Speaking generally, the value of the remedy depends far more upon the mode of its employment than upon its nature, for even simple soap and water may sometimes prove efficacious, if it is injected in sufficient quantity to wash out not only the rectum and the sigmoid flexure, but also a fairly large proportion of the large intestine. It is important to lay stress upon this fact, since discouragement frequently ensues when attempts have been made to dislodge thread-worms by small injections. Mothers and nurses are prone to consider that a large injection may do harm, and undoubtedly, if introduced in bulk with great rapidity, an injection may do much damage; but when slowly and gently introduced, and when the position of the patient is such as to favor the upward movement of the liquid, it is possible, without causing much discomfort, to introduce sufficient liquid to reach the cæcum. In general, it is not necessary to use so much, but it is advisable to lay stress upon the fact that success is more likely to ensue from one or two large injections than from very numerous small ones.

Solutions containing tannin are sometimes employed, as, for example, dilute preparations of cinchona, while the unofficial enema of aloes is still occasionally prescribed. Even carbolic acid, in dilute solution, has been used for the dislodgement of thread-worms. Whatever substance is employed, it must be remembered that a dilute solution only should be introduced, as otherwise much irritation may ensue. Even a simple enema of soap and water may cause not only irritation of the rectum, but even general urticaria.

When thread-worms persist after the use of any of the above enemata, it will be desirable to use a purgative before employing the enema, so as to enable the full force of the enema to be expended upon the offending parasites. Should these measures still prove ineffectual, it is probable that some of the thread-worms lie above the cæcum, and it then becomes necessary to use either san-tonin or kamala to dislodge them, and to follow the employment of these remedies by a purgative, such as calomel; and after action has resulted, to use an enema of quassia or of salt.

Hitherto nothing has been said of the treatment of symptoms resulting from the presence of thread-worms, since these symptoms can only be dealt with satisfactorily by the removal of the cause; after the use, however, of any of the above measures, the irritation and the restlessness may be largely controlled by local applications

and by sedative measures. Of the local applications, sedatives like zinc ointment, especially if diluted and rendered more fluid by admixture with fluid petroleum, will often give relief, while aqueous solutions of carbolic acid (1 per cent.) will sometimes tend to prevent the wanderings of thread-worms from the rectum. Should the frequent irritation have caused disturbance of sleep, with dreaming and perhaps night terrors, small doses of ammonium bromide may tend to check the habit of restlessness. The local application of dilute solution of cocaine hydrochlorate has been recommended and may prove comforting, pending the employment of remedies intended to remove the thread-worms, or may be of service should the irritation continue after their removal.

Suppositories of carbolic acid, or of tannic acid, have sometimes been employed, but they do not, as a rule, suffice to cause the removal of thread-worms from the upper part of the rectum. Some practitioners are in favor of employing in every case of thread-worms fairly strong purgatives: such as, for example, calomel, scammony, and aloes. As already indicated, they may be of service in troublesome intractable cases, when some of the thread-worms are situated high in the large intestine, or when they have even reached the small intestine; but happily for the vast majority of children, these drugs, which may produce much discomfort, are not required. This objection does not hold against the employment of small doses of rhubarb frequently repeated. The tincture has been given in doses of from 3 to 4 minims, three or four times a day, in conjunction with a small quantity of magnesium carbonate and ginger, and it has been stated that these will sometimes obviate the necessity of enemata. Very commonly, when using enemata for the treatment of thread-worms, it is of advantage to give some soluble preparation of iron together with infusion of quassia by the mouth. Iron and ammonium citrate may be given with 1 or 2 drachms of infusion of quassia, and will not only cause improvement of appetite, but will tend to remove the pallor from which these children so commonly suffer. Tonic remedies are, as a rule, always indicated for children suffering from thread-worms.

Next to the thread-worm in point of frequency stands the round-worm, which may occur singly, though occasionally two or more may be present in the intestine. The existence of the round-worm is frequently not suspected until it is found either in the motions during an attack of diarrhoea or in the vomit when sickness has

been excited by its presence within the stomach. The appearance of the round-worm is so well known that it does not call for detailed description. The symptoms are commonly those of malnutrition, of perverted appetite, of restlessness, irritability, and perhaps of night terrors, or grinding of the teeth. Picking the nose is sometimes attributed to this cause, but it is frequently little more than a habit of childhood.

The remedy which is commonly employed for this condition is *santonin*, which may be used in doses of from 1 to 3 grains for a child, or 3 to 5 grains for an adult, mixed with sugar, or suspended with mucilage, or made into a lozenge. When using *santonin*, it is desirable to follow its employment with a purgative, partly with the object of removing the dead worm, or worms, as speedily as possible, and partly to diminish the duration of the disturbance of vision which so commonly results from the use of this drug. The *santonin* should always be given at night, so that this disturbance of vision should be as little noticeable as possible. A further feature of this remedy is a tendency to alter the color of the urine, which may become a deep orange color, and this color may be increased almost to redness on coming into contact with clothes impregnated with alkalies. It is advisable to call attention to the probability of this change, since otherwise the red appearance may be mistaken for hæmaturia and cause needless alarm.

Before giving *santonin*, it is advisable to insure comparative emptiness of the alimentary canal, partly by diminishing the amount of food for two or three days and keeping the child upon a liquid diet, and partly by the use of a dose of castor oil shortly before the administration of *santonin*, and again a few hours later. It will generally be advisable to repeat the *santonin* on two or three occasions, even though no obvious result may ensue from the first doses employed. It must, however, be remembered that with *santonin* there is some danger in the use of overdoses; for even in medicinal doses it may produce headache and slight dizziness, while in overdoses it has occasionally caused vomiting, giddiness, and even convulsions. Several other remedies have been recommended for use against the *ascaris lumbricoides*, as, for example, *kamala*, *kousso*, *mucuna*, *sigelia*, turpentine, etc.; but these are seldom necessary, since *santonin* so very rarely fails, and most of these drugs possess special inconveniences, or dangers: thus turpentine may produce toxic symptoms, while *kamala* and *kousso* require to be used in

large doses, and the infusion of kousso, in particular, is difficult to administer to a child.

Considering the enormous length which tape-worms may sometimes attain, it is extremely curious to note the frequency with which their presence either is not marked by symptoms of any kind, or is associated with symptoms of an indefinite type which may be referred to various functional derangements of the digestive organs. Very often the existence of tape-worms may not be suspected until some of the mature segments appear with the feces. Sometimes, however, it is found that their presence is associated with some disturbance of nutrition, or with some disproportion between the appetite of the patient and the nourishment he derives from his food. Frequently the hunger may be excessive, and may be accompanied by discomfort, which is relieved after food has been taken. Occasionally there may be feelings of distention, or of colic, which may be referred to other causes. These anomalous sensations are, however, often at their worst during fasting, and are relieved after a full meal. In exceptional cases the action of the bowel may be irregular, attacks of constipation alternating with some diarrhœa. Reflex symptoms, such as irritation about the anus and nose, may be noted, but they are less frequent than with thread-worms. Palpitation may be complained of, especially when there is much distention, and the presence of tape-worms may even give rise to reflex nervous symptoms, such as cramp, or choreic movements. Many of these symptoms may be observed for a length of time before the truth is discovered; indeed, they are so frequently due to simpler causes, that, as above indicated, the existence of a tape-worm is perhaps never suspected until some segments are found.

Should there be any suspicion that these symptoms are due to the presence of a tape-worm, the administration of a brisk purgative may serve to establish the diagnosis by hastening the detachment of some of the segments. Before undertaking the treatment of tape-worm, it is necessary to remember that the case cannot be considered to be cured until the first portion, or the so-called head, has been removed, since, if this attached portion retains its vitality, it is capable of developing a further length of tape-worm. To effect the expulsion of the head is therefore essential to success. Numerous so-called vermicides or vermifuges may succeed in bringing away great lengths of segments, and yet after a time it will be found that the patient has not been cured, since the head has not

been removed. The first segment is commonly somewhat deeply embedded in an accumulation of mucus and other materials surrounding the point of attachment to the mucous membrane, and it is essential, therefore, to submit the patient to a form of preparatory treatment to remove this mucus and to enable the vermicide or vermifuge to act primarily on this point of attachment. This preparatory treatment consists in the use of purgatives, by means of which the contents of the bowel may be thoroughly evacuated. The various salines, or one or other of the purgative mineral waters, may be of great use in thus clearing the way for the administration of the anthelmintic. These purgatives should be administered for three or four days before the use of the anthelmintic, and during this time it is advisable to keep the patient upon a restricted diet, of which milk and bread should form the principal constituents. When these disagree, or when they appear insufficient for the needs of the individual, they may be supplemented by various kinds of concentrated soups, and by rice or other farinaceous puddings.

There is a curious idea among the public that in cases of tapeworm, salt meat and salt fish are beneficial, and no doubt, to some extent, this opinion is based upon the influence of salt in increasing the fluid character of the intestinal mucus. They may, therefore, be given in moderation, but it is perhaps more scientific to employ chlorides, such as ammonium chloride or sodium chloride, to diminish the tenacious character of the intestinal secretions. Some of the mineral waters are rich in chlorides, and if these have been used as purgatives, there will be no need for the separate administration of other chlorides; but should magnesium sulphate or sodium sulphate or phosphate be used as a saline, ammonium chloride may also be given in doses of from 10 grains and upward, three or four times during the day.

Before undertaking this preparatory treatment it will be well to inquire into the general power of the digestion, since if this is much disordered, there will be great probability that the anthelmintic may be rejected by vomiting. When there is evidence of gastritis, this may be appropriately treated with mineral acids, with small doses of pepsin, or with vegetable tonics, such as quinine or quassia, and it may be advisable to defer the above-described employment of purgatives until the digestive system is in better working order. It must not be forgotten, however, that to a great extent the digestive powers are dependent upon the free action of the bowels, and,

therefore, during the administration of these digestive tonics, it may be necessary to employ a mild saline purgative occasionally, even though the free administration of salines and the use of the anthelmintic may be deferred. When the intestine has thus been prepared, it is advisable to allow no food to be taken after the midday meal of the day preceding that upon which the anthelmintic is to be used, and it is often recommended that a tablespoonful of castor oil should be taken at bedtime to completely empty the bowel.

The anthelmintic that is most commonly employed is the oleoresin of male fern. This should be used in doses of from 30 to 60 minims, according to the age of the patient. It is sometimes recommended that, on account of its nauseous taste, the oleoresin should be given in capsules; but frequently it is given in an emulsion with mucilage or with tragacanth powder, made up with peppermint water. I have found that to some extent the tendency to vomiting depends upon the degree of concentration of this mixture, and that when drachm doses of oleoresin of male fern are given in a mixture made up to one ounce, it is frequently rejected, while the same dose, when further diluted, may be tolerated. The tendency to vomiting forms the chief obstacle to the satisfactory treatment with male fern, and patients differ greatly in the way in which this tendency may be overcome. Some prefer taking the nauseous draught at a single dose, while others prefer taking it in divided doses, at intervals of ten or fifteen minutes. When either of these expedients fails, the nausea may be diminished either by the use of small doses of ammonium or potassium bromide, or by advising the patient to lie down for an hour or so after the dose has been taken. It has even been found possible to facilitate the retention of the dose by giving it at a very early hour in the morning, and encouraging the patient to attempt to sleep for some time after it has been taken.

Should no action of the bowels follow within a couple of hours after the administration of the anthelmintic, it will be well to give a laxative, such as a dose of an ounce of compound tincture of jalap of the *National Formulary*. When the bowels act, the patient should be seated over a pan containing water, and everything passed should be carefully preserved for examination. Diligent search for the head must be made, since, unless this is discovered, there is no guarantee that the symptoms will not return. Should it not be found, it will be advisable to repeat the dose of male fern after an interval of a week or two, adopting the same precautions previously and sub-

sequently to its use. In dealing with private patients, this second administration under the above circumstances is almost absolutely necessary, since the conditions are so favorable for thorough examination of the results of the action of the drug, and there is, therefore, very little chance of the head escaping detection. With outpatients at a hospital, however, it is frequently difficult to feel sure that due care has been taken in collecting the whole of the action, and it is also difficult to induce the hospital patient to undergo a second time an unpleasant course of treatment for which he fails to see the immediate necessity.

The treatment with male fern has been described in detail, since, when employed with these precautions, it very rarely fails to be efficient; but it is well to mention that numerous other anthelmintics have been recommended. Some have been employed on account of the real or supposed difficulty in the administration of a sufficient dose of male fern. Oil of turpentine has been mentioned, and in its favor it has been urged that it is unnecessary to employ purgatives after its use; but oil of turpentine is almost as difficult to administer in large doses as male fern, and it is not altogether devoid of risk, especially when small doses of the oil are given, since if it fails to produce purgation, it may be quickly absorbed and may give rise to considerable renal irritation during elimination. It may be employed in doses of 3 to 4 fluidrachms or more, either in the form of capsules, or made up into a mixture with olive oil and with yolk of egg, or with tincture of quillaia. Kousso is another remedy that is sometimes used. Formerly there was an infusion of kousso in the *Pharmacopœia*, and it was recommended that it should be made as required and given without being strained, in doses of from 4 to 6 ounces. A quarter to half an ounce should be infused in 4 to 5 ounces of boiling water, and the whole should be taken as a draught after it has been allowed to cool. Like male fern, kousso is apt to produce nausea and vomiting, and it is very rarely employed in this country.

In America pomegranate root appears to be greatly in favor, and this may be given as an infusion of the bark, 3 ounces being macerated in 10 ounces of water and then reduced to one-half by evaporation. It may also be used as the decoction of pomegranate bark in doses of $\frac{1}{2}$ to 2 fluidounces. Recently the active alkaloid of pomegranate—pelletierine—has been employed, and it is stated that its use is not followed by any general symptoms, except a slight

feeling of giddiness, though occasionally it may excite nausea and vomiting. Pelletierine is given either as the sulphate or the tannate, in doses of $\frac{1}{2}$ to 1 grain, after the same preparatory treatment already indicated. When it fails to purge within two or three hours, castor oil or some other purgative should be employed. Pelletierine has the disadvantage of being somewhat expensive, and it has scarcely yet found favor with English practitioners.

Kamala has been much employed in Eastern countries as an anthelmintic; it is commonly administered in doses of from 1 to 2 drachms, every three hours, mixed with syrup. This drug is stated to cause less nausea than any of the foregoing, but it has the disadvantage of requiring the subsequent administration of a purgative. It is a drug which may be employed in troublesome cases when other remedies have failed, but it must be given under the same conditions, and there is very little evidence that it possesses any powers superior to those of male fern.

Pumpkin seeds have been recommended for children. Osler states that for adults 3 or 4 ounces should be carefully bruised, then macerated for twelve or fourteen hours, and the entire quantity taken, followed in an hour by a purgative. For children, however, the dose should be much smaller; 1 ounce of powdered seeds, prepared in the same way, or given with syrup, is generally considered to be sufficient. Although it is stated that this remedy is well taken, the large dose is a disadvantage, and it may occasionally produce some nausea.

It has been stated that anæsthetics have been successfully used to produce loosening of the attachment of the tape-worm, and that the removal may then be facilitated by a brisk purgative. It is said that this method has been successful when all other remedies had failed.

With regard to the foregoing fairly long list of anthelmintics, it is probable that the selection of the remedy will to some extent be influenced by the residence of the patient; thus, in Eastern countries it is perhaps easier to obtain kousso or kamala of sufficient powers, but in this country male fern can nearly always be trusted to produce the desired result, if given under appropriate conditions.

Hydatids of the Liver. Hydatids of the liver depend upon one stage in the development of the *tænia echinococcus*—the tape-worm of the dog. When the embryo reaches the liver of the human being it is gradually converted into a small cyst, consisting of two layers,

a true capsule and an inner granular layer. The cyst speedily increases in size, and a fibrous covering is developed. The primary cyst frequently contains numerous smaller cysts, and the disease makes itself apparent by subsequent changes occurring in these various cysts—changes that sometimes lead to suppuration and occasionally to rupture. On the other hand, sometimes the echinococcus dies, and the contents of the cyst are to a large extent absorbed, leaving merely a mass containing a putty-like material, which may become somewhat calcareous.

The symptoms of hydatids of the liver are often extremely vague, amounting only to the presence of a globular, painless tumor, through which the characteristic fremitus or thrill may often be felt.

It is perhaps unnecessary to deal here with the treatment of this condition at any great length, since although various drugs, such as potassium iodide or sodium chloride, have been recommended, they do not appear to influence the size of the cyst or the vitality of the echinococcus, and the treatment, therefore, is almost entirely surgical.

When suppurative changes have occurred, the symptoms are more definite. Frequently there is some degree of jaundice, and the tumor becomes tender, owing to the inflammation in the surrounding tissues. The course of the disease will also be marked by oscillations of temperature, by rigors, and by considerable emaciation. These febrile symptoms will call for special treatment, such as the administration of quinine, or of acetanilid, and will indicate the necessity for a nourishing diet, but they render surgical interference more imperative. It is not necessary to attempt to describe the surgical treatment in detail. It will perhaps be sufficient to indicate that it is actuated by two main objects: the first, to secure the death of the echinococcus, and thus to check further growth of the cyst; the second, to remove the cyst and its contents, this course being generally adopted when suppurative changes have occurred. To secure the death of the echinococcus, the cyst has been punctured, either with or without removal of fluid. The removal of even a small amount of fluid is sometimes followed by an arrest of growth and by subsequent rapid diminution in the size of the tumor; occasionally, however, the cyst is freely incised and evacuated.

At one time various injections into the cyst were made through a trocar, with the view of arresting vitality; but these injections have so frequently been followed by indications of suppuration that at the present time they are very rarely performed.

Trichinosis. This disease depends upon the development of the *trichina spiralis*. The trichina occupies the small intestine, and may give rise to symptoms of gastro-intestinal disturbance, while the embryos subsequently pass from the intestine to the voluntary muscles, and there become encapsulated.

The disease is conveyed through eating infected pork, and the danger is, therefore, only to be averted through thorough cooking, by which the temperature of every part is raised to the boiling-point. Raw ham and imperfectly smoked sausages are extremely likely to cause this disease.

A few days after infected meat has been taken there will probably be developed gastro-intestinal symptoms, consisting of abdominal pain, anorexia, vomiting, and perhaps diarrhoea. To these symptoms some rise of temperature is occasionally added, but the fever is frequently of an intermittent type. The rise of temperature, however, indicates, as a rule, the stage of general infection, and is accompanied by tenderness and perhaps swelling of various muscles.

The only treatment that is possible in this disease is one which secures the speedy removal of the infected meat so soon as the earliest symptoms have been declared. With this object, emetics and purgatives of prompt action should be used; and even when severe diarrhoea is present no efforts should be made to check its frequency, although supporting measures, such as the administration of stimulants, of milk and strong beef-tea, will be desirable.

For the relief of febrile symptoms, acetanilid and antipyrine are sometimes serviceable, and the free use of stimulants will also be desirable; but we are at present unacquainted with any form of medicinal treatment which will influence the development of the embryos after they have reached the muscles. Gymnastic exercises, Turkish baths, and massage may be used, but the benefit to be derived from these measures is somewhat problematical.

CHAPTER XII.

HEPATIC DISEASES.

Gallstones—Hepatic Colic—Acute Obstructive Jaundice—Chronic Obstructive Jaundice—Icterus Neonatorum—Congestion of the Liver.

Gallstones. The symptoms produced by gallstones call for treatment under two conditions: when dislodged from the gall-bladder and attempting to make their way to the intestine, they commonly give rise to very marked acute symptoms, with urgent need for treatment; and, on the other hand, in the intervals between the attacks of biliary colic, it will be desirable to adopt measures to facilitate the removal of gallstones, and to diminish the tendency to their formation. The conditions under which gallstones arise have not been determined with any accuracy. They are more common among women than among men, but it is not certain whether this fact is due to a sedentary life, or to the possible interference with the functions of the liver by clothing or by diet. An increased formation of cholesterin has been attributed to nervous influence, but gallstones arise commonly under conditions where this element can be eliminated. Recurrent attacks of catarrh of the bile-ducts may perhaps predispose to the formation of gallstones by affording plugs of mucus or masses of epithelium, which may serve as the nucleus around which cholesterin and other bile solids may be deposited. The prolonged retention of bile within the gall-bladder may perhaps increase the tendency to deposition of cholesterin, and such retention may occur when meals are taken at very long intervals.

Gallstones may be very numerous and small, consisting of granular masses, or, when of larger size, they may have facets and be somewhat angular, owing to friction and pressure within the gall-bladder; but sometimes they may be much larger, and occasionally the whole of the gall-bladder is found to be occupied by a single calculus. Symptoms of colic are usually produced whenever fragments or concretions pass along the duct toward the intestine. The extent of colic will greatly depend upon the size of the gallstone and upon the consequent difficulty it has in passing along the duct.

Doubtless, after one fairly large concretion has passed through the common duct, others of smaller size may make their escape without inducing much pain. Ordinarily, however, the duct contracts during the passage of a calculus, and the contraction causes pain of an excruciating character. This pain may start in the region of the gall-bladder and may radiate thence toward the spine and toward the right shoulder, though sometimes the pain is referred to the umbilical region. During the pain, numerous reflex phenomena are to be noted; frequently there is considerable restlessness and uneasiness, and very often the pain may be sufficiently severe to excite vomiting of a reflex character. The pulse is commonly small, and the depression of the circulation is further evidenced by pallor and by cold, clammy perspiration. When the pain is very severe, rigors may occur, with the usual rise of temperature to 103° or more. Almost from the commencement of the seizure the abdominal walls become rigid, so that it is difficult to determine the position or the size of the gall-bladder, while the size of the liver is only to be inferred from percussion.

Sometimes the liver is increased in size, and there is always tenderness over the hepatic region. The pain frequently continues for three hours or more, when the acute character may to a great extent disappear if the gallstone has found its way into the duodenum, or been returned to the gall-bladder. This sudden relief of pain is, however, merely a relief of degree, since much tenderness and soreness are usually still felt in the hepatic region. Some cases of gallstone are followed by jaundice, which is dependent upon the blockage of the common bile duct and the reabsorption of bile. The probable occurrence of jaundice varies with the time that the gallstone remains in the common bile-duct.

Occasionally, when it is rapidly passed onward, there may be no jaundice, while on the other hand, the jaundice is liable to become very intense if the calculus is arrested at the duodenal orifice. When the attack has been of short duration, it may not be followed by any symptom of importance, but frequently, when jaundice occurs, it is associated with the passage of dark bile-stained urine and with nausea and a tendency to vomiting.

From the above brief account of the symptoms noticed during the passage of a gallstone, it will be seen that the prominent symptoms calling for treatment are pain, due to the irritation of the calculus and the spasmodic contractions of involuntary muscle, and

vomiting, which is ordinarily of a reflex character. Jaundice may or may not be present, and during the attack of biliary colic it will not call for any particular treatment. Practically, therefore, the measures for relief are narrowed down to those which will either allay pain or cause relaxation of muscular spasm, and, happily, both objects can commonly be attained by the same treatment.

Morphine is naturally the first remedy to be thought of during biliary colic, and it may either be employed hypodermatically, or it may be given by the mouth when the pain is not attended by vomiting. There is distinct advantage in its administration by the mouth, if it can be retained, since, although during its absorption from the stomach some of it is carried through the portal system to the liver, part escapes absorption in the stomach and is passed onward to the duodenum, where it may cause relaxation of the orifice of the common bile-duct. When given by the mouth it should be combined with diluted hydrocyanic acid, or it may even be given in an effervescing draught; in either of these forms it appears to be less likely to be rejected by vomiting. Pending the preparation of these mixtures, the pain from which the patient is suffering is so urgent that it is commonly desirable to administer morphine hypodermatically, and to adopt other measures for relieving pain and spasm, such as the application of hot fomentations over the region of the liver, or the use of a bath at the highest temperature that can be tolerated.

When there is frequent vomiting, the hypodermatic use of morphine must be continued, and when used repeatedly for some hours it is advisable to administer atropine sulphate with morphine. Atropine sulphate may be used in doses of from $\frac{1}{200}$ grain to $\frac{1}{100}$ grain. Most practitioners, however, who carry hypodermatic syringes, are supplied with tablets of atropine sulphate and of morphine acetate or tartrate in appropriate proportion for simultaneous administration. The morphine tartrate may be given in doses of from $\frac{1}{8}$ to $\frac{1}{2}$ grain according to the severity of the pain, and according to the practitioner's knowledge of the effect of morphine on the individual. It may be necessary to repeat the hypodermatic use of morphine and atropine within an hour or so, if the pain has not abated, and it should not be forgotten that in using morphine in this way we are employing a remedy which will also assist in causing relaxation of the muscular spasm; hence, the relief of pain following the administration of morphine may occasionally occur very suddenly, owing to the gallstone

having passed onward into the intestine. The chief object of treatment with morphine is to obtain this result, and not simply to deaden pain; hence it may be necessary to repeat the dose a second or even a third time, if the relief of pain is only partial.

The relaxation of muscular spasm is greatly facilitated by the use of hot fomentations, or of hot baths; indeed, habitual sufferers from biliary colic are so well acquainted with the relief afforded that they often adopt these measures pending the arrival of the doctor. As already stated, the bath should be as hot as possible without causing pain, and with appropriate precautions to avoid scalding. It is often found more convenient to increase the temperature of the bath gradually by the addition of hot water during the time of immersion. To be of much service, the bath should permit of complete immersion. If only ordinary hip or sponge baths are available, it will be better to trust to fomentations or poultices, since the pain is so great and the restlessness so extreme that hip or sponge baths are practically useless.

When there is no vomiting, muscular relaxation may be further favored by encouraging the patient to take frequent copious draughts of weak tea or warm water. The effect of the latter is sometimes increased if it contains sodium salicylate and sodium bicarbonate, 20 grains of the former and 6 grains of the latter to the pint. Even when vomiting has occurred, this alkaline solution may still be tolerated, and will often prove beneficial if taken frequently in small doses, although a large draught might speedily be rejected. It is sometimes recommended that other anæsthetics, more particularly chloroform, should be used at the commencement of the treatment, the chloroform being given by inhalation. This may be of service pending the action of morphine, but if administered after the hypodermatic use of morphine, the condition of the pulse and respiration must be noted closely, and the anæsthetic must not be pushed to its full extent, since dangerous symptoms may occasionally arise when chloroform is used after the hypodermatic injection of morphine, and moreover the anæsthetic may provoke vomiting.

Not long since it was recommended that biliary colic should be treated with olive oil, and, from the fact that some cases of biliary colic seemed to be relieved after the use of olive oil, numerous explanatory theories have been put forth; thus, it has been suggested that the oil may possess some solvent powers, or that it may cause relaxation of the orifice of the common bile-duct, or that its benefits

may be attributed to the mild purgation, or at least to increased peristalsis following its administration. These explanatory theories are not particularly satisfactory, and indeed they appear to be superfluous, since the action of olive oil has not been found to be certain or even frequent, and it is possible that the relief of pain may have resulted from the action of other remedies, or even from the natural termination of the attack.

During the attack of hepatic colic, especially when the pain is very severe, patients may suffer from symptoms of collapse, which, when associated with much vomiting, necessarily call for the administration of diffusible stimulants. Those which are most readily taken are, as a rule, to be preferred. Small doses of brandy and water may give great relief; but when the collapse is severe and the pulse becomes weak and small, it may be necessary to employ ether, and, if the vomiting is frequent, to administer the same hypodermatically. Even the employment of smelling-salts may sometimes be beneficial when there is a tendency to fainting.

During the continuance of hepatic colic, purgatives are best avoided, since, by favoring the formation of bile and by necessitating more frequent bodily movements, they will commonly increase the pain; but when the intestine is much distended with an accumulation of flatus, relief may be afforded by enemata, and the action is frequently increased by the addition of a small amount of turpentine. It has sometimes been held that benefit results from the violence of vomiting, since the nausea which accompanies this act is commonly associated with some reflex relaxation of muscular tissue, while the efforts of vomiting, the depression of the diaphragm, and the contraction of the abdominal muscles may assist in dislodging the gallstone. Acting on this supposition, some practitioners are in favor of the use of emetics, and if there is much nausea, would promote the onset of vomiting by the frequent sipping of warm water. It is generally considered that there is some risk in thus favoring violent propulsive efforts, especially when the passage of the gallstone has been unduly delayed, and when there may be some probability of inflammatory changes within the common bile-duct; accordingly, in protracted cases it is better to employ remedies calculated to relieve, rather than to favor, vomiting. Under these conditions, the use of diluted hydrocyanic acid and of sodium salicylate and sodium bicarbonate has been already mentioned. The sodium salicylate more particularly is likely to be of service, since,

without increasing the amount of bile formed, it is credited with the power of rendering the bile more liquid.

Hitherto nothing has been said regarding the diet to be followed, for during the passage of a gallstone the distress is so great as to render the administration of food impossible. When the pain is protracted, small amounts of iced beef-tea may assist in maintaining the patient's strength.

During the intervals between the attacks of biliary colic, the diet has to be regulated, and the habits, more particularly those relating to exercise, must, as a rule, be altered. With regard to diet, all excesses must be avoided, and indeed the dietary must be reduced to the minimum consistent with comfort. Uncooked fruit and green vegetables may be taken freely, since they commonly increase the activity of the bile, and they contain no materials which will favor the formation of gallstones. In the selection of fruits, however, it is advisable to employ, as far as possible, such fruits only as are thoroughly ripe and easily digested; hard fruits, such as apples, should be cooked before being eaten. Nearly all other articles of diet must be taken in moderation. Animal fats, in particular, are credited with favoring the formation of gallstones; while, on the other hand, farinaceous foods and sugars throw an increased amount of work upon the liver, and may, therefore, do harm. Alcoholic beverages also should not be employed, since they so frequently tend to interfere with the hepatic functions, and may, indeed, induce gastric and intestinal catarrh, which may form the starting-point for irritative changes in the course of the common bile-duct, and may thus favor the onset of fresh attacks of hepatic colic.

It is generally held that a tendency to the formation of gallstones is increased by the too sparing consumption of liquids, and, since the deposition of bile salts must undoubtedly be promoted by concentration of bile, it is desirable to take fluids freely. The beverages which are most beneficial are the alkaline mineral waters, and those which contain purgative principles in addition to ordinary alkaline ingredients will be of the greatest service. To diminish the risk of the formation of gallstones, patients are frequently sent to Carlsbad to drink the waters. It must not be forgotten, however, that at Carlsbad and at most other health resorts the system of treatment entails considerable modification in the diet and in the habits of the individual—modifications which ordinarily involve an increased amount of exercise and a diminished quantity of food. With regard

to the habits of the individual, exercise is, as a rule, beneficial, but it must be remembered that gallstones are frequently found even in those who take an abundance of exercise and who live sparingly. The most beneficial forms of exercise are walking and moderate gymnastics ; and although more violent exercise, such as horse riding or bicycle riding, will undoubtedly diminish the tendency to the formation of gallstones, yet, on the other hand, if calculi are already present in the gall-bladder, violent movements may frequently precipitate an attack of biliary colic.

It is commonly believed that the formation of gallstones is favored not only by sedentary habits, but by prolonged inactivity of the body, and that those who spend a good many hours in sleep, or at least in bed, may prove likely subjects for this disease ; hence, after an attack of biliary colic, early rising should be enjoined, and if the patient needs more than seven hours' sleep, it is better to allow a short period of repose during the afternoon, if the circumstances of the patient permit.

Then with regard to medicinal treatment between attacks, or subsequent to an acute attack of biliary colic, the first essential is to insist upon the use of laxatives or purgatives, to counteract the common tendency to constipation. Frequently the occasional use of magnesium sulphate will be almost all that is required, or, in place of this, Carlsbad salts may be taken, either alone or with those purgatives that are credited with cholagogue action.

The most important remedies which favor the evacuation of the gall-bladder are various mercurial preparations. Blue mass or gray powder may be given at intervals of a few days, or $\frac{1}{2}$ -grain doses of calomel may be administered. The blue mass, or calomel, may be mixed with ordinary medicinal doses of euonymin (the dry extract of euonymus) or podophyllin (podophyllum resin)—drugs which are credited with promoting the formation of bile. Commonly, however, it is preferable to use the mercurial alone, or, if other drugs are given, to employ those which favor the fluid character of the bile rather than those which increase the amount formed. Sodium salicylate is frequently used with this object, 15 grains or more being given three or four times a day ; while ammonium chloride, ammonium phosphate, and sodium benzoate are often similarly employed. These remedies, however, although they may limit the tendency to the formation of fresh calculi or even the increase in size of those already in the gall-bladder, do not appear to have any

power of diminishing the size of the calculi which have already been formed. If, therefore, the patient suffers from frequent attacks of biliary colic, surgical measures for relief must be considered. The late Dr. George Harley was in favor of attempting to pass gallstones down the common bile-duct by external manipulation, and he believed he had been able, on many occasions, by pressure over the gall-bladder, to dislodge several concretions. This proceeding is, however, not devoid of risk, and it is, on the whole, better to adopt surgical measures when the frequency of colic or the appearance of a calculus indicates the probable presence of numerous gallstones. Surgical measures may be called for even during an attack of biliary colic, and there can be no doubt that the risks of septic trouble and of secondary hemorrhage are increased when the patient has been allowed to remain jaundiced for a long period. Most surgeons now prefer early interference, and it has been urged that a frequent succession of attacks of colic will increase the likelihood of the formation of adhesions around the gall-bladder, and will thus render subsequent operation more dangerous.

The nature of the operation to be performed was recently discussed at the Surgical Society of Paris,¹ when several speakers were in favor of total removal of the gall-bladder whenever practicable. More recently Mayo Robson² has discussed the same subject at length. For an impacted stone in the common duct he seems to favor pressing the stone forward or backward with the fingers, combined perhaps with compression, so as to break it up; and if these efforts should fail, he considers that incision of the duct is required when the condition of the patient appears to indicate a reasonable degree of safety. McBurney³ has described the removal of a calculus through an incision in the duodenum.

It may be stated, in general terms, that operations are imperative when there is reason to believe that the stone is impacted in the cystic duct or in the common duct. In the former it may cause very great suffering, even though there may be no jaundice; but when in the common duct there is generally considerable jaundice, unless the angular shape of the stone permits the bile to reach the intestine. The duration of the pain, however, in these cases, as in the former, may afford sufficient indication for operation.

¹ Bull. et Mém. de la Soc. de Chir. de Paris, vol. xxii.

² British Medical Journal, March, 1897.

³ Annals of Surgery, October, 1898.

Although jaundice is a common symptom associated with the passage of a gallstone, it is obviously impossible to treat this symptom by any measures which do not attack the cause, while those symptoms which may result from jaundice, as, for example, the irritation of the skin and the alteration in the rapidity of the pulse, must be treated subsequently by measures to be described in the next section.

Jaundice. Jaundice may occur from obstruction, or, more rarely, it may arise without any indication of interference with the free outlet of bile from the gall-bladder. Of the conditions causing obstruction, the most important and most frequent is that already described, namely, the presence of a gallstone in the common bile-duct; but, independently of a gallstone, the free outflow of bile may be interfered with by a plug of mucus in the duct, or by the obstruction due to the presence of a round worm in the duct. More common, perhaps, than any of the above, is the catarrhal jaundice due to mild inflammation in the course of the duct, such as may arise in connection with irritation of the stomach and duodenum, as, for example, with acute gastritis. The bile appears to be formed at a very low pressure, and, therefore, a slight degree of inflammatory thickening of the common duct, or of its orifice, will suffice to prevent the free evacuation of the gall-bladder, and will thus favor the reabsorption of bile.

Jaundice due to catarrhal thickening, or to the presence of a gallstone, is commonly of short duration. Catarrhal jaundice may last on an average from two to three weeks, but its period may be as short as one week, or as long as three months, though when it continues as long as this, anxiety must be felt lest the obstruction is due to some more permanent cause. The most important of the permanent causes of obstruction are malignant growths connected with the liver, with the pylorus, or with the pancreas, and affecting the glands in the transverse fissure of the liver. These glands may also be involved in a tubercular process, and pressure may also be exerted by aneurisms, by fecal accumulations, or even by the pressure of a pregnant uterus. Another form of jaundice which is frequently seen is that associated with chronic hepatic changes, as, for example, with cirrhosis, or with passive engorgement of the vessels. Under these circumstances, the jaundice is usually relatively slight and does not demand separate treatment. The form of jaundice which it will be most convenient to consider here is that dependent

upon catarrhal changes in the bile-duct, since many of the conditions above mentioned are either not amenable to treatment, or else can be dealt with only by surgical measures.

The first essential in the treatment of jaundice is to ascertain the cause. To some extent this may be indicated by the nature of the associated symptoms, and more particularly by the rapidity with which jaundice occurs after severe pain in the region of the gall-bladder. With the ordinary obstructive form of jaundice, due to catarrh of the bile passages, although complaint of pain may be made, the pain is not nearly so severe as with the passage of a gallstone, and indeed it may consist more of discomfort and perhaps tenderness over the region of the liver than of actual pain. It has already been indicated that with gallstones pain is severe at the commencement, and that the symptoms of jaundice only occur a few days later. Owing to the severity of the attack of biliary colic, the patient is commonly confined to his bed from the commencement, while with obstructive jaundice the discomfort is usually so slight that he may pursue his ordinary vocations.

With cases of obstruction which are not the result of gallstone, the first symptoms to claim attention will be those of gastric catarrh, which are so frequently the prelude to the jaundice. These symptoms may be dealt with partly by modifying the diet and partly by gastric sedatives. The diet should be rendered light and nutritious, but it need not of necessity consist solely of liquids, though from the severity of the catarrh the patient will commonly express a preference for a liquid diet, or at least for a diet from which meat and fats are excluded. Weak tea, dry toast, and a farinaceous dietary will generally tend to allay symptoms of gastric catarrh, and at the same time preparations of bismuth and diluted hydrocyanic acid may be prescribed; these not only relieve pain, but also tend to check vomiting and nausea. Since in these cases the gastric catarrh is commonly associated with constipation, it may be advisable, at the commencement of the treatment, to employ mild purgatives. A small dose of calomel will often be beneficial, and the action of calomel may be favored by the subsequent administration of effervescent saline purgatives, which may be continued on alternate mornings, or oftener if necessary, during the continuance of the jaundice.

The use of more active purgatives, more particularly of vegetable purgatives, is distinctly contraindicated in cases of obstructive jaun-

dice, since many of the vegetable purgatives are comparatively inoperative in the absence of bile. Further, there appears to be no advantage in causing frequent and copious action of the bowels, since in cases of jaundice the appetite so commonly fails early in the disease that there can be no benefit from frequent purgation, and, moreover, violent purgatives might only tend to increase the irritation which is probably already present within the stomach and intestine.

When there is much discomfort over the region of the liver some relief may be afforded by local applications, such as mustard poultices or hot fomentations. The dyspeptic symptoms may frequently call for the administration of alkalies, especially if the bismuth preparations give but little relief. Of the alkalies, sodium bicarbonate is undoubtedly the best and most commonly used. This may be given in conjunction with bismuth oxycarbonate and hydrocyanic acid, but it should not be prescribed in conjunction with bismuth subnitrate, since the latter so frequently possesses sufficient free acid to form an effervescing mixture. Sometimes it is more convenient to administer alkaline mineral waters, such as Vichy or Apollinaris, which may be taken alone or mixed with warm milk; in place of these, ammonium chloride, sodium salicylate, or sodium phosphate may be given. I must confess that I have rarely found it necessary to employ these last-named preparations, although many observers speak enthusiastically of the value of ammonium chloride, and even of ammonium phosphate. If the jaundice depended merely upon inspissation of bile, no doubt these remedies, which increase its fluid character, might be beneficial; but in most cases of catarrhal jaundice the cause of retention lies in the narrowing of the bile passages by inflammatory changes, rather than in the retention of the bile, owing to its altered physical characters.

Another form of treatment which has been advocated, but which in my practice it has never been necessary to employ, is the administration of an emetic at an early stage. Ordinarily there is no great tendency to vomiting, unless in cases of obstruction from gallstones, or when the gastritis is unusually severe; it has been thought, however, that emetics might be serviceable in dislodging plugs of mucus or small concretions which might be blocking the orifice of the common bile-duct. The irrigation of the large intestine with quantities of cold water has been recommended in the treatment of jaundice, but this proceeding does not always give satisfactory

results ; in fact, many who have tried it for a length of time do not appear to be convinced that it has any beneficial influence. Another course of treatment that has been highly recommended consists in the application of diluted hydrochloric acid over the region of the liver. Beale recommends that the strong acid should be diluted with twice its bulk of water, and that a rag should be carefully wetted with this lotion and placed over the liver, and then covered with some old rags or with an old towel, and he states that the only discomfort it produces is a little tingling of the skin. Possibly this may be of service as a counter-irritant when the liver is much enlarged as the result of obstructive jaundice ; but in general the same object may perhaps be attained more conveniently by the use of poultices or fomentations.

Chronic Obstructive Jaundice. When, in spite of the foregoing treatment, the jaundice persists, the case becomes one of considerable anxiety, since the cause of the obstruction may ultimately prove to be of a more serious nature than had at first been supposed, and, as in cases of jaundice from obstruction by gallstones, operative measures for the relief of obstruction will probably have to be discussed. When the jaundice is associated with pain, the idea of operation becomes more pressing ; but, on the other hand, it will frequently be found that, as in acute jaundice dependent on inflammatory obstruction, patients are able to be up and even to continue their ordinary work, so in chronic jaundice there is in general very little pain, and the chief symptoms consist in the absence of bile pigments from the motions, and its presence in the urine, the conjunctivæ, and in the subcutaneous tissues. Even in chronic cases devoid of pain, operative measures may sometimes be adopted for the relief of jaundice, more particularly when the continuance of this symptom is associated with much disturbance of general nutrition. An exploratory operation may be performed with comparatively little risk and with the possibility of affording great relief. But, on the other hand, if the patient is unwilling to face the anxieties of an operation, and if the condition does not even appear to necessitate one of an exploratory nature, measures must be adopted to counteract the evils attendant on the absence of bile from the intestinal canal. In cases of acute jaundice the measures hitherto recommended include mainly various forms of treatment pending the re-establishment of the natural functions of the liver ; but in chronic jaundice the continued absence of bile has to be faced, and clinical

experience shows that absence of bile is followed commonly by definite symptoms due mainly to partial decomposition of the contents of the intestine and associated with constipation. It becomes necessary, therefore, to regulate the diet of the patient in accordance with this condition, and, at the same time, to encourage habits of life which will favor the re-establishment of the functions of the liver.

With regard to diet, this should be nutritious but sparing; fats should be eliminated from the dietary, and carbohydrates should also be reduced in amount, and, so far as possible, the individual should be encouraged to obtain his necessary nutriment from nitrogenous materials, lean meat, nutritious soups, or concentrated meat juice.

Although alcoholic stimulants are best avoided as a general rule, conditions may arise which necessitate their employment. Cases of chronic jaundice are frequently associated with much circulatory and mental depression, and, to some extent, both of these symptoms may be controlled by the judicious use of stimulants. It is essential, however, when it is considered necessary to employ stimulants, to keep in mind the possible origin of the jaundice in an attack of gastritis and duodenitis due to alcoholic irritation; hence, stimulants, if used at all, should be freely diluted, and they should always be taken with food, so as to produce the minimum of irritation upon the stomach, the duodenum, and the liver. If given in concentrated form, or in large doses, they may do considerably more harm than good.

The slow pulse of jaundice is a well-recognized symptom of the disease, and, so long as this diminution of the rate is not accompanied by much loss of force, the use of stimulants is not indicated; but if, on the other hand, the pulse is not only slow but becomes weak and irregular, and if, moreover, there is any tendency to fainting, stimulants are urgently required. Similarly with regard to the mental depression so often seen with jaundice; it must be carefully considered whether the depression is due to this symptom, or whether both the jaundice and the mental depression are dependent upon a common cause, such as alcoholic irritation, or the deficient nutrition which so often accompanies chronic alcoholism. Frequently, as will be mentioned shortly, the circulatory and mental depression must be treated by drugs other than alcohol.

In chronic catarrhal jaundice it is desirable to encourage regular exercise, even though there may be a strong disinclination to any

form of muscular exertion. Riding is often beneficial when the jaundice is not dependent upon obstruction due to biliary calculi, but if calculi are present in the gall-bladder, this form of exercise may precipitate an attack of biliary colic.

Chronic catarrh of the gall-bladder and chronic catarrhal jaundice often appear to have some dependence upon injudiciously tight clothing, more particularly in females; hence it becomes necessary to enjoin the strict avoidance of any tight constrictions by which the shape of the liver might be altered or its functions interfered with by the upward pressure of the viscera.

Saline aperients will be necessary in this condition, as in acute catarrhal jaundice, and, for reasons already stated, the saline purgatives are preferable to purgatives of vegetable origin. The most convenient of the salines are the preparations of magnesium sulphate, or of sodium sulphate or tartrate, and the effervescent preparations are frequently more readily taken than the mineral waters which contain these salts. Some patients, however, prefer the use of saline aperient waters, such as those of Cheltenham or Leamington, or those of Carlsbad, Marienbad, or Franzensbad. Frequently the activity of the saline aperient waters is increased by their administration when diluted with warm water.

The measures above indicated serve not only to increase the comfort of the individual, but to some extent they favor a restoration of the normal conditions under which the bile formed within the liver may obtain access to the intestine, instead of being absorbed by the blood. It must not be forgotten that the use of so-called cholagogues is not required under these conditions, since the presence of jaundice is an indication that the secreting work of the liver is being properly performed, even though the secretion is not able to enter the intestine. For the relief of symptoms resulting from the absence of bile, the purified ox bile of the *Pharmacopœia* may be administered, in doses of from 5 to 15 grains. This remedy is credited with aiding the absorption of fats and peptones, with diminishing putrefaction, and with stimulating peristalsis; theoretically, therefore, it should be of extreme service in these cases. It must be confessed, however, that it is not extensively used, and that it has the disadvantage of interfering with gastric digestion. If employed, it should be given in small glutol capsules, or in pills coated with keratin, so as to favor the intestinal action, while avoiding the risk of disturbing the gastric functions.

Other modes of attaining intestinal antisepsis are usually preferred, as, for example, the employment of creosote, which may be administered in doses of from 1 to 5 minims, emulsified or in capsules. A mixture of creosote, made with spirit of juniper and syrup, contains 1 minim to the ounce; or the drug may be made into an emulsion as in the following formula :

R.—Creosote	.	.	.	.	.	.	.	℥v.
Compound tincture of gentian	.	.	.	.	.	.	.	℥xv.
Alcohol	.	.	.	.	.	.	.	℥xv.
Fluid extract of liquorice	.	.	.	.	.	.	.	℥xxx.
Water	.	.	.	.	.	.	q. s. ad	℥j.

In the above emulsion the proportion of creosote may be adapted to the needs of the individual. Creosote is best taken after meals. Creosote carbonate (creosotal) is credited with being less disagreeable than creosote; it can be given in from 5 to 20-grain doses, as a pill. More recently guaiacol and guaiacol carbonate have been employed; these are used in 3-grain doses in cachets, and are credited with inducing less irritation of the digestive organs, and with the power of being decomposed into their component parts in the intestine. Doses of $\frac{1}{2}$ grain to 2 grains of thymol have also been given in pills with powdered soap and a small quantity of alcohol, and, like the foregoing, these appear to control intestinal putrefaction if given after meals.

Of the special symptoms connected with both acute and chronic obstructive jaundice, one of the most trying is cutaneous irritation. For the relief of this symptom many remedies have been used, but, as a rule, with indifferent success. The cutaneous functions should be favored, particularly in chronic cases, by the frequent employment of warm baths, followed by the use of a rough towel and by warm flannel clothing. These serve to promote diaphoresis, which may be further encouraged either by a vapor bath or by a warm pack. Should these measures fail, and should the itching be intolerable, diaphoresis may be promoted by the hypodermatic use of pilocarpine nitrate, in doses of from $\frac{1}{20}$ grain to $\frac{1}{2}$ grain. In medium doses, such as $\frac{1}{8}$ or $\frac{1}{6}$ grain, pilocarpine may be used two or three times a day, and sometimes the relief afforded is said to be very great. When using this remedy it will, of course, be necessary to warn the patient of the risk of exposure to cold while the skin is acting freely.

The albuminuria, which may occur with acute or chronic jaun-

dice, scarcely calls for treatment, but, since it appears to be dependent upon the irritation of the kidney by pigment, the elimination of this pigment may be promoted by the use of diuretics. It is rarely necessary to employ the more stimulating diuretics, since the elimination may be promoted by the consumption of quantities of water, more particularly if this is taken in an alkaline form. Vichy water or water containing sodium bicarbonate will often be of service, and during their use the albuminuria is commonly diminished.

With regard to the weakness of the circulation which is often associated with jaundice, in addition to the use of stimulants, it will sometimes be desirable to employ cardiac tonics, such as digitalis or strophanthus, in order to increase the force of the contractions of the ventricle. Of these two remedies the former is to be preferred, since it possesses diuretic powers in addition to its cardiac tonic action. It is occasionally desirable to combine with either of these drugs $\frac{1}{2}$ -drachm doses of the aromatic spirit of ammonia. It is sometimes found advisable to combat both the mental and the circulatory depression by the use of quinine or of nux vomica; occasionally, however, the mental depression is better dealt with by ammonium bromide.

Although the above account of chronic obstructive jaundice deals mainly with the treatment of this symptom when due to chronic catarrhal conditions, many of the same principles of treatment may be followed in connection with chronic jaundice resulting from obstruction due to the presence of tumors pressing on the common bile-duct; thus, for example, the general principles of intestinal antisepsis, the desirability of exercise, and of the modifications of diet, will be equally applicable to the relief of symptoms in these cases, even though they do not afford any prospect of permanent alleviation.

Icterus Neonatorum, or the idiopathic jaundice of new-born children, is frequently seen and demands mention here, although the condition is not one which ordinarily calls for treatment. The yellow tint is generally seen on the second or third day of life, and it may increase in intensity for one or two days. In mild cases the jaundice may disappear entirely in three or four days, and it is very rare for it to continue for so long as ten days or a fortnight. The tinging differs from that commonly seen with other forms of jaundice, since the eyes are usually normal or but slightly affected, while the skin,

more particularly about the face, shows the greatest amount of bile-staining. This jaundice also rarely causes any tinging of the urine, while the feces may be normal in appearance and are certainly not decolorized, as in obstructive jaundice. It is unnecessary here to enter into the interesting discussion connected with the mode of origin of this form of jaundice. It will be sufficient to allay the natural anxieties of the parent by indicating that the prognosis is invariably good.

Congestion of the Liver. Congestion of the liver—that is, overfulness of the bloodvessels resulting in some increase in the size of the organ—occurs in several forms which arise from different causes. Passive congestion is the form commonly induced by various disorders which impede the return of blood to the right side of the heart; hence this condition will be found with chronic heart disease when compensation is failing, and it may also occur as one of the side symptoms of lung trouble connected with imperfect circulation through a large portion of the lung, as, for example, with emphysema and with chronic bronchitis. This passive congestion is of comparatively little importance, since the symptoms due to the hepatic condition are overshadowed by the gravity of the primary disease. Passive congestion is associated with some tenderness in the region of the liver, some increase of size, and some pulsation which is commonly communicated from the distended right side of the heart; symptoms of disordered digestion will also probably be prominent, although they depend upon the same cause as the hepatic condition, instead of being directly due to alteration in the liver.

Whether resulting from heart-failure or from lung trouble, the indications for treatment are sufficiently clear. Remedies for the primary disease must necessarily be used. In heart disease the remedies should be those which increase the contractile force of the ventricles and promote more efficient work, so that less obstacle is presented to the onward passage of blood. When due to lung trouble, the treatment must depend upon the nature of the lung affection. Stimulant expectorants are usually of considerable service in promoting the expectoration of fluid from the bronchial tubes, and thus relieving the engorgement of the bronchial and pulmonary vessels. Further benefit will, however, result from the use of mild depletory measures, the most important being those which act on the intestine. Should there be much complaint of pain in the region of the liver, a small quantity of blood may be abstracted

by applying leeches along the costal margin, or pain may be diminished by the use of fomentations. More frequently, however, relief will be obtained from the occasional employment of small doses of mild mercurous chloride, $\frac{1}{2}$ grain to 1 grain, which may be given with cascara sagrada and compound extract of colocynth if there is much constipation, or with euonymin if the motions are deficient in bile pigment. In the ordinary course, however, passive engorgement scarcely demands treatment other than that required for the disease which gives rise to the engorgement.

There are some forms of engorgement which are not thus dependent upon failure of the work of other organs, as, for example, the active congestion which is commonly seen as the result of frequent irritation of the liver with alcohol. It appears probable that, independently of gastritis, some overfulness of the hepatic vessels may be produced by the frequent consumption of alcohol, either in overdoses or in too concentrated a form. The dilatation of vessels that results may be sufficient to interfere seriously with the ordinary functions of the liver. Similar dilatation will also frequently arise from reckless over-indulgence in food. Those who take large meals at short intervals are peculiarly prone to suffer from this form of active engorgement, since the frequent consumption of a large quantity of food is necessarily followed by great dilatation of the gastric vessels, and, therefore, by an increased flow of blood through the vessels of the liver; and it must not be forgotten that, under these circumstances, not only is more blood conveyed to the liver, but the amount of work thrown upon that organ is greatly increased. Active congestion may also result from cold. Sudden chills of the surface, especially when the body has been previously overheated, may be followed by active congestion; thus it may follow from bathing at midday after violent exercise, or from chill after exposure to rain, or from wearing clothes saturated with perspiration, as, for example, after bicycling.

Active congestion often occurs in connection with exposure to malarial influences. Sometimes enlargement of the liver will accompany the rigors and other symptoms of malaria, while at other times the main toxic influence appears to be expended upon the liver. In malarial districts, therefore, hepatic changes are frequent, independently of other evidences of malaria. This condition will also often be met with in cases of chronic dilatation of the stomach, but the explanation of this circumstance is not very obvious, though possibly

it is to be found in the altered nature of the blood-supply which reaches the liver.

The symptoms of active congestion of the liver are in part the result of the enlargement of the liver, and in part due to the interference with its functions. The enlargement is frequently associated with a sense of weight and discomfort on the right side of the body, and there may often be tenderness on pressure, or on percussion over the epigastrium. As with other forms of active engorgement, there is commonly some rise of temperature, but the course of the temperature does not follow any characteristic line. Frequently, especially when due to over-indulgence in food or in alcohol, there will be symptoms of gastro-intestinal irritation, such as loss of appetite, impaired digestion, and perhaps nausea, or even vomiting. Occasionally there may be slight jaundice, especially noticeable about the conjunctivæ, but, independently of this symptom, the motions are often found to be pale and clay-like, although they may be passed fairly frequently, and there may be some tendency to diarrhœa. As with other forms of interference with the elimination of bile, the urine is apt to become high-colored and bile-tinged. More general constitutional disturbance will be indicated by inability to concentrate thought; there is often also some degree of muscular lassitude and of mental depression.

In the treatment of acute congestion of the liver it is important to ascertain the influence both of errors of diet and of other forms of bad habits, and to correct them. When the case is marked by mild symptoms, very slight modifications of habits may suffice to effect the cure. In any case it is advisable to insist upon a somewhat sparing diet of an unirritating type, and to counsel the discontinuance of alcoholic stimulants. It is generally unnecessary to interfere with the ordinary occupation of the individual, unless this occupation entails much worry, or unless it leads to undue haste over meals. Certainly, the symptoms are rarely sufficient for it to be desirable for the patient to keep in bed, although it is commonly found that a moderation of the ordinary amount of exercise will be beneficial. Frequently one or other of the mineral waters should be recommended, and in cases of recurring acute congestion much benefit may be derived from a short course at one of the Continental spas.

The benefit thus obtained is by no means solely dependent upon the nature of the mineral water, although to some extent the

laxative action is advantageous. A large element in the cure lies in the enforced detachment from business worries, in the relative idleness entailed, and in the strict regulation of diet which is commonly enforced.

For mild cases, or for patients with sufficient self-control to enable them to follow directions, it is quite unnecessary to adopt a course of treatment which involves so much expense and so much interference with the ordinary occupations; but for many business men, above all for those engaged in subordinate positions in offices, the advisability of a Continental spa becomes almost a necessity, since without such complete detachment from their ordinary occupations they may find it impossible to follow instructions.

When the congestion is marked by febrile symptoms, it will, however, be necessary to advise a few days' rest in bed, even though the temperature is not in itself an element of risk. During the time spent in bed, mild saline and alkaline remedies may be employed with advantage, and if there is much complaint of pain in the region of the liver, or much tenderness, relief may be obtained from the use of leeches, or of fomentations. Occasionally, when the congestion is distinctly to be traced to exposure to cold, similar treatment may be adopted; but frequently, in the absence of febrile symptoms, patients will be found to rebel against the enforced inactivity, and many cases of hepatic congestion from chill may run a mild course without needing any great interference with the ordinary habits. The duration of the attack will be shortened by rest in bed, and the likelihood of the development of other symptoms may possibly be diminished; but with previously healthy individuals, slight attacks of hepatic congestion may not be sufficient to necessitate interruption of ordinary work, nor indeed to cause symptoms other than those of slight dyspepsia.

Whatever may be the cause of the attack, the diet should be light and unirritating, and it is generally advisable to reduce the amount of fats, or even to recommend the temporary discontinuance of butter and of all forms of fat. Patients can often readily take farinaceous food without any discomfort, while the use of animal food may sometimes promote dyspeptic symptoms; hence, it is better, especially in severe cases, to advise the discontinuance of meat, and to recommend the use of beef-tea and of light, nourishing broths. The dyspeptic symptoms may to some extent be controlled by these modifications of diet, but in addition it may be well to use alkaline and

sedative preparations, such as sodium bicarbonate, or compounds of bismuth and diluted hydrocyanic acid.

Of more distinct value are the measures by which the amount of liquid which reaches the liver may be reduced ; thus, by the employment of cathartics, which stimulate peristalsis, it will be found that the contents of the intestine are hurried onward without allowing time for the absorption of liquid, and the amount of liquid in the portal system may thus to some extent be controlled. Saline purgatives, for instance, when given in concentrated solution, are found to have the power of reducing markedly the quantity of fluid in the portal circulation. It is now known that most saline purgatives tend to form a solution of the strength of 6 per cent. within a short time after they have been administered ; hence, if given with a greater proportion of water, some of this fluid will be absorbed, while, if employed in more concentrated form, the saline tends to abstract water from the intestinal vessels, and will thus reduce the liability to portal congestion. When, however, salines are given in concentrated form, their action is somewhat slower than when freely diluted.

Other remedies which favor free catharsis may be of great service. A treatment that is frequently followed is the administration of a grain of calomel at bedtime, together with euonymin or a small amount of podophyllin, and the action is often hastened by the administration of a saline draught on first waking. Some practitioners prefer the employment of effervescent preparations, such as the effervescent magnesium sulphate, or effervescent sodium phosphate ; after these remedies have been used in the morning, comfort may be even further increased and the action may be favored by the use of alkaline effervescent draughts at short intervals during the day. The following is a favorite mixture for "sluggish liver and indigestion :"

R.—Acidi nitrochlorici diluti	.	.	.	.	.	℥x.
Resinæ podophylli	.	.	.	.	.	gr. $\frac{1}{3}$.
Extracti taraxici fluidi	.	.	.	.	.	ʒj.
Tincturæ nucis vomicæ	.	.	.	.	.	℥x.
Syrupi zingiberis	.	.	.	.	.	ʒss.
Aquæ menthæ piperitæ	.	.	.	q. s. ad		ʒss.

S.—In water three times a day.

When an attack of congestion of the liver tends to become chronic, some modifications of the course of treatment will be advisable,

although these modifications are comparatively slight. The chief alteration is connected with the amount of exercise that is to be taken. Certain forms of chronic hepatic congestion benefit from active exercise, while with acute congestion greater improvement usually follows rest. The exercise must be adapted to the age and to the circumstances of the individual, and to some extent it must depend upon his general physique. For patients who are abnormally stout, gradually increasing walking exercise will give the best results as the breathing-power improves. When, however, circumstances permit, riding is preferable, since, during the necessary active movements of the body, the circulation in the viscera is facilitated, and the tendency to constipation is diminished. Many patients with chronic hepatic congestion derive benefit from massage and from the use of baths. The cold douche applied over the region of the liver is frequently of great service, and often even more beneficial is the alternation of heat and cold known as the *douche écossaise*, so largely employed at balneological establishments, when a current of hot water, under considerable pressure, is projected from a distance over the surface of the body while the patient stands under a cold shower bath.

Frequently, in addition to the value of the baths, benefit will follow a course of treatment at a hydropathic establishment, where the modifications of diet and the use of waters with mild purgative properties exert considerable influence over the hepatic circulation. Should the circumstances of the patient not permit the adoption of these measures, it will be necessary for him to attend closely to the action of the bowels, and to favor some laxity of action by the employment of mild saline purgatives, or the occasional use of a pill of calomel and euonymin. *Cascara sagrada* is sometimes of service in these cases, and it may be well to favor daily action by the frequent administration of small doses of the solid extract of *cascara sagrada*; while greater freedom of action is insured by the use of mercurial preparations once or twice a week. Patients with chronic congestion demand the same precautions with regard to diet as have already been indicated for acute congestion, though it is rarely necessary to insist upon their being restricted to liquid diet.

CHAPTER XIII.

HEPATIC DISEASES—*Continued.*

Cirrhosis—Hæmatemesis—Melæna—Ascites—Cancer of the Liver—Syphilitic Disease of the Liver—Lardaceous Disease of the Liver—Acute Yellow Atrophy of the Liver—Abscess of the Liver ; Tropical ; Pyæmic—Suppurative Pylephlebitis—Fatty Liver.

Cirrhosis. Although it is needless here to enter at length into the etiology and pathology of cirrhosis, it will be necessary to touch briefly upon these subjects, since the symptoms are so largely dependent upon the stage of the disease and also to a slight extent upon its causation. In the majority of cases the treatment of cirrhosis has to be guided by the prominent symptoms, since it is impossible by the administration of drugs, or by any modification of diet, to influence materially the morbid process occurring in the liver. The symptoms, however, which call for treatment are of two distinct varieties : obstructive and toxic. The symptoms belonging to the former group are the more important and more easily dealt with than those of the latter.

The term “obstructive” indicates that the symptoms depend upon an interference with the circulation as the result of the overgrowth of fibrous tissue in the liver. The hepatic terminations of the portal vein are pressed upon and engorgement results in various organs. Although it is impossible by treatment to influence the hepatic circulation directly, or to favor the freedom with which the blood passes from the portal vein through the liver, it is possible to favor the return of venous blood to the heart through other channels, and the efforts of the physician are largely concerned with minimizing the troubles resulting from interference with the circulation, pending the establishment of greater freedom of collateral circulation. It is important to remember that many cases of cirrhosis, when judiciously managed, will go through three distinct stages. During the first the patient suffers from the impeded circulation through the portal system, and this stage of suffering may be followed by a second stage of variable duration, during which compensation has, to a certain extent, been effected ; and the third or

final stage is marked by the ultimate failure of compensation and the rapid increase of urgent symptoms. In dealing with the first stage of cirrhosis, therefore, efforts should be directed mainly toward promoting comfort pending the establishment of the second stage.

One of the earliest indications of this disease is to be found in disturbance of the digestive functions. There is frequently some nausea and vomiting, as well as some gastric and intestinal catarrh. The catarrh is sometimes due to the habits of alcoholism, which form the foundation of cirrhotic changes in the liver; but when cirrhotic changes are progressing, symptoms of catarrh may arise, even though the patient may have long given up alcoholic habits, since the catarrh then results from passive engorgement of the branches of the portal vein within the stomach and the upper part of the small intestine. To some extent it is possible to treat these symptoms of gastric and intestinal catarrh as they arise, but in general the employment of a modified diet and even of gastric sedatives will be of little service, unless it is carefully remembered that the impeded portal circulation is at the root of the symptoms. Occasionally the intestinal catarrh is marked by frequent action or irregular action of the bowels, and it is generally advisable not to attempt to check this symptom by astringents, since these would, in all probability, tend further to embarrass the portal circulation. Indeed, when diarrhoea is absent, it is generally desirable to promote frequency of action of the bowels by the employment of saline or of hydragogue purgatives.

While thus modifying the treatment of gastritis and enteritis, it is important not to neglect the ordinary principles of treatment. Nausea and vomiting may be diminished by gastric sedatives, and it is always well, when these symptoms are present, to regulate the diet accordingly.

A symptom of frequent occurrence in connection with the stomach is hemorrhage, which may be recognized either by the gradual darkening of the motions—that is, *melæna*—or by distinct attacks of hæmatemesis. The hæmatemesis due to cirrhosis is usually but small in amount, and the blood is frequently of a dark-brown color. Occasionally, however, the hemorrhage may be more profuse, so that large clots or even large quantities of fluid blood may be vomited. In general, the hæmatemesis of cirrhosis scarcely requires separate treatment; like that of gastritis, it is due to engorgement of the radicles of the portal vein, and, when only small quantities of blood

are being brought up it is probable that the minor vessels only have ruptured and thus permitted slow oozing. It is obviously impossible to check this by the administration of astringents, since astringents cannot beneficially influence the cause of the engorgement of the radicles of the portal vein, and, indeed, they may do considerable harm by increasing the tendency to gastritis. Although this symptom, like the former, is to be treated indirectly, it will be necessary to insist upon absolute rest if the patient is not already kept in bed on account of other symptoms, and, in general, it is advisable to use remedies or measures calculated to relieve the portal engorgement.

Hæmatemesis in connection with cirrhosis may occur fairly late in the disease when, in addition to other troubles, there is much ascites, and occasionally the hæmatemesis will improve very markedly with the measures undertaken for the relief of ascites. It should not be forgotten that when there is a large accumulation of fluid within the peritoneal cavity, this fluid, by its pressure, embarrasses the various collateral channels through which relief of portal engorgement is ordinarily to be effected. I have often seen both hæmatemesis and melæna suddenly stop when fluid has been withdrawn from the peritoneal cavity for the relief of other more urgent symptoms.

The ascites due to cirrhosis varies considerably in amount. It is almost invariably an indication for keeping the patient in bed. In the early days after the recognition of ascites, hydragogue purgatives are commonly employed, such as the compound jalap powder, or jalap powder with an equal part of scammony. Occasionally stronger purgatives, such as elaterium, are used; but ordinarily I prefer to avoid this remedy, since, in spite of its undoubted action, it is somewhat uncertain in its results, and it very frequently causes considerable discomfort. After a few days of treatment with purgatives, it will be easy to determine whether the ascites is increasing or diminishing in amount, and any alteration in this respect will furnish valuable indications for further treatment. Should the ascites appear to be diminishing, the use of purgatives should be continued, and still further diminution may be obtained by the employment of diuretic remedies. When, however, in spite of diuretics and purgatives, there is a rapid increase in the peritoneal accumulation, it is advisable to operate as soon as possible, without waiting for symptoms of further distress arising from the pressure of the

fluid upon the diaphragm, and the consequent interference with the action of the heart.

In all cases of ascites early tapping is advisable, since, by the removal of fluid, the pressure on peritoneal vessels will be diminished and the reabsorption of the ascitic fluid will be favored, while risks of further effusion will be rendered less, since collateral circulation may be established more easily. Delay in performing paracentesis is likely to be followed by a speedy reaccumulation of ascitic fluid, and by the need of more frequent operations for its relief. It was at one time recommended that the ascitic fluid should be removed by means of a trocar and canula; but although it may be sometimes necessary to use these instruments, it is now far more usual to employ one of Southey's tubes, connected with a long india-rubber tube passing into a basin, or a bath, underneath the bed, which permits of the gradual slow withdrawal of fluid, and diminishes the risks of fainting, or of collapse due to the sudden alteration of pressure. Even when employing Southey's tubes, however, it is desirable to give a small quantity of brandy, or other stimulant, since faintness is frequently complained of during the operation. The site to be punctured is first thoroughly cleansed with some antiseptic lotion, and the instruments also are rendered aseptic, usually by being passed through the flame of a spirit lamp.

It is sometimes advisable to employ an anæsthetic locally—thus, for example, to inject cocaine, or to diminish the cutaneous sensibility by cold, either by means of an ether spray, by the use of ice, or of ethyl chloride. Frequently, however, the pain of introducing Southey's tube is very little more than that produced by the introduction of a hypodermatic syringe, and the previous employment of a local anæsthetic is, therefore, scarcely necessary, unless the fluid is to be removed with a trocar and canula.

The number of times that ascitic fluid may require to be removed varies greatly; sometimes within a few days the accumulation may re-form, and the distress of breathing may necessitate further removal. Frequently, however, after the fluid has been partially or wholly withdrawn, the tendency to recurrence may be checked by the employment of purgatives and diuretics. For the same reasons that have already been given for early operation, it is desirable to watch reaccumulations closely. Sometimes, after tapping has been necessary on three or four occasions at intervals of two or three weeks, the tendency to accumulation may cease, owing to the

establishment of free collateral circulation. It was at one time thought that the arrest of ascites in these cases was mainly due to some thickening or other alteration in the peritoneum, and certainly, after repeated ascites, the peritoneum is frequently found to be more opaque and less smooth than usual. This is more likely to be the case when the fluid removed during later tapplings has become more opaque, owing to the presence of leucocytes. Ordinarily, when proper precautions have been taken, this change in the appearance of ascitic fluid does not occur. The matting together of the intestines is another condition to which the arrest of ascites has been attributed, but this condition is not likely to arise unless there has been some peritonitis.

Frequently there may be œdema of the feet, and this is especially likely to arise when patients with ascites have been allowed to keep on their feet, or when the ascitic fluid is large in amount. Patients often present themselves in the out-patient room with both ascites and œdema of the leg, and the latter symptom frequently disappears after they have been kept in bed for a few days.

The history of the case generally shows that the ascites commenced before the œdema of the feet, but when the patient is very stout the œdema may occasionally be the first symptom to attract attention, even though, in all probability, it is consecutive to the accumulation in the peritoneal cavity. Even while patients are still able to be about, the extent of œdema varies greatly; it is generally found to increase toward night, but sometimes, especially after attacks of diarrhœa, there may be great improvement so far as the œdema of the feet is concerned. The variations in œdema from day to day, or when the patient is in the recumbent posture, are sufficiently explained by the cause of this symptom. It results mainly from pressure of the ascitic fluid upon the large veins and absorbent vessels passing into the pelvis, and this pressure is greatest when the patient is erect; a comparatively small amount of fluid within the abdominal cavity may then be sufficient to lead to œdema, while in the recumbent posture the pressure is more evenly distributed, and the tendency to œdema is thus reduced.

It is very rare for the œdema of the legs to call for special treatment. Generally it diminishes with the measures adopted for the relief of the ascites, and it is only under exceptional circumstances that it is ever necessary to remove fluid from the legs by means of Southey's tubes, by acupuncture, or by small incisions, such as

would be adopted in cases of dropsy resulting from heart or kidney disease. It is, nevertheless, necessary in dealing with ascites to examine the lower extremities from time to time, and to note alterations in their size. Frequently, as with other conditions leading to œdema of the legs and feet, these parts may become cold, owing to the imperfect circulation due to the pressure of the fluid upon the bloodvessels, and warmth must then be maintained by blankets and hot-water bottles. In using the latter it must be remembered that, as in other cases of œdema, the cutaneous sensibility is greatly lowered, and, accordingly, care should be taken to prevent actual contact of the hot-water bottle with the limb.

With cirrhosis a slight degree of jaundice is sometimes observed, more particularly in the face and in the subconjunctival tissues, but practically it never requires special treatment. The slight character of the jaundice is, in all probability, to be accounted for by a diminution in the amount of bile formed, rather than by the absence of pressure on the commencements of the bile-ducts. Although intense jaundice is rare, the toxic symptoms to be described below are probably due to the interference with the ordinary functions of the liver, owing to the diminution of true secreting structure.

With cirrhosis the urine frequently undergoes marked alterations. Commonly it is greatly reduced in quantity, and this reduction is greatest when there are large accumulations of ascitic fluid. The urine is not only reduced in amount, but it becomes more highly concentrated and of a deeper color, and there is great tendency to the deposition of urates. When these alterations are associated with ascites they are best treated by the measures adopted for the ascites. Short of the removal of the ascitic fluid by operation, it is difficult to materially increase the amount of urine passed. Occasionally diuretics are of service, especially those which influence the circulation through the kidney; digitalis may be employed with this object, but the chances of success are far greater when the intraperitoneal pressure has been reduced by operation. During the early days of treatment, after the patient has been confined to bed, some improvement in the nature of the urine may follow the administration of hydragogue purgatives, especially when under their influence the amount of ascitic fluid shows signs of diminution; but the greatest alterations in the urine are commonly found when, after tapping, hydragogue purgatives and diuretics are simultaneously employed. Under these conditions the diuretic value of water

may be utilized, although prior to the removal of ascites some hesitation may have been felt about the advisability of allowing copious draughts of liquid. As already indicated, when the character of the urine can be improved and its quantity increased, the chances of beneficially influencing the amount of ascites are also increased.

Frequently in the course of cirrhosis albumin may be found in the urine, and it may be difficult to determine, until the patient has been under observation for a prolonged period, whether this albuminuria is the result of passive engorgement of the kidney, or whether it is indicative of a form of nephritis associated with the cirrhosis. Ordinarily, the albumin diminishes in amount with the improvement of the ascites, and it may entirely disappear as collateral circulation becomes established.

Hitherto attention has been mainly directed to the symptoms arising during the first stage of cirrhosis, before the establishment of collateral circulation sufficient to counteract the obstruction to the circulation within the liver. Under favorable circumstances the measures above described will be attended with success, and occasionally patients who have had considerable ascites and œdema when first coming under treatment, improve so far that even though they are allowed to be up and about these symptoms do not return. Caution must be exercised in allowing a patient who has had severe symptoms to leave his bed, and the difficulty of decision in this question lies in the fact that frequently, if kept in bed too long, the appetite and general strength will fail, while improvement might follow with exercise and fresh air. The results, therefore, of allowing the patient to leave his bed must be carefully watched, and any return of œdema, or of ascites, will serve as an indication for once more assuming the recumbent posture.

During the second stage of cirrhosis, the treatment should be mainly directed toward the improvement of general nutrition and alleviation of urgent symptoms. With these objects it will be necessary to employ tonics such as quinine and iron, while small quantities of *nux vomica*, or of the *strychninæ hydrochlorate*, may be given if the appetite does not improve. The condition of the bowels will demand attention, since, during the second stage of cirrhosis, attacks of diarrhœa may alternate with a general tendency to constipation. A little diarrhœa may not do any material harm, but if the symptom continues, and if four to five motions or more are passed in the twenty-four hours, they will probably cause much

weakness and will call for the use of astringents and intestinal sedatives. More commonly it is necessary to employ saline purgatives repeatedly, to increase the action of the bowel.

Perhaps a symptom which requires most frequent treatment during the second stage of cirrhosis is the dyspepsia, which continues even after collateral circulation has to a great extent been established. The symptoms of dyspepsia may be alleviated by the use of the tonic remedies already mentioned, such as quinine, acids, and *nux vomica*; but the temptation to employ bismuth is very great, and occasionally, when given in conjunction with diluted hydrocyanic acid, bismuth subcarbonate, subnitrate, or salicylate, will be found to be of some service. The value of these remedies will depend upon the extent to which the dyspeptic symptoms are due to continued irritation of the stomach by alcohol or by indigestible articles of diet. When the occurrence of gastritis can, even in part, be attributed to such causes, these sedatives will be extremely useful; but, on the other hand, when the inefficient work of the stomach is due mainly to impeded circulation through the portal system, gastric sedatives are of very little service, and the best treatment that can be followed consists in the use of tonic remedies, and the occasional employment of alkalies or of pepsin to relieve the main results of the gastritis.

When there is any history of syphilis, potassium iodide and mercurial preparations may be employed, during either the first or the second stage of cirrhosis. In syphilitic cases these drugs may prevent further changes within the liver; but when cirrhosis has been fairly established—that is, when there is distinct overgrowth of fibrous tissue within the liver, encroaching upon the hepatic cells—no drugs can control this new-growth and lead to the formation of fresh glandular tissue. During the second stage the amount of urine passed should be carefully watched, since any diminution in the urinary secretion is likely to be followed by a return of ascites; whenever there is any marked diminution in the daily excretion of urine, or whenever there appears to be undue concentration, as indicated by the deposition of urates, it is advisable to employ diuretic remedies. Tincture of *digitalis* may be added to the tonic mixtures which these patients are so often instructed to take from time to time. As Sir R. Douglas Powell, in his *Lumleian Lectures*, indicates, “there is a great advantage in not prescribing too large a dose at first, since this is liable to be followed by premature arterial con-

traction and cumulative effects.”¹ He points out that with the appearance of these physiological symptoms, the drug should be stopped and some other medicine substituted until the pulse again calls for its administration, and he therefore advocates the employment of moderate doses. When the patient is kept at rest, he considers that 10 minims of the tincture should be given every four hours, or 15 minims every eight hours.

In the above remarks Sir R. Douglas Powell is speaking of the value of digitalis in connection with heart disease, and he notes that under these circumstances it generally takes about three days before the pulse is under control and the urine begins to increase. When employing digitalis, however, for a patient who is not confined to his bed, it is advisable to employ smaller doses than the above, and, as a rule, it is better to commence with the minimum dose of 5 minims, carefully watching the influence on the pulse, as well as on the urinary secretions. Should the pulse, after becoming slow, exhibit small intermittent beats, digitalis should be discontinued for a few hours, or the dose should be reduced. When digitalis disagrees and favors dyspeptic symptoms, or even vomiting, it is advisable to use squill. The tincture of squill appears to have more diuretic action than digitalis, and when there is no primary weakness of the circulation this can be given in doses of from 5 to 15 minims, three times a day ; or, on the other hand, when the digitalis is not producing any ill results, the syrup of squill, in doses of from $\frac{1}{2}$ to 1 fluidrachm, may be added to the mixture containing digitalis, to increase its activity.

Other diuretics may be used from time to time, such as potassium nitrate or the spirit of nitrous ether, either of which can be conveniently added to prescriptions containing tincture of digitalis or tincture of squill. The presence of free acid in the syrup of squill would, however, prevent the administration of the latter with spirit of nitrous ether.

The treatment during the third stage of cirrhosis when compensation is failing does not differ materially from that suitable for the first stage. The ascites is likely to be more marked and the weakness will be greater, but the various symptoms will still require to be dealt with on the principles already described. It is during the third stage that the toxic symptoms most commonly occur. These

¹ Treatment in Diseases and Disorders of the Heart, p. 72.

symptoms are frequently mistaken for uræmia, since they are very often marked by coma or stupor, and sometimes by convulsions. Occasionally these cerebral symptoms may be interrupted or replaced by delirium of a noisy type. It must be admitted that the treatment of these toxic symptoms is extremely unsatisfactory, since their explanation has not been finally reached. They may occur independently of any suppression of urine or of any marked diminution in the excretion of nitrogenous waste. Similarly they do not appear to be the result of jaundice, or even of the absorption of bile. Sometimes it has been thought that these symptoms have been favored when alcohol has been administered on account of the weakness of the pulse; but toxic symptoms have been frequently noted in patients who have been under observation for a length of time without the administration of alcohol. It would appear more probable that these toxic symptoms are directly attributable to the increasing interference with the functions of the liver. When delirium is present, and when the urine is not much reduced in quantity, it is desirable to check restlessness by the frequent hypodermatic injection of morphine. Sometimes, however, in addition to this treatment, it is desirable to give small doses of alcohol repeatedly, especially when the pulse is rapid and irregular. In a recent case under my care, temporary improvement followed the intravenous injection of saline solution. It must be admitted, however, that when toxic cerebral symptoms arise, the end is, as a rule, not far off.

Cancer of the Liver. It is necessary to say a few words on the treatment of cancer of the liver, although, as in many other affections of this organ, the treatment has to be entirely symptomatic, since no remedies can influence the development of fresh nodules, or the rapidity of their growth; the utmost, therefore, that can be attempted is to treat the various symptoms as they arise, and to render the natural progress of the disease as painless as possible. The symptoms connected with cancer of the liver are extremely various, since they so largely depend upon the portion of the liver affected and upon the extent to which the new growth interferes with the circulation or with the functions of other organs. When the new-growths develop toward the centre of the liver they may attain considerable size before giving rise to any symptoms. As they approach the surface and involve the capsule, they will commonly give rise to pain, particularly if the portion affected is submitted to frequent alterations of position. Nodules may form close

to the diaphragm and be comparatively devoid of pain, but when they affect the anterior margin of the liver, which is subject to frequent gliding movements, pain will probably be a very prominent symptom. When the nodules grow toward the under surface of the liver, more particularly when they press toward the transverse fissure, the comparatively quiescent period is at an end, and the symptoms become much more marked and more severe. These symptoms are, in the first place, due to pressure upon the common bile-duct, and to obstruction which leads to jaundice, frequently of a persistent type. The jaundice with carcinoma of the liver is not only persistent, but it gradually deepens, although it may be subject to fluctuation. In addition to jaundice, ascites may frequently result from pressure upon the portal vein, and, as in cirrhosis, may lead to interference with the functions of the stomach and intestines, in consequence of the obstruction to the circulation. As in cirrhosis, therefore, gastric symptoms may arise, nausea, dyspepsia, flatulence, and even vomiting and hæmatemesis, the latter being occasionally associated with melæna, either from the onward passage of blood from the stomach to the intestine, or from passive effusion from the vessels in the duodenum.

The various symptoms, therefore, of cancer of the liver may be conveniently grouped as gastric symptoms, ascites, jaundice, and pain, and the treatment of these symptoms in no way differs from the treatment of similar symptoms occurring in connection with cirrhosis. The frequency of pain will, however, necessitate the use of sedative remedies. The pain is often so intense as to interfere with sleep, and even during the waking hours it may largely contribute to the imperfect nutrition which is such a marked feature of this disease, quite regardless of the occurrence of gastric symptoms. Hence, pain demands the frequent employment of opium and of morphine, and inasmuch as these cases are hopeless from the beginning, there need be no hesitation in employing these remedies repeatedly, since the fatal nature of cancer of the liver does not admit of the subsequent establishment of the opium or morphine habit.

Sometimes, after there has been long complaint of pain, the use of opiates is scarcely essential, since a stage of toleration may be established; at any rate, one often sees cases in which fomentations of opium or of belladonna are sufficiently sedative to enable the internal use of morphine or of opium to be discontinued. When there is complaint of considerable pain, these fomentations should always

be employed in addition to the internal use of opium or of morphine, and they should be continued alone when the pain shows any sign of subsidence. It should be remembered that the pain of cancer of the liver is liable to be increased by frequent manipulation of the liver; hence, when the diagnosis has been made, there is distinct disadvantage in frequent examination of the new-growths.

With regard to the jaundice of carcinoma, the measures described in connection with obstructive jaundice are of no use with carcinoma; it is hopeless to attempt measures intended to diminish jaundice or even to relieve obstruction of the common bile-duct. The utmost that can be done is to attend to the action of the bowels and to employ remedies calculated to supply the deficiency of bile. These have already been detailed in connection with obstructive jaundice. To a great extent they consist in the employment of saline purgatives and in the occasional use of intestinal antiseptics and carminatives.

In connection with carcinoma of the liver, special care must be taken to avoid the formation of bed-sores, since these patients, from their weakness, from the size of the hepatic tumor, and from the ascitic accumulations, are extremely likely to remain in one position, on their back.

Frequently during the progress of carcinoma of the liver some pyrexia of a mild type occurs, the temperature ranging from 100° to 101°, or 102°, and the pyrexia, when it assumes this continuous form, is rarely amenable to treatment. Sometimes the course of the temperature is less regular, being interrupted by great fluctuations associated with rigors. These symptoms are frequently indications of suppuration in the neighborhood of the nodules, or at least of inflammatory processes originating in the irritation caused by their pressure. Rigors, however, occur occasionally when no anatomical cause can subsequently be discovered. With rigors, fairly large doses of quinine should be administered: 5 grains may be given three times a day, and, should there be any tendency to nausea or vomiting, the quinine may be conveniently given in an effervescent form, from $\frac{1}{2}$ drachm to 1 drachm of citric acid serving to dissolve the quinine and to allow a sufficient quantity of free acid to give brisk effervescence on being added to the alkaline solution. Another symptom which may appear to call for treatment is the occasional oedema of the feet and legs. This rarely results from the pressure of fluid in the peritoneal cavity; far more frequently it is due to

anæmia. Beyond the administration of tonic preparations and compounds of iron, very little can be done for the relief of this symptom, unless the ascites is sufficiently great to call for the removal of fluid.

Syphilitic Disease of the Liver. Syphilitic disease of the liver frequently simulates cirrhosis of the liver, and inasmuch as the prognosis in the former is much the more favorable, it is important to recognize the diagnostic indications. The disease may occur in three forms: the first is a diffuse hepatitis, the form commonly observed in congenital syphilis. In this, although the liver is larger than usual, owing to great increase of connective tissue and small-celled infiltration, the shape is not materially altered. Secondly, gummata may arise, either in adult life or during childhood. The size of the gummata varies from a quarter to three-quarters of an inch in diameter, but both smaller and larger nodules may be found. These may produce considerable deformity and lead to deep fissures, composed of fibrous tissue. The third form appears to originate in the fibrous capsule of the liver, and leads to an increase in the connective tissue in the portal canals.

As above indicated, the symptoms, especially in adults, are mainly those of cirrhosis. The jaundice is usually not well marked, but there is commonly much disturbance of the digestive system and much ascites. The diagnosis mainly depends upon the irregular surface of the liver and upon the presence of nodules and of deep fissures at an age when cancer of the liver appears improbable.

The treatment of the prominent symptoms—the pain, vomiting, and ascites—in no way differs from the treatment of these symptoms in connection with cirrhosis; but, in addition to the ordinary measures adopted for their relief, it is advisable to employ antisiphilitic remedies. When the disease occurs in early life and appears to be congenital, preparations of mercury must be used freely; but should it develop later in life, it will also be necessary to use potassium iodide in large doses, and if the symptoms show no signs of improvement, it will be advisable to discontinue the mercury and to increase the amount of potassium iodide. For congenital syphilis the mercurial ointment is commonly the most convenient, since this can be applied to the flannel binder worn by the child, and the movements of the body will affect the absorption of mercury by the skin, its volatilization, and its further absorption through the lung. Although this mode of treatment has the disadvantage of

uncleanliness, it has the advantage of being easily employed, and hence it is more likely to be carried out than the frequent inunction of mercurial ointment in the groin or in the axilla.

Should the indications of syphilis occur while the child is being nursed, antisyphilitic remedies given to the mother may be beneficial to the infant. For older children the mercurial ointment is less convenient than the internal administration of gray powder. Gray powder must, however, be used somewhat cautiously, since it may cause considerable diarrhoea if given in overdoses or for too long a period. Frequently a grain of gray powder is given, with 3 or 4 grains of white sugar, twice or three times a day. It is unnecessary here to enter into detailed description of the modes of treating syphilis in the adult, since these are in no way modified by the special organs affected. The rules for early tapping in ascites and for the subsequent employment of cathartics are the same, whether the ascites is due to cirrhosis or to syphilitic disease. It remains to add that syphilitic disease of the liver is occasionally marked by more pain than is usually present in cirrhosis, this pain being especially severe as the degeneration affects the capsule and leads to perihepatitis. Sometimes the inflammation thus caused may be sufficiently severe to form the foundation of general peritonitis. It is important, therefore, to treat the pain of syphilitic disease at an early stage by counter-irritants applied over the site of pain, and by the hypodermatic use of morphine. As in other cases of hepatic pain, benefit usually follows the use of hot fomentations or of poultices, either of which may be sprinkled with laudanum. Should general peritonitis arise, the treatment will require to be modified accordingly. (*See Peritonitis.*)

Lardaceous Disease of the Liver. Lardaceous disease of the liver, or amyloid disease, is always the sequel of some form of chronic suppuration, and, therefore, must be considered in the light of one of the side phenomena incidental to chronic suppuration, rather than as a distinct disease. In addition to this dependency of origin, we have to note the fact that considerable lardaceous change may be present in the liver, without necessarily leading to any distinctive symptoms. The forms of chronic suppuration leading to lardaceous changes are frequently those connected with tubercular disease, either of bone or of lung tissue. So long as the suppuration in connection with diseased bone has not appeared externally, lardaceous disease is not likely to arise; but when large

abscesses communicating with diseased bone have formed, and have discharged externally, and when, from the situation of the primary cause of suppuration, the discharge is difficult to arrest, lardaceous disease is very likely to arise. Great enlargement of the liver from this form of degeneration is frequently accompanied by similar alterations in the size and in the structure of the spleen. Although generally dependent upon suppuration connected with tubercular changes, lardaceous disease may follow suppuration resulting from syphilis, and here, also, one of the factors necessary to the contraction of lardaceous disease appears to be the contamination of the abscess cavity with air and with the germs which it contains.

Frequently considerable enlargement of the liver and of the spleen may have occurred before attention is attracted by the increased size of the abdomen. The enlargement is commonly painless and does not interfere with the work of the liver, either with regard to the secretion of bile, or with the freedom of circulation. Hence, jaundice and ascites are generally absent; and, apart from the cachexia, which is largely due to the prolonged suppuration, lardaceous disease possesses no special features of its own. The increase in the size of the liver may, however, be very considerable, and it may cause discomfort either by pressing on other abdominal viscera, or by interfering considerably with the freedom of the movements of respiration. The smooth surface of the liver and its rounded margin, together with the previous history, usually leave very little doubt about the diagnosis.

Since lardaceous disease of the liver is commonly associated with lardaceous changes in the vessels of other organs, it is desirable to arrest further degeneration at the earliest possible stage. This can only be effected satisfactorily by dealing with the cause of suppuration, by correcting, if necessary, the syphilitic cachexia by the administration of mercury or of potassium iodide, and by dealing surgically with any diseased bone; for example, by clearing out tubercular joints, by removing portions of necrosed bone, and by the free use of antiseptic measures when the caries—as, for instance, in caries of the spine—does not appear to be within reach of more active surgical interference. Under these modes of treatment, the slighter forms of lardaceous disease of the liver or spleen may undergo improvement, and the liver may eventually return to its normal size and shape. More commonly, however, the disease is met with when too far advanced to hope for such good results.

Independently of the adoption of surgical measures for relief, some benefit may be occasionally derived from the employment of iodine, or of iodides, and this improvement may occur even though there may be no suspicion of a syphilitic origin. It has been recommended that ammonium chloride should be given in large doses (30 grains) in this disease. I have often tried this remedy, and have been unable to satisfy myself that it possessed any power of controlling lardaceous changes. As with other conditions leading to or associated with chronic suppuration, benefit may sometimes result from prolonged residence at the seaside, or from a long sea voyage in a well-provisioned ship; but all of these measures are of secondary importance compared with the value of surgical measures for checking suppuration.

The frequent association of albuminuria with lardaceous disease of the liver is commonly an indication that the changes have affected the glomerulus and other vessels of the kidney. Occasionally, however, this explanation of albuminuria may be misleading. I have known cases where the albuminuria resulted from pressure, or at least where the diminution of pressure was followed by a diminution in the amount of albuminuria, or even by disappearance of albumin from the urine. Similarly, although ascites is commonly absent, I have seen it in a marked form in a child who had a considerable lardaceous enlargement of the liver. In this patient the ascites was preceded by œdema of the lower extremities, which persisted after the removal of fluid from the abdominal cavity. The disease originated in spinal caries, and the abscess was found to have obliterated the inferior vena cava. Should ascites arise in the course of lardaceous disease, some such explanation may commonly be found, and the ascites will require to be dealt with as though it were entirely dependent upon hepatic cirrhosis.

Acute Yellow Atrophy of the Liver. Happily this condition is rare; its symptoms are severe, and it appears to be almost invariably fatal. The few cases of recovery which have been recorded seem open to some doubt as to the diagnosis. The prominent symptoms are those of gastroduodenal catarrh with jaundice, which within a few days may be followed by severe cerebral symptoms—headache, delirium, and sometimes convulsions. As the cerebral symptoms develop the jaundice increases, and the case commonly terminates with deep coma. Hemorrhage into the skin, or from the mucous membranes, frequently occurs. The tempera-

ture is generally low until the final rise shortly before death. In addition to the presence of bile pigment in the urine, leucin and tyrosin are commonly to be met with. From the commencement of the disease the size of the liver rapidly diminishes. The atrophy results from rapid fatty degeneration of the glandular tissue, and fatty degeneration may also simultaneously affect the cardiac muscle.

The foregoing short account of the symptoms and of the pathology of this disease sufficiently indicates the hopelessness of treatment. As in other cases of acute jaundice, saline purgatives are, however, generally administered, and it has been thought that under the influence of repeated doses of these purgatives the cerebral symptoms have been retarded, or even averted. With the onset of cerebral symptoms, of convulsions, or of coma, the case must be treated as one of uræmia, even though there may be no indications of marked interference with the functions of the kidney. Sometimes the cerebral symptoms appear to be reduced in severity if free catharsis can be obtained by magnesium sulphate, and also if the action of the skin can be stimulated either by vapor baths or by the wet pack. The rapid increase in the severity of the symptoms leaves, however, very little hope of permanent advantage from any of the above measures. In treating the rare cases marked by high temperature, quinine and other antipyretic remedies are indicated. The newer antipyretics, such as antifebrin, antipyrin, and phenacetin, are, however, not wholly devoid of risk, since they may interfere considerably with the normal functions of the liver and may contribute to the development of further toxic symptoms. Quinine may be used in large doses, and its employment is sometimes followed by a reduction of temperature. The symptoms so strongly resemble those produced by phosphorus poisoning that there appears to be very little reason for doubting that the changes in acute yellow atrophy depend upon some distinct toxic influence.

Abscess of the Liver. Abscess of the liver occurs in two forms which are widely separated in their etiology, in their symptoms, and in their treatment. The first—tropical abscess—is commonly of large size and occurs in those who have endured some of the discomforts and diseases incidental to tropical climates. This form of abscess can generally be traced to an acute attack of dysentery. The abscess develops comparatively slowly, and is often painless. The first symptom to attract attention is the deterioration of health, and

this may be closely followed by a sense of weight and discomfort in the region of the liver. Frequently the abscess may attain considerable size before its presence is recognized, and its existence may be first demonstrated by a profuse flow of pus from the intestine, or the expectoration of pus from the lung. Tropical abscess has to be dealt with on surgical principles, and the two modes of evacuation above mentioned should be averted, if possible, since they almost invariably lead to prolonged and exhausting suppuration. Tropical abscess sometimes makes its way toward the surface of the liver, and, as it involves the capsule, it may lead to severe pain, necessitating the employment of morphine. This pain is, however, to some extent an indication of a natural conservative process, since it is commonly accompanied by the formation of inflammatory adhesions between the capsule of the liver and the peritoneal surface. These adhesions limit the movements of the liver, and they also diminish the risks of spontaneous discharge into the general peritoneal cavity. Occasionally the formation of adhesions between the liver and the abdominal wall may be favored by the application of blisters over the site of the abscess. It must be remembered that the dangers of spontaneous discharge are very great; hence, when the diagnosis of tropical abscess has been made, it is advisable to seek the assistance of an experienced surgeon at an early date, since even the surgical treatment of this disease involves many difficulties and dangers.

The second variety of hepatic abscess is that in which numerous small collections of pus may be formed in the liver. Such abscesses may occur as the result of septic and pyæmic processes, and they may follow the condition known as portal pyæmia, where the infective material is absorbed from some ulcerated portion of the alimentary canal, as, for example, in connection with appendicitis, with typhilitis, and with ulcerations of the stomach, the large intestine, and even the rectum. Numerous small abscesses may also be found along the course of the bile-ducts in some cases of gallstone. This form of hepatic abscess constitutes "suppurative pylephlebitis."

With multiple abscess the symptoms are mainly those of pyæmia with hepatic symptoms superadded; thus the temperature is somewhat elevated, and frequently it oscillates widely, but, as a whole, the chart does not conform to any regular type. There is usually some jaundice, especially in those cases where the suppurative pylephlebitis results from impacted calculi; but even in pyæmic cases

where there is, as a rule, no direct pressure on the common bile-duct, jaundice is fairly frequent, and doubtless results from the reabsorption of bile from the bile-ducts, owing to irregular pressure of the purulent collection. The liver itself is generally evenly enlarged and tender on percussion or pressure, but the enlargement rarely attains the dimensions exhibited by the single tropical abscess.

The treatment of this condition is extremely unsatisfactory unless the symptoms appear to originate in the impaction of a gallstone. Even then, however, the measures to be adopted are those calculated to relieve the obstruction (*see* Gallstones), and neither the collections of pus, the tenderness, nor the temperature can be dealt with directly by any surgical measures. These collections of pus may be suspected from the size of the liver, but usually they are so numerous and small that it is absolutely impossible to attempt to evacuate this form of hepatic abscess. More commonly the existence of these multiple hepatic abscesses may be scarcely suspected during life. In connection with pyæmia, however, the existence of multiple abscesses becomes more certain with the development of jaundice and the oscillations of temperature above referred to. Pyæmic abscesses rarely attain sufficient size to enable their position to be diagnosed; but should they appear to be near the surface of the liver, they may occasionally be dealt with surgically. As a rule, however, with pyæmic abscesses, the condition is so desperate that much hesitation will be experienced about performing operations. The general treatment, therefore, will resolve itself into that commonly adopted for cases of pyæmia or septicæmia.

Fairly large doses of quinine may be administered if rigors are present, and, even independently of rigors, 5 grains of quinine may be given three or four times a day in an effervescing solution. The strength of the patient must be maintained by a suitable dietary of a light and digestible character, while, for the weakness and irregularity of the pulse, it will often be necessary to employ stimulants. These should be given in frequent small doses distributed over the twenty-four hours, though the total amount need not exceed 3 to 4 ounces of brandy. The furred condition of the tongue and the irregular action of the bowels will call for the use of purgatives. Small doses of calomel, $\frac{1}{2}$ grain to 1 grain, made into a pill with extract of cascara sagrada and compound extract of colocynth, may be given at night, and the action of the mercurial may be rendered more rapid and less irritating by administering an effervescent saline

draught in the early morning. In these cases the employment of glycerin suppositories, or of enemata of soap and warm water, of olive oil, or of glycerin, will be of very little service, since the object is to clear the whole course of the bowel rather than to empty the lower portion. In some form of pyæmia, when the obstruction to the outflow of bile is not so complete, diarrhœa may be present instead of constipation; but even under these conditions the occasional employment of a mercurial will, as a rule, be beneficial.

Fatty Liver. The two forms of fatty liver are fatty infiltration and fatty degeneration, the latter being the more important, since this is the form associated with cases of malignant jaundice and of phosphorus poisoning. With fatty infiltration the causes are more various. It may arise in connection with general obesity, and, on the other hand, it may occur when the ordinary processes of oxidation are interfered with, as in phthisis, in cachexia and confirmed anæmia. It also occurs in a marked form with chronic alcoholism. The symptoms are extremely indefinite, since there is no direct interference with the portal system, and no distinct obstruction to the outflow of bile. Hence ascites is absent, notwithstanding the extreme size which fatty livers sometimes attain; and similarly, although the motions may sometimes be somewhat light in color, jaundice never appears.

It is impossible in this place to give a detailed account of the treatment of this condition, which depends upon such a variety of causes. The utmost that can be done is to treat the cause—that is, to encourage abstinence, or at least moderation, in those who are in the habit of indulging in alcohol—to adopt measures for the reduction of obesity—measures which must include not only a modification of diet, but increased activity of body. At the same time the general nutrition must be maintained, and the prominent symptoms in cases of phthisis, of anæmia, or of other forms of cachexia, must receive appropriate treatment.

CHAPTER XIV.

RENAL DISEASES.

Lithuria—Uric Acid Gravel—Phosphaturia—Oxaluria—Hæmaturia—Hæmoglobinuria—Chyluria—Albuminuria—Renal Calculus—Pyelitis—Hydronephrosis.

Lithuria. Foremost among the anomalies of the urinary secretion must be noted the tendency to the deposit of uric acid and of urates. Of the two, the latter is by far the more common. The urates should normally be held in suspension, but frequently, in acid urine, owing to concentration, or owing to an excess of urates, these may be deposited in an amorphous form. The conditions leading to the deposition of urates are very numerous. Sometimes the deposition may be the result of conditions which differ very little from the normal physiological state, and the cause of the deposition may often lie altogether outside the body; thus, for example, it is scarcely to be regarded as an indication of a pathological condition when, owing to concentration of the urine produced by the loss of fluid from the body by perspiration, urates are deposited during hot weather. Similar precipitation may, however, also arise in connection with many trifling ailments, especially those involving variations of the temperature of the body.

During dyspepsia, urates may be deposited when the urine is acid, but the quantity of amorphous deposit is commonly greater during febrile attacks. In all probability the deposit is largely the result of concentration, owing to the over-action of the skin and lungs. The urates deposited in this way are mostly red, and under the microscope they are found to consist of granular masses devoid of characteristic shape. With moderate heat the deposit will dissolve, and it will generally re-form as the urine cools. In examining highly concentrated urine directly it has been passed, the addition of testing reagents may suffice to cause the precipitation of amorphous urates; thus, in the cold nitric acid test for albumin, urates may sometimes be precipitated at the line of junction between the acid and the urine. The urates found under these circumstances are, according to Sir William Roberts, quadri-urates of potash, soda, and ammonia, and they are not to be regarded as pathological products.

Free uric acid may sometimes be precipitated in the urinary pas-

sages, and, in America and England, uric acid deposits are most common among those who live too freely. This precipitation is especially favored when the urine is unduly acid, but it may also ensue from insufficient supply of food, and especially from an insufficiency of food containing mineral salts; thus it is particularly likely to arise when the dietary consists principally of carbohydrates, and in countries where the diet is almost entirely farinaceous, not only is uric acid gravel frequent, but uric acid calculi are also extremely common. There appears to be some evidence in favor of the assumption that the deposit of uric acid is retarded by the consumption of mineral salts, such as chloride of sodium. The deposit of both uric acid and of urates will be favored by a high degree of acidity of the urine, and the chief point of interest in comparing these two conditions lies in the fact that uric acid may form crystalline concretions before leaving the body, while the urates are deposited only during the cooling of the urine after it has been passed.

Of the two formations, that of uric acid gravel is the one which requires the greater consideration, since the deposition of urates, occurring as it does outside the body, can be regarded as an indication of processes occurring within the body, only so far as the urine is concerned, and does not commonly call for special treatment. The deposition of urates is a condition which may often be entirely relieved by the more liberal use of liquids and by the occasional administration of alkalies. Many persons, from one reason or another, are prone to take too little fluid. This is sometimes done to avert indigestion, more commonly to avoid obesity, while in reality both of these conditions may be favored by the sparing use of liquids. Hence, although this deposition is in itself of little importance, it will serve to attract attention to errors of diet which might otherwise escape observation.

When the urates are found in connection with febrile conditions, they are again an indication for an increased amount of liquid; but in all probability, if the temperature is high, the urates will still be precipitated, as, for example, in many cases of typhoid fever and pneumonia. The deep red color due to urates is not uncommonly thought to indicate the presence of blood, but on heating a small quantity of urine in a test tube the distinction is so evident that, for the sake of reassuring the patient or his friends, it is worth while dissolving some of the urates in their presence.

When uric acid crystals are being passed they may occasionally cause considerable irritation. Commonly these crystals are distinctly visible, and when examined microscopically they are found to form rosette masses of brilliantly tinged crystals, the form of the mass sufficiently accounting for the irritation they produce. The treatment must depend upon the conditions under which they are found. In large cities, and among the upper classes, they frequently call for a great reduction in the amount of food taken, more particularly with regard to the nitrogenous elements of the food. Although an excess of nitrogenous food appears to favor the deposition of uric acid, this may be further increased by reckless indulgence in alcoholic beverages and saccharine substances, and by the life of relative inactivity usually led by these patients, which contrasts painfully with the energy displayed by them at meal times. These remarks furnish sufficient indications for modifying the habits of these individuals, and not only should they be encouraged to be less indulgent in regard to their diet, but they should be stimulated to lead more physiological lives and to take an increased amount of exercise. These measures may be aided in their curative tendencies by the use of alkalies. It is generally inadvisable to produce alkalinity of the urine, but there is distinct advantage in reducing the acidity. Lithium compounds may be used with this object, and they are commonly found to be less depressant than salts of potassium or of sodium, which possess a similar power of reducing the acidity of the urine, as well as of rendering it distinctly alkaline. Lithium citrate may be given in doses of 5 grains and upward, when administered in a mixture with other alkalies or with bitter tonics; or in place of these, from 60 to 120 grains of the effervescent lithium citrate may be given alone. It must be remembered, however, that in this preparation a considerable proportion of sodium bicarbonate is present. Lithium carbonate is also frequently used in doses of from 2 to 5 grains, but, like the citrate, this is mostly employed in conjunction with other alkalies.

With the twofold object of favoring alkalinity and increasing dilution of the urine, lithia water is often prescribed; this may be taken with the meals or at bedtime with a small quantity of alcohol. Uric acid crystals are most frequently seen when the urine has attained its maximum of concentration and of acidity; these conditions are to be met with in the urine that is passed in the early morning; hence the special value of employing lithia water at

night. When the deposition of uric acid is associated with gastric irritation there is some advantage in using sodium bicarbonate and sodium chloride in fairly large doses: 20 grains of the former and 5 grains of the latter may be given at bedtime, or a mixture of 20 grains of sodium bicarbonate with 10 grains of potassium carbonate, given under the same conditions, may sometimes be more beneficial. It is of some importance to use these alkalies in a single dose at night-time, since they thus favor the alkalinity of the morning urine, and they are also less liable then to impede gastric digestion; they may be conveniently given in milk, which to some extent conceals their unpleasant taste and has the additional advantage of favoring diuresis. Occasionally it is found that the tendency to the deposition of uric acid is aided by habits which might often be regarded as abstemious; thus, when meals are taken at very long intervals, the urine becomes periodically extremely acid and concentrated, and under these conditions uric acid may appear in crystals, even though the total amount of food taken may not exceed the physiological requirements. When the condition appears to be due to this error, the meals should be taken at intervals of about three hours, and should be of a light nature. Even during the intervals between breakfast and the midday meal, a cup of milk with soda water or Vichy should be taken, and the same may be repeated shortly before going to bed.

Many of the alkaline mineral springs have been recommended in the treatment of uric acid gravel. Some are credited with the power of dissolving the crystals, but this may be an error of observation. Symptoms of uric acid gravel may be diminished during the use of alkaline mineral waters, such as those of Mt. Hartford, Poland, Bethesda, Vichy, Royat, Neuenahr, etc.; but in all probability the improved condition results from the concretions which are present in the urinary passages, being washed away by the increased flow of fluid, while the tendency to the further formation of concretions is reduced, owing to the diminution of the acidity and to the dilution of the urine.

Patients subject to uric acid gravel should be advised to employ laxatives to favor the daily action of the bowels. *Cascara sagrada* may sometimes be of great service, and its action may be considerably increased by the addition of a small quantity of calomel. Some patients prefer to employ podophyllin, or aloin; but, inasmuch as this condition is frequently associated with constipation and with a

tendency to hemorrhoids, these remedies may sometimes be objectionable. Other measures which will diminish the tendency to uric acid gravel are those calculated to improve the general health. Mild exercise in the open air is often very useful, but the exercise should stop short of fatigue, and should never be sufficiently violent to cause free perspiration, which, in its turn, might lead to concentration of the urine and thus favor deposition of uric acid. It is advisable also to recommend the daily employment of a cold bath, provided always that the use of the cold bath is followed by a good reaction; this may frequently be favored by the use of a rough bath towel.

Phosphaturia. The deposition of phosphates occurs in alkaline urine, and it may follow the ordinary alkaline tide which so often ensues after meals, or it may be associated with more permanent alkalinity due to inflammatory processes connected with the urinary passages. The former condition results in the passage of white, milky, or chalky looking urine at intervals during the day. This chalky opacity may appear only toward the end of micturition, and it frequently causes much anxiety and dread of the formation of phosphatic calculi. The precipitation of phosphates in the amorphous form, however, is very rarely followed by the formation of urinary calculi; it appears to result merely from disorders of digestion, which are often due to the consumption of large quantities of vegetable food. Sometimes, also, it follows the employment of special articles of food; thus, in many individuals, phosphaturia will ensue after the use of fish, particularly of boiled fish of coarse fibre. This condition may also result from sedentary habits connected with much mental exertion, and it is often accompanied by oxaluria and by a general feeling of mental depression.

This form of phosphaturia is, however, of comparatively little importance, and it will frequently disappear entirely with the administration of acids, especially if they are given with tonic remedies to increase the digestive powers. Small quantities of *nux vomica* and of diluted hydrochloric acid are often of great service, and the action of these remedies is largely increased by suitable modification of the diet and of the general habits of the individual. Phosphaturia is extremely frequent among students who, in the anxieties connected with examinations, are perhaps leading unphysiological lives. The condition, which is in reality of slight importance, is often the cause of a disproportionate amount of anxiety, since it may be mistaken for spermatorrhœa.

The form of phosphaturia connected with permanent alkalinity of the urine is almost invariably due to chronic irritation of the bladder, though sometimes it may ensue with irritation of the ureter, or of the pelvis of the kidney. Phosphates may thus result from the introduction of bacteria through the employment of dirty catheters. The deposition of phosphates frequently occurs outside of the body during the ammoniacal decomposition of urine that has been left to stand in a warm place. The phosphaturia due to permanent alkalinity tends to form the well-known knife-rest crystals of triple phosphates; and when these are produced within the body, there is considerable risk of the formation of calculi, if the crystals are deposited on any blood clot or other nucleus. Phosphaturia is also likely to arise when the bladder is not being completely emptied; thus, independently of the employment of catheters, phosphaturia and ammoniacal urine may ensue after enlargement of the prostate in elderly men.

From what has been already said of the etiology of this condition, it is obvious that the treatment is, to a large extent, necessarily surgical. Chronic irritation of the bladder may, however, be relieved by the internal administration of boric acid, which may be given in doses of from 5 to 15 grains, and similar antiseptic action may be exerted by the use of salicylates, salicin, or of salol, which all give rise to the presence of salicyluric acid in the urine, which exerts a beneficial control over the further development of bacteria within the bladder. Although these remedies are frequently of service, it is commonly necessary to resort to surgical measures as well; thus, in cases of enlarged prostate, a catheter must be used twice a day, so as to insure the complete emptying of the bladder. When, on the other hand, the condition is connected with cystitis, although boric acid and similar internal antiseptics may be of considerable service, still greater benefit will often follow the irrigation of the bladder with boric acid, or with dilute solutions of silver nitrate; and, in addition, it is desirable to encourage the employment of copious draughts of unirritating fluids, such as milk, barley water, and the like, which will favor the relief of irritation by dilution of the urine. It is unnecessary, in this place, to enter into greater detail connected with the treatment of acute or chronic cystitis, but it may be remarked that the irritation and discomfort may frequently necessitate the employment of alkaline remedies, although these may to some extent favor the deposition of phosphates. The

indications for these alkalies are to be found in the frequency of micturition and the association of pain. When these symptoms are not severe, boric acid or salicylates are preferable; but should there be great complaint of pain, it is almost essential to use sodium bicarbonate, lithium citrate, or other alkalies, so as to reduce the discomfort; and, under such circumstances, the deposition of phosphates must be controlled partly by judicious diet and partly by the increased quantity of liquid consumed.

Sometimes, with the view of further increasing the amount of excretion, infusion of buchu may be administered; commonly, however, it is well to avoid this preparation if there is much complaint of pain. Other remedies which are employed are preparations of turpentine, of santal, and of juniper, but in cases of cystitis all of these are liable to cause more discomfort, although by producing an increased excretion they cause reduction in the amount of phosphates deposited.

Oxaluria. The deposition of crystals of oxalate of lime occurs under very numerous conditions. Oxaluria frequently coexists with phosphaturia, but notwithstanding this association the condition appears to result more commonly from the employment of vegetable diet. In a large number of ordinary articles of diet oxalic acid is present in considerable quantity; thus, for example, in rhubarb and in spinach the crystals may be readily recognized, and if the proportion of oxalic acid in the system is largely increased by a diet in which these articles are included, this increase may favor the deposition of small brilliant octahedral crystals of oxalate of lime; more rarely the crystals may be of the dumb-bell form. Oxalate of lime, or oxalic acid, occurs in tomatoes, cabbage, celery, and beetroot, while it is also an ingredient of most of the commoner forms of fruit. To a variable extent it is present, too, in tea and in cocoa. The tendency to the deposition of crystals is favored by a high degree of acidity of the urine, the octahedra most commonly occurring with conditions which favor increased acidity. Sometimes these crystals appear to be deposited after the water has been allowed to stand, but they may often be formed within the body, and may thus greatly increase the risks of the formation of calculi in the urinary passages.

The deposition of oxalic acid is commonly associated with some dyspeptic symptoms and with mental depression. Frequently it will be found that oxaluria occurs when individuals are overworked

or when they are of a neurotic temperament. Considerable mental depression is often regarded as an indication of oxaluria, especially when this is associated with a sense of discomfort in the lumbar region and undue irritability of the bladder. It may be questioned, however, whether these symptoms are directly referable to oxaluria, unless, indeed, the vesical irritation is to be regarded in this light. Mental depression and dyspepsia are sufficiently frequent among nervous, overworked individuals, and even independently of oxaluria they lead to muscular weakness and lassitude. In all probability, therefore, it would appear that the oxaluria is merely one of the side phenomena, without being responsible for the production of the principal symptoms.

From what has been said of the influence of diet, it is desirable to modify the diet of patients known to be troubled with oxaluria, to reduce the amount of vegetable ingredients, and to avoid particularly those articles which are rich in oxalic acid or in oxalates. It is also advisable to reduce the strength and the quantity of tea, and to furnish the requisite amount of liquid in a form not likely to promote oxaluria. Milk and bland mucilaginous draughts, such as barley water, may be used freely. Should the diet lead to constipation, this tendency should be counteracted by the use of salines or of mild cathartics. Small doses of aloin, of cascara sagrada, of euonymin, or even of podophyllin, may be employed occasionally, with the view of relieving constipation; but more important even than any of these remedies is the regulation of the general habits of the individual. Oxaluria so often follows overwork with sedentary habits that it is necessary to encourage exercise in the open air, and, if possible, to reduce the amount of nerve strain. The general physical condition may also be improved by favoring the action of the skin with cold baths and with the free use of a rough towel.

When the depression is extreme it is necessary to give ordinary tonic remedies, and when associated with sleeplessness it will call for the employment of sedatives. Ordinarily it is advisable to confine the employment of sedatives or narcotics to the ordinary hours of sleep, and to administer nerve tonics during the waking hours. Full doses of ammonium bromide, or of potassium bromide, at bedtime may be beneficial; while even moderate doses, employed during the day, may further increase depression and languor—symptoms which are very readily controlled by the administration of nuxvomica and of preparations of iron. Arsenic is also frequently

beneficial in these cases, but it must be used with discretion. If given in large doses it may disturb the digestion, while smaller doses will increase the digestive powers, appetite, and blood formation.

Oxalic acid is so commonly present in association with uric acid in acid urine that alkalies have sometimes been given. Their action should be carefully watched, since they may favor further dyspepsia, and they usually increase the lowness of spirits. They appear to be most serviceable in those cases associated with the deposition of uric acid, while they scarcely influence the frequency of the appearance of oxaluric crystals when they occur as the result of dyspeptic troubles or of errors of diet.

Hæmaturia. The importance of hæmaturia depends upon the cause of this symptom, since hæmaturia must distinctly be regarded as a symptom, though it is often the first indication of a diseased condition that attracts attention. Hæmaturia is sometimes associated with serious organic diseases, but it is also frequently connected with comparatively trifling ailments of a passing nature. Before considering the treatment of this symptom, it is essential, therefore, to formulate the principal conditions under which it arises. Some of these conditions require no treatment, others involve the adoption of surgical measures, others necessitate active medication; moreover, it must be remembered that after the disappearance of hæmaturia the patient is not always to be regarded as cured.

Hæmaturia may result from local lesions, such as the over-distention or rupture of bloodvessels within the kidney, the pelvis of the kidney, the ureter, the bladder, the prostate, or the urethra. When the blood comes from the substance of the kidney, hæmaturia is generally an indication of acute Bright's disease, or of active congestion occurring in the course of chronic Bright's disease. It may also be an indication of laceration or bruising of kidneys, as in injuries occurring in the foot-ball field, or in railway, street, or hunting accidents. In all the above-mentioned examples of hæmaturia the blood is intimately mixed with the urine, and blood casts will be found, indicating that the effusion has come from vessels within the substance of the kidney.

Severe hemorrhage may sometimes occur as the result of displacement of the kidney, but a more common cause is to be found in the presence of renal calculi in the pelvis or in the ureter. This differs from most of the preceding causes of hæmaturia in being associated with much more violent pain. The pain of acute or subacute at-

tacks of nephritis is generally little more than a dull sense of aching in the lumbar region ; while with traumatic causes, although the pain at the time of the injury may be very severe, the acute character is soon lost if the patient is kept at rest. With renal calculus, however, as the cause of hæmaturia, the pain is extremely acute, and constitutes renal colic, of which mention must be made later.

The symptoms of some forms of chronic diseases of the kidney are occasionally interrupted by the appearance of hæmaturia ; thus it is met with in cancer, in syphilis, and in tubercle. In the last mentioned—a condition which is fairly frequent in children—the hæmaturia may be superadded by pyuria. With cancer of the kidney, hæmaturia, should it occur, may be very profuse. This symptom is, however, of quite secondary importance from a diagnostic point of view, owing to the rapid growth of cancer of the kidney. With syphilis the symptom is not very frequent, but it occurs occasionally, and the connection with this disease is indicated by the improvement sometimes seen with antisyphilitic remedies. Hemorrhage from the pelvis of the kidney is sometimes dependent upon the presence of a parasite—the *Bilharzia hæmatobia*. This constitutes the endemic hæmaturia seen in Egypt and in some other hot countries, and the diagnosis is readily made by the detection of ova and embryos in the urine. Slight hæmaturia may frequently occur with injuries of the skin, such as burns, or with long exposure to cold, while it is occasionally seen with scarlet fever, tonsillitis, diphtheria, typhoid fever, etc.; in these conditions the diagnosis between simple congestion and definite acute Bright's disease is frequently very difficult.

The occurrence of hæmaturia from congestion due to the employment of renal irritants, such as cantharides or turpentine, is a sufficiently well-recognized condition, of which little need be said. It is also scarcely necessary to enter into detail concerning the frequent appearance of blood in the urine as the result of conditions primarily connected with the bladder. The presence of calculi within the bladder will occasion hæmaturia, with pain in the hypogastrium and excessive frequency of micturition. Hemorrhage will also result from growths within the bladder, such as villous papillomata, or other forms of malignant disease, and it is sometimes seen in connection with tubercular ulceration within the bladder. It should not be forgotten that even small traumatic abrasions may sometimes be associated with severe hæmaturia. Laceration of the urethra, as

the result of injury, may give rise to this symptom, but any hesitation about the origin will rarely be felt, since the separate passage of blood, either before micturition or during the strain at the end of micturition, is of considerable diagnostic importance.

There are some diseases, such as scurvy and purpura hemorrhagica, in which hæmaturia is frequently seen, and constitutes a somewhat serious complication. In these cases, as also in malarial fevers, in cholera, and in yellow fever, the hæmaturia can scarcely be treated as a separate symptom. Hæmaturia may also occur in some rare cases of hæmophilia. The condition has also been stated to be sometimes vicarious of menstruation, of hemorrhoids, or even of asthma.

The treatment of this symptom must, as already stated, depend upon the cause. In all cases it is desirable to insist upon absolute rest in a warm bed during the urgency of the symptom, and in some of the conditions above enumerated this will produce a very marked diminution in the hæmaturia. Should the action of any irritant be suspected, the course of treatment is comparatively simple. The use of the irritant must be discontinued and other measures substituted. The removal of the cause and the adoption of a liquid form of diet, with the further use of alkaline diluent drinks to reduce the acidity of the urine, will, under such circumstances, often suffice to cure the patient.

With regard to hæmaturia with the acute or subacute forms of Bright's disease, directions for the treatment of this symptom would almost entail a description of the whole treatment of the underlying disease. During the whole of the early treatment of these conditions the patient must be kept in bed, and all solid foods must be withheld. In these diseases the amount of blood that is lost is of comparatively little moment, the hemorrhage, although weakening, never being sufficient to cause anxiety. Hence, if for no other reason, it is not advisable to employ many of the astringents which have frequently been recommended. Tannic acid, gallic acid, and perchloride of iron have often been advocated, but generally, in acute and subacute attacks of nephritis, they tend to impair digestion, while they exert very little, if any, control over the size of the vessels in the kidney. On the other hand, measures that are ordinarily employed for the relief of dropsy—such as vapor baths, diaphoretics, and hydragogue purgatives for diverting the blood from the kidney—will usually be found to produce marked diminution of hæmaturia.

It is not necessary here to enter into detail concerning the treatment of the surgical forms of hæmaturia. Patients with laceration must be kept at rest, and narcotics should be employed to relieve pain and to insure quiet. When hæmaturia occurs in connection with renal calculus it is frequently associated with such severe pain as to involve the use of opiates and of morphine; but the treatment must necessarily be regulated by the general course of the disease, rather than with a view to check this special symptom. The same rule applies to most of the other causes of hæmaturia which have been enumerated. The primary disease will require treatment, rather than the hæmaturia, although this symptom is very alarming in its appearance.

In chronic cases of hæmaturia, some advantage may be occasionally obtained from the employment of the preparations of ergot, which may be given either by the mouth or hypodermatically. In conditions where the hæmaturia persists for a long time in spite of rest and liquid diet, small doses of alum will sometimes prove serviceable—from 3 to 5 grains, given three or four times a day in solution, appear to be able to control the loss of blood.

The treatment of many of the forms of hæmaturia above mentioned will be further considered under the respective headings of the different medical diseases in which this symptom occurs.

Hæmoglobinuria occurs in two forms: the paroxysmal or periodic, and the form which is more commonly connected with toxic influences, as, for example, with the inhalation of arseniuretted hydrogen and with poisoning by various acids, by iodine, or by potassium chlorate.

The paroxysmal hæmoglobinuria is usually associated with shivering fits resembling ague, and the blood-coloring matter appears in the urine after the paroxysms. The treatment of paroxysmal hæmoglobinuria is not particularly satisfactory. Cases have recovered, but it is extremely doubtful whether the recoveries are attributable to the treatment that has been adopted. From the nature of the symptoms, it is advisable to keep patients with hæmoglobinuria in bed in a warm room, since under these conditions the feeling of chilliness or the actual shivering fits are less likely to occur. It may be of service, however, to enumerate the several measures that have been suggested for the treatment of this condition.

Various forms of iodine have been used, and gallic acid has been favorably mentioned; while—apparently under the idea that par-

oxysmal hæmoglobinuria is in some obscure way connected with renal congestion—bleeding, dry cupping over the loins, and even vapor baths have been recommended. In some cases of hæmoglobinuria a definite history of exposure to malaria, or of syphilitic infection, may be obtained, and under such conditions it would undoubtedly be wise to employ quinine or preparations of cinchona, or else to use mercurials and potassium iodide. Frequently, however, such helpful indications are wanting, and the utmost that can be done is to use tonic remedies, such as arsenic and preparations of iron, to advocate the employment of warm clothing, and, if possible, to recommend residence in a warm climate during the winter months. These measures appear to have a far more beneficial effect on cases of paroxysmal hæmoglobinuria than any influence exerted by drugs, unless exception be made for the malarial and syphilitic cases.

With the simpler forms of hæmoglobinuria resulting from toxic influences or associated with one of the exanthemata, the removal of the cause is generally sufficient to check this symptom; but in these cases, also, hæmoglobinuria appears sometimes to originate in exposure to cold, although the dark appearance of the water may occur without any distinct shivering fits. Even this condition, however, rarely calls for any special treatment beyond the recommendation to wear woollen clothing, to promote the action of the skin by the occasional use of a warm bath, and to advise the patient to keep absolutely at rest whenever troubled by a feeling of lassitude, which so often forms the premonitory symptom of this form of hæmoglobinuria.

Chyluria. Two forms of chyluria have been described—the parasitic and the non-parasitic. The former is the more common; the existence of the latter depending upon several well-authenticated cases that have been described, where the affection occurred in temperate regions, and where all efforts to prove the presence of a parasite were unsuccessful. The parasitic form, which is widely distributed in some tropical countries, is due to the development of the *filaria sanguinis hominis*. The urine which is passed is opaque and white, though it may sometimes have some slight reddish tinge, owing to the presence of blood-coloring matter. On standing, it forms a firm, jelly-like mass which liquefies later, when a pinkish sediment falls, and a cream-like material rises to the surface.

Chylous urine is often intermittent in its appearance, the attacks being sometimes separated by long intervals. In some cases, while

the day urine coagulates, the night urine is less milky and may even appear to be free from any change. Ordinarily it would appear that this disease lasts almost indefinitely, the duration being dependent upon the length of life of the filaria. Astringents have sometimes been employed, and injections of chloride of iron have been made into the bladder. As a rule, however, the only treatment which is likely to be of much service is the tonic form intended to abate the deterioration of the general health. Hitherto no remedial measures seem to have had any influence upon the vitality of the filaria. In the rare cases in which retention appears to depend upon the coagulation of the urine within the bladder, this organ must be relieved by irrigation of the bladder, which will favor the liquefaction and break down the coagulum.

Albuminuria. Albuminuria, like hæmaturia, may exist under conditions when its presence indicates either a grave constitutional malady or a comparatively trifling ailment. Albuminuria is essentially a symptom, and therefore its treatment is largely dependent upon the cause. When forming part of a grave affection, the mere symptom of albuminuria may to a great extent be disregarded so far as treatment is concerned—that is to say, in many forms of chronic Bright's disease the albumin affords an indication of the nature of the disease, although the amount lost is often so small that it does not materially weaken the patient, and does not, therefore, call for special treatment. The amount of albumin in such cases may often be a guide as to the progress of the disease, and may, therefore, indicate the employment of a special course of diet and hygienic control, as well as of remedies calculated to treat the disease rather than to produce any material modification in the amount of albumin that is being lost. Albuminuria, therefore, in many forms of chronic kidney disease, must be appropriately dealt with in connection with the disease under which it occurs, rather than as a separate affection. On the other hand, in a large proportion of cases of albuminuria this symptom stands almost alone, and indeed the presence of albumin in the water may cause so little disturbance that it is only discovered by some chance examination. This group includes the forms of albuminuria that have been termed functional, intermittent, and cyclic, together with the so-called albuminuria of adolescence. It is this group which more particularly demands recognition in this place.

The first of the two forms of albuminuria above mentioned con-

stitutes what may be termed true renal albuminuria, inasmuch as albumin is added to the water from the renal vessels, and is, therefore, intimately mixed with the water and commonly associated with the presence of casts of various kinds. Another form of albuminuria, however, deserves mention, namely, the extra-renal, or accidental albuminuria, in which from some accidental cause the albumin is added to the urine after it has left the kidney. This accidental cause is sometimes to be found in the addition of blood or of pus; thus the presence of a calculus in any part of the urinary tract will probably give rise to occasional hæmaturia, and consequently albuminuria, and all the conditions which have already been mentioned as producing hæmaturia will necessarily also produce albuminuria. In addition to this, however, it must be remembered that the admixture of pus will give indications of albumin, and pus may be derived from the substance of the kidney, or from the pelvis of the kidney; more rarely from the ureter, and most commonly from the bladder or urethra. It is easy to recognize the presence of pus in the urine, but it is not always easy to indicate the source, nor to determine whether the amount of albumin that is present exceeds that which can be accounted for by the amount of pus. This difficulty is greatest when the pus does not appear to be formed within the bladder. In some cases of cystitis the improvement during treatment, so far as pus is concerned, will often be far greater than the alteration in the amount of albumin present.

It is scarcely necessary here to enter into the diagnostic indications which separate the simple cases of cystitis, of pyelitis, or of hydro-nephrosis from the same diseases to which chronic renal affections are superadded. Some of these forms will demand consideration in a later section, but in this place it will be sufficient to confine attention to the renal forms of albuminuria which are not associated with anatomical lesions in the kidney. The chief difficulty with regard to this group lies in the diagnosis, since it must be remembered that even in chronic nephritis the amount of albumin varies from day to day, and varies also with what may be regarded as accidental conditions, such as those connected with diet, with mental emotion, or with exposure to cold. To differentiate organic albuminuria demands careful consideration of the history of the case, of the character of the pulse, of the nature of the sounds of the heart, of the position of the apex beat, and of the age of the individual; but even with every care some uncertainty as to the diagnosis may persist until the patient

has been carefully watched, perhaps for some length of time. The foremost consideration, therefore, in connection with the treatment of albuminuria lies in the formation of an accurate diagnosis. The probabilities of a transient form of albuminuria are greater when dealing with youths or young men than when confronted with a patient of middle age or of advanced life.

Even when the existence of renal changes has been provisionally negatived, it will be necessary to determine to which of the categories of functional albuminuria the individual case is to be relegated. Careful inquiry into the habits of the individual may throw a strong probability upon some special error occasioning this symptom ; thus, for example, it is generally easy to ascertain whether the albuminuria depends upon dietetic errors, since, by modification of the diet and the successive elimination of different articles which appear to be taken to excess, the amount of albumin may be diminished, or the existence of albuminuria may even be arrested. Again, though undoubtedly violent muscular exercise is occasionally a cause of this symptom, yet in weakly individuals it may arise from any mechanical causes which influence the blood pressure within the kidney ; thus, for example, in some cases of albuminuria of adolescence the mere change of posture appears to produce this symptom. A form of neurotic albuminuria has been described, but this group rests upon a somewhat uncertain basis, and in all probability many cases of so-called neurotic albuminuria must be relegated to other classes. It is perhaps unnecessary to do more than mention the febrile albuminuria so often associated with high temperatures ; this form of febrile albuminuria appears to be dependent upon the presence of toxins, rather than upon the actual temperature of the body.

The so-called albuminuria of adolescence is generally seen in youths with pale faces and other indications of depressed vitality. It is frequently associated with listlessness and languor, and even though many hours may be spent in sleep, the patient wakes unrefreshed. Often some disorder of digestion is to be noted. In this form the albumin varies in amount not only from day to day, but even at different times during the day. Generally only a small cloud is developed by the contact test, while the urine maintains a good color and fairly high specific gravity. It has been noted with this form of albuminuria that the symptom frequently disappears entirely while patients are kept in bed, and it has even been asserted

that while in the recumbent posture many articles of diet which produce albuminuria so soon as the patient gets up may be indulged in without harm.

In the treatment of these functional forms of albuminuria, next in importance to the removal of the cause, if this can be ascertained, lies the improvement in the general health, which is to be effected by hygienic measures and by constitutional remedies. In dealing with the albuminuria of adolescence, much may be done by encouraging moderate athleticism to promote the functions of the skin; and this should be insisted upon, even though the albuminuria may appear to have originated in over-indulgence in athletics. It is, generally speaking, a mistake to pass abruptly from one extreme to another. The majority do better with moderate exercise, with the frequent use of a cold bath, and the occasional employment of a hot bath; the latter cleanses the surface and encourages the freedom of action of the skin, while the former will undoubtedly be found beneficial, provided it is followed by brisk reaction. I am convinced that it is a mistake to forbid the use of the cold bath in all cases of functional albuminuria. This is often done under the impression that the application of cold will, by driving blood from the surface, cause increased engorgement of internal organs; and while this is undoubtedly true for those who become blue after the use of a cold bath, the majority improve and gain in health and strength.

Should the albuminuria be associated with vicious habits, these must necessarily be corrected; but before hastily determining that the case is one to be dealt with by moral treatment only, it is advisable to ascertain whether there is any chronic cause for irritation, such, for example, as would be produced by the existence of worms, by an elongated prepuce, or even by habitual constipation. These conditions may readily be recognized, and in any case it is generally advisable to encourage daily action of the bowel by the use of saline purgatives. When the albumin is associated with extreme nervousness, ammonium bromide may sometimes be employed. More commonly, however, cases of functional albuminuria do better with nerve tonics than with nerve sedatives; thus, quinine will frequently be of service in those who are deficient in tone, and its action may be aided by the employment of preparations of iron, provided that care is taken to prevent the occurrence of constipation. *Nux vomica* and strychnine are occasionally beneficial, but these, together with arsenic, are perhaps better reserved for the forms of functional albu-

minuria occurring in adults than for the albuminuria of adolescence. Frequently in cases of the latter class the digestive functions will require to be treated ; thus, for example, it may be necessary to use sodium bicarbonate, or preparations of bismuth, together with diluted hydrocyanic acid and gentian.

From the above it will be noted that with albuminuria, as with most of the forms of hæmaturia, the symptom is one which is only indirectly attacked. Various remedies, mostly astringents, have been recommended for their power of controlling the amount of albumin that is lost, but it has already been indicated that in these cases the amount is altogether insignificant ; on the other hand, the digestive powers are extremely likely to be disordered by any astringents given in sufficient doses to produce a remote action upon the vessels of the kidney. It is necessary, in nearly every form of functional albuminuria, for the practitioner to satisfy himself that suitable clothing is worn. Many lads, from carelessness or from the desire to harden themselves, are apt to wear an insufficiency of warm clothing, and although it is extremely necessary, in dealing with this group of complaints, to avoid any enervating treatment, and to encourage healthy open-air exercises and interests, it is, nevertheless, advisable in cases of albuminuria to insist upon the use of warm woollen garments next the skin, especially over the region of the loins.

As a rule, it is difficult to interfere with the dietary of the ordinary school-boy, but in the albuminuria of adolescence it is generally desirable to forbid the use of eggs, to encourage moderation in the amount of meat, and to recommend the liberal consumption of milk. Such modifications of dietary may often be effected without exciting remark, though occasionally the use of milk may present a difficulty, and indeed may favor the occurrence of constipation. As the chief object, however, is to act as a diuretic, water may be taken in place of milk ; a glass of water on going to bed and again on rising will often serve not only as a diuretic but also as a mild laxative.

Renal Calculus. The symptoms which may result from the formation and the descent of renal calculus depend, to a great extent, upon the site of the calculus, upon the degree of difficulty associated with its passage, and upon the number of calculi which may be present. Renal calculi may vary very much in size, from concretions that are almost microscopic to masses of a quarter to half an inch in diameter. The smaller concretions appear to form fre-

quently within the urinary tubules. It is no uncommon occurrence to find running through the kidney small striations of a yellowish color, consisting of small concretions of uric acid. These are often voided with the urine, and constitute the condition termed gravel—a condition which has already been referred to in connection with the uric acid diathesis; when, however, these concretions remain within the pelvis of the kidney, they may form nuclei for larger growths or deposits, which are usually composed chiefly of oxalic acid or of oxalate of lime, though sometimes the nucleus consisting of such deposits is surrounded with phosphates, or with urates, and the size that the renal calculus will then attain appears to depend mainly upon the duration of its retention in the pelvis of the kidney. When located between the pyramids at the lower part of the kidney, the calculus may remain quiescent, and indeed may not give rise to any symptoms other than perhaps occasional aching pain in the lumbar region.

On the other hand, when the calculus is dislodged so as to fall into the pelvis of the kidney and to be carried on with the flow of urine toward the ureter, it provokes urgent symptoms, the severity of which depends, to some extent, upon the shape and size of the calculus. Of these two elements the more important is the shape. The so-called mulberry calculus, which is provided with a number of nodular projections, is invariably associated with very severe pain during its onward passage, the shape causing irritation of the lining membrane of the ureter, with consequent reflex spasm both above and below the position of the calculus. When the calculus is smoother on the surface, it will still cause pain, though not of such an acute character, and the condition more readily yields to treatment, the shape of the calculus frequently favoring its progress along the ureter.

Although this act of expulsion forms the natural termination of an attack of renal colic, this termination is not invariably reached, since it appears that calculi may be dislodged, may produce pain and hæmaturia resembling the symptoms due to the passage of a renal calculus, and these symptoms may pass away if the calculus returns to the pelvis of the kidney, instead of passing onward to the bladder. One attack of renal colic frequently forms the prelude of others, since a renal calculus rarely occurs alone. Further, a renal calculus may sometimes remain in the ureter, completely blocking the ureter and leading to hydronephrosis.

Another group of symptoms which may occasionally result from

the presence of a calculus in the pelvis of the kidney is that of suppurative pyelitis, with the appearance of pus in the urine. The treatment of hydronephrosis and suppurative pyelitis demands separate consideration ; while those symptoms which are ordinarily referable to the presence of a renal calculus, and are most amenable to treatment, ensue from the dislodgement of the calculus from its nidus, and continue during its passage along the ureter. The symptoms are pain of a severe type, commonly associated with reflex vomiting, and frequently followed or accompanied by hæmaturia. The pain is often so acute that the patient may writhe in the endeavor to find a position of rest. It starts in the lumbar region and shoots downward along the course of the ureter, though it is often deflected along the inguinal canal and even to the testicle. The pain has been described as acute, cutting, or tearing in nature, and it continues not only during the whole time that the calculus is in the ureter, but even after the calculus has entered the bladder ; the degree of relief that is afforded is only partial, the soreness along the ureter remaining for a variable period.

The progress of the calculus along the ureter appears to be effected chiefly by the fluid pressure of the urine, since, although the ureter contains muscular fibre which might conceivably assist in the propulsion of the calculus, it must be remembered that the muscles are in a state of tonic spasm in front of the calculus as well as behind, and, indeed, it is found that the measures which afford the best prospects of relief are those which favor relaxation of muscular spasm. With the onset of pain the line of treatment to be adopted is comparatively simple. Morphine must be injected subcutaneously, and it is well to inject comparatively small doses repeatedly, at short intervals, rather than to employ a single larger dose. The comparative frequency of the administration of morphine will not only serve to allay anxiety by indicating that measures for relief are being employed, but it will also enable this relief to be afforded with the use of the minimum quantity of morphine. Simultaneously with these injections it is advisable to employ a hot bath at the highest temperature which the patient can bear, and to encourage him to remain in it either until he begins to feel faint, or until relief is afforded. When possible a large bath should be used ; but even if this is not available, relief may be obtained by using a large hip bath filled with hot water, while the patient should be enveloped with a blanket so that he is surrounded with an atmosphere of

steam, which will promote the action of the skin and favor muscular relaxation. Even after removal from the bath, further relaxation may be obtained by the abstraction of blood, either by venesection or by cupping over the loins. Provided that sickness is not severe, it is frequently advisable to employ diluents, as, for example, copious draughts of milk, or of beef-tea, or of dilute alkaline solutions; these favor the onward movement of the calculus, and, by reducing the acid character of the urine, they tend still further to diminish spasm in the ureter. Frequently, however, reflex vomiting is so persistent during colic that it is impossible to administer food or drugs by the mouth.

When the pain is very severe it may sometimes be controlled by the administration of chloroform; but this is a somewhat unsatisfactory form of treatment, since it does not favor the expulsion of the calculus, and although it affords a brief period of relief, the pain returns as the effect of the anæsthetic wears off. The utmost that can be said for the use of an anæsthetic is that it may allow time for the excretion of fluid by the kidney, which will favor the dislodgement of the calculus. Even this, however, is a somewhat delusive hope, since the anæsthetic may itself be followed by vomiting, and, moreover, during the time of its employment it is probable that very little liquid is being absorbed from the digestive system.

Of recent years the treatment during the intervals between attacks of renal colic has been considerably modified. It was at one time recommended that those who had suffered from one attack should undergo a course of alkaline treatment, and with this object many patients have been sent to various foreign spas, where alkaline waters are reputed to possess solvent properties. Although the solvent action is open to dispute, there can be no doubt that copious draughts of these waters will, by flushing the kidney with liquid, probably dislodge and remove calculi of small size. This course of treatment is still frequently recommended, but modern surgery has shown that renal calculi are most satisfactorily to be dealt with by surgical interference, since it may be possible thus to avert the disorganization of the kidney, which so often ensues after repeated irritation by renal calculi. Unless renal calculi are very numerous, or unless the disorganization of the kidney has already reached an extreme condition, it is generally advisable not to remove the kidney; indeed, cases have been recorded where the removal of the kidney has been

followed by a fatal result, owing to the previous disorganization of the opposite kidney by other calculi.

Pyelitis. Pyelitis is a convenient name for suppuration of the pelvis of the kidney, which is indicated by the presence of pus in the urine, and often by pain and increased frequency of micturition; the last two symptoms, however, may to some extent render the diagnosis difficult. The bare fact of suppuration is one which is dependent upon a great variety of causes, and, indeed, pyelitis might almost be regarded as a symptom of some underlying disease if it were not that this suppurative inflammation of the pelvis of the kidney will start a cycle of symptoms of its own.

The treatment of pyelitis is dependent upon the cause, and very commonly this cause lies in the presence of renal calculi; accordingly no form of treatment is likely to be of much service unless these calculi can be removed. It must not be forgotten, however, that the irritation produced by these calculi is often associated with some definite alteration in the urine, as, for example, over-acidity or undue concentration. Both of these conditions may be satisfactorily dealt with by the employment of alkalies and of diluents, which may conveniently be given together. It is this form of pyelitis which is so often benefited by a visit to one or other of the alkaline springs. The growth of the calculi may in this way be arrested, while the excess of liquid consumed will favor their removal, and will also reduce the irritation which they originate.

Pyelitis is, however, often dependent upon forms of obstruction, frequently of an inflammatory nature, in the lower part of the urinary apparatus. Thus chronic cystitis may be followed by pyelitis, and chronic pyelitis may in turn result from gonorrhœal infection, or from retention of urine, owing to enlargement of the prostate, or from the irritation of the bladder by the presence of a vesical calculus. The form of treatment appropriate to each of these conditions is sufficiently indicated in their enumeration, since, under these various circumstances no special treatment of pyelitis will be of much service so long as the cause is allowed to persist.

There is a special form of pyelitis which occurs in connection with some of the infectious fevers. Thus this affection may arise in the course of, or subsequent to, attacks of scarlet fever, of diphtheria, of typhoid, and of smallpox, while it is sometimes seen after pneumonia. In this form of pyelitis hemorrhage is often associated with

the pus, but the hemorrhage is frequently of an intermittent character. Pyelitis of this nature is also often marked by great oscillations of temperature, as well as by the occurrence of pain primarily localized in the region of the kidney, and passing thence along the ureter, pain in the bladder, and increased frequency of micturition. In these diseases the patient is already receiving treatment calculated to prove beneficial at the time when pyelitis is developed ; thus the restrictions to the recumbent posture in bed, the use of warm clothing and of a diet largely consisting of liquids will already have been adopted for the treatment of the specific fever.

When pyelitis is consecutive to cystitis, unless it is speedily relieved, there is considerable probability of an extension of the disease to the kidney and the production of pyelonephritis. Although this condition adds largely to the risk of this affection, it is not possible to treat it separately. Another frequent cause of pyelitis lies in tubercular changes, either in the pelvis of the kidney or in the ureter, leading to retention and to consequent irritation. This form of pyelitis readily passes on to the production of pyonephrosis, which will require separate consideration. Pending the determination of the cause of the pyelitis, which is not always readily apparent, the patient must be kept in bed and should be encouraged to avoid all unnecessary movements, since restlessness, by possibly altering the position of a renal calculus, might favor an extension of the disease.

The relief or diminution of pain is commonly effected by the employment of warmth ; hence, poultices or fomentations may be applied over the loins, and from time to time the use of a warm sitz bath may be advocated. Further relief is sometimes afforded by the employment of fomentations of turpentine, by means of which a considerable degree of dilatation of the superficial vessels may be obtained. Dry cupping over the loins has been advocated, and will be of service when the pain is of an intermittent or spasmodic character. With the view of further reducing pain, it is always desirable to encourage the employment of copious draughts of bland, mucilaginous drinks. These prove beneficial by simple dilution of the urine, and further dilution is sometimes obtained by the employment of alkaline diuretics. Potassium citrate and bicarbonate may be used, and are frequently more readily taken if administered in an effervescent form. The value of these remedies is, however, mainly dependent upon the resulting alkalinity of the urine, and in

general it is better to avoid the employment of more stimulating diuretics. It is not always desirable, however, to alter the reaction of the urine by these salts; thus, for example, where the pyelitis is associated with cystitis the urine is frequently alkaline, ammoniacal, and offensive, and these conditions may be increased by the use of alkalies, while remedies which tend to favor the acidity of the urine, such as ammonium benzoate or salicylic acid, may be preferable on account of their action within the bladder.

Another compound that is often employed with benefit under these circumstances is boric acid. This is given by the mouth, in doses of from 5 to 15 grains, and it may be administered in powders or in cachets, or it may be given in solution as a mixture. Frequently the pain due to pyelitis may to some extent be controlled by tincture of hyoscyamus, which in doses of from $\frac{1}{2}$ to 1 fluidrachm appears to have marked power of controlling pain, both in the kidney and in the bladder. The sedative action of hyoscyamus is well worth bearing in mind in connection with all forms of renal irritation, especially when there is any risk of the existence of chronic renal changes. Under such circumstances opium and morphine are distinctly dangerous, and hyoscyamus or hyoscyne hydrobromate will often enable the patient to derive considerable relief from sleep, even though this may be accompanied by mild delirium.

When, in spite of these forms of treatment, the case assumes a chronic form, and there does not appear to be any sufficient indication for direct operative interference, further measures must be adopted to counteract the exhausting results of this constant formation of pus. Although the appetite is usually poor, and although nitrogenous elements of food must be reduced in amount, these patients will frequently do well with an almost exclusive milk diet, or, if this appears to be too repugnant to them, milk may possibly still form the main element of the diet if given with eggs, with custards, or thickened with various starchy foods. In addition to these, however, it will be necessary to increase the nutrition by the administration of cod-liver oil and the frequent employment of tincture of ferric chloride. Numerous other drugs have been recommended with the idea of diminishing or of arresting the formation of pus. Those which have given the greatest satisfaction are astringent preparations, as, for example, tannic acid, alum, and lead acetate. The waters of the various alum springs of Virginia have been

employed in pyelitis on account of their astringent properties due to the presence of a fairly large proportion of alum.

Hydronephrosis. This term indicates an over-distention of the pelvis of the kidney with urine, owing to some obstruction in the course of the ureter. This obstruction may be due to a calculus which has become impacted, or it may result from alterations within the ureter, such, for example, as ulcerations, or possibly it may be due to some kinking of the ureter owing to dislocation of the kidney. The ulcerations in the ureter which lead to hydronephrosis are commonly tubercular, and the hydronephrosis which results from this cause is frequently of an intermittent type, since the obstruction to the outflow of urine is generally formed by a plug of suppurative origin, which occludes the narrowed calibre of the ureter. This plug may sometimes be dislodged by the pressure of the urine, or even by manipulative measures over the abdominal wall, and occasionally it may possibly be dislodged as a consequence of the contortions of the patient due to the pain. Similarly the form of hydronephrosis due to alterations in the length of the ureter is sometimes intermittent. The tumor in the region of the kidney may attain considerable size, and may produce very much pain; both these conditions are sometimes relieved with comparative suddenness and with the passage of an increased amount of urine. The hydronephritic tumor may, however, remain the same size for a long while, or it may undergo gradual diminution in size, when in all probability the urine is slowly reabsorbed, since the diminution in the size of the tumor, when unaccompanied by an increased outflow of urine, is invariably associated with considerable headache and constitutional disturbance.

Another form of hydronephrosis seen in children is probably congenital, owing to the ureter being impervious. Hydronephrosis may also result from pressure on the ureter from without, such as might follow the growth of pelvic tumors, as, for example, of ovarian cysts, or of cancer of the pelvic organs; while closure of the orifice of the ureter may be due to papillomata or other growths developing within the wall of the bladder.

The prominent symptoms resulting from this affection in an advanced stage are pain in the back, comparative frequency of micturition, and diminution in the daily amount of urine excreted while, in addition, if the hydronephrosis persists, uræmic symptoms may be developed. When the renal tumor is of large size the pain

may be of an agonizing character, and even when it is of moderate dimensions the patient may complain of a sense of weight over the affected side.

The treatment of cases of hydronephrosis is mainly surgical, but, pending a decision concerning the operation to be performed, it will generally be advisable to employ anodynes to afford temporary relief. The most valuable, when it can be used, is, of course, morphine, but considerable discretion must be shown in the selection of the cases in which morphine is to be employed. If the age of the patient, the character of the pulse, and the sounds of the heart indicate the probability of serious chronic renal changes superadded to the hydronephrosis, it will in general be inexpedient to administer morphine, or if used at all, the smallest doses consistent with the relief of pain should be given.

In cases of intermittent hydronephrosis, the indications for treatment will have been ascertained in the intervals between the separate attacks; thus, during these intervals the urine must be examined to ascertain whether albumin and renal casts are present in sufficient quantity to indicate the existence of chronic renal changes, while, on the other hand, the occurrence of hæmaturia at the commencement of an attack will afford some presumptive evidence in favor of the existence of a renal calculus as the cause of the hydronephrosis. In those cases, however, which do not appear to be intermittent, when the patient first comes under treatment for hydronephrosis the question of the employment of morphine may generally be determined by the presence or absence of albumin from the water, though this only indicates the character of the work being performed by the kidney which is not affected by hydronephrosis.

Independently of the employment of morphine, it is necessary to keep the patient in bed, lying on his back, with his head slightly raised; the knees will naturally be drawn up to diminish abdominal tension as much as possible. Occasionally some measure of relief may be obtained from the employment of fomentations over the region of the kidney, and also over the front of the abdomen, when the renal tumor can be felt through the abdominal wall. Further relief may be afforded by the use of hydragogue purgatives, since they diminish the excretory work of the kidney, and thus prevent the further enlargement of the tumor. Even when the irregular contractions induced by the administration of hydragogue purgatives increase the pain, it will still be necessary to favor

further frequent action of the bowel by the employment of glycerin suppositories, or of glycerin enemata.

The presence of hydronephrosis is commonly associated with diminution of appetite and of thirst, while sometimes the pain may be sufficient to produce sickness. For all these reasons, therefore, the diet will require considerable management, so as to be as nutritious as possible while taken in small bulk. Various forms of beef-tea or of concentrated meat essences may be used, and ice or iced water may be given, which will tend to diminish the frequency of vomiting. The copious alkaline draughts which have been mentioned as so serviceable in connection with renal calculus are generally inadvisable in hydronephrosis, since the presence of the renal tumor shows that the pressure due to the accumulation of the fluid in the pelvis of the kidney is insufficient to remove the obstruction to the outflow of the urine.

The surgical treatment will necessarily depend upon the diagnosis. When the pain is severe, aspiration of the pelvis of the kidney has been recommended, but this is merely a palliative measure; the fluid commonly reaccumulates quickly, and other treatment has to be adopted. When dependent upon renal calculus, it is generally necessary to remove the kidney, since the renal tissue has probably been considerably disorganized, owing to the pressure due to repeated attacks of hydronephrosis. When no calculus can be found, and when the kidney appears to be dislocated, the condition is sometimes dealt with by fixing the kidney in its proper site by ligatures. This operation is sometimes successful when the hydronephrosis is due to dislocation of the kidney and alterations in the length of the ureter; and although in itself severe, the risks of removal of the kidney are so great that it is often better for this operation to be performed, and for the results to be watched, before deciding upon the removal of an apparently healthy kidney.

CHAPTER XV.

RENAL DISEASES—*Continued.*

Acute Nephritis—Scarlatinal Nephritis—Chronic Nephritis—Cirrhosis of the Kidney.

Acute Nephritis. The treatment of acute nephritis depends upon the stage of the disease when the patient first comes under observation and upon the predominant symptoms. When arising from cold, or from exposure to wet, the onset may sometimes be gradual. Frequently, however, when first seen, there is marked diminution in the daily excretion of urine, and the urine is altered by the presence of blood and of lithates. Microscopical examination reveals the presence of free blood-corpuscles, of blood casts, and of renal epithelium. These alterations in the urine are associated with abnormal frequency of micturition, the urine being voided in small quantities with considerable discomfort.

Apart from these changes, there will be complaint of severe headache, and possibly of nausea or sickness. These symptoms are frequently closely followed by dropsical effusions into the subcutaneous tissues, which alter the appearance of the patient, the features being obliterated, the eyes almost closed, while the face is characterized by marked pallor, due rather to the œdema of the subcutaneous tissues than to the loss of blood in the urine.

The leading indications during early days are to secure physiological rest for the kidney, to diminish the risks of extension of the disease, and to counteract the dangers which result from interference with the eliminative work of the kidney. These indications hold good in nearly every case; hence, the following general treatment may mostly be adopted.

As soon as a diagnosis of acute nephritis has been made, the patient should be kept in bed, and the action of the skin promoted by the use of woollen garments, while chill should be avoided by the removal of the sheets. The dietary should, at the commencement, be as non-nitrogenous as possible, and should be limited to the smallest amount consistent with the maintenance of strength.

As a general rule, patients should be kept on a strict milk diet, and the milk may be given either cold or slightly warmed, in quantities of half a pint at a time. It is advisable to continue the use of a milk diet until far into the stage of convalescence, since it is often found that the early use of solid nourishment entails a return of hæmaturia.

Occasionally it will be found that patients rebel against this form of treatment, partly with the idea that they are receiving insufficient nourishment, partly from distaste. When difficulty arises from either of these causes, a little gentle persistence may suffice to enable the treatment to be continued. It is sometimes found, however, that the milk undoubtedly produces dyspeptic symptoms, and skimmed milk may then be substituted, though it has the disadvantage of favoring constipation.

During the early days of treatment, thirst may be allayed by the use of barley water or thin arrowroot, and when the patient is wholly unable to take pure milk diet, these may be given in conjunction with beef-tea; though, as already indicated, it is, in general, preferable to avoid the use of nitrogenous forms of diet. It sometimes appears that the milk disagrees, owing to its administration in too large quantities at the commencement of the treatment; hence, it is advisable to use only small quantities of milk at intervals during the first few days, and to increase the amount gradually as toleration is established, and as the urine becomes less deeply tinged with blood. Later, the patient should be encouraged to take "imperial drink," made as follows: Two drachms of potassium bitartrate are placed in a large jug, the juice of one lemon and some sugar or syrup are added, and two pints of boiling water poured in, the ingredients being well mixed. When cool, the drink may be placed by the bedside, and taken when desired.

During the treatment of acute nephritis three dangers must be kept in mind: First, the danger of suppression of urine; second, that of interference with respiration and with circulation; and, third, the more remote danger of the establishment of chronic renal nephritis. The first of these dangers, that of suppression, is best averted by the early re-establishment of the interrupted functions of the kidney, and since this interrupted function depends upon extreme engorgement of the renal vessels, efforts must be directed toward the relief of engorgement and of the symptoms which are the direct result of this engorgement.

These indications entail the removal of fluid from the bloodvessels and from the subcutaneous tissues, and this removal can, as a rule, be stimulated either by diaphoretics, by hydragogue purgatives, or by diuretics. Since, however, most diuretics cause an increase in the calibre of the renal vessels, and thus tend to promote engorgement, it is essential to place full reliance upon diaphoretic measures and drugs and upon hydragogue purgatives.

Frequently there is some degree of constipation at the commencement of the attack, and this, in addition to the presence of dropsy, indicates the desirability of using purgative remedies, and of these the salines and mild hydragogues are preferable to mercurials, since the latter often favor diuretic action. When dropsy is extreme, headache severe, and when convulsions occur, the use of purgatives becomes imperative. In the milder cases full doses of magnesium sulphate may be employed; but when dealing with cases of greater severity, compound jalap powder is generally followed by good results, although some practitioners prefer to substitute resin of scammony, with potassium bitartrate, in the proportions present in the compound jalap powder. Should convulsions have been followed by coma, the administration of these remedies becomes a matter of extreme difficulty, and it will be advisable to use croton oil in doses of one-third of a minim and upward, so as to secure prompt evacuation of the intestine.

Later in the course of this disease, when the urine has lost its smoky character, mercurials, such as calomel, may be given occasionally, since at this time there is distinct advantage in favoring diuretic action; but when calomel is given at night-time it should be followed in the morning by the administration of a saline purge, so as to remove the mercury quickly from the system and to prevent any prolonged irritating action upon the renal vessels. Although the mercury is distinctly beneficial in the treatment of dropsy, it is a somewhat dangerous drug to employ early in the course of acute nephritis, and it gives better results in connection with the dropsy of heart disease, where a prejudicial influence upon the kidney is not so much to be feared.

Pending the action of these purgatives it is desirable to favor diaphoresis by the wet pack or by the vapor bath. The latter is usually the more prompt in action, and is, therefore, generally employed if available, but there are strong objections to the use of the vapor bath; it often entails placing the patient in a chair, envelop-

ing him with blankets, and allowing a spirit lamp, with a large wick, to burn under the chair. These objections are to be found not only in the risks of igniting the woodwork or the bedclothes, but also in the necessary but undesirable movement of the patient. It is possible to arrange for a vapor bath by supporting the bedclothes with low stools or with barrel-hoops, but it is still somewhat difficult to arrange the lamp so that the vapor may pass around the patient without risk.

When there are suitable appliances, as in hospitals, the vapor bath is of extreme service, but it is necessary to be extremely careful that the tube of the steam kettle can by no possibility come into contact with the patient's limbs, since the cutaneous sensibility is so far reduced that severe blistering may occur before there is any complaint of pain. In cases where the dropsy is not so severe the vapor bath is scarcely required unless great difficulty is experienced in producing diaphoresis by means of the wet pack or by the administration of diaphoretic remedies.

The wet pack may be used either hot or cold, and of the two the latter is generally preferred, since although some degree of shock is excited at the moment of application, this is speedily followed by reaction; while, on the other hand, the use of the warm pack may occasionally produce much discomfort, owing to the fall of temperature after application.

In applying the pack the patient should be completely undressed, or should only wear a thin cotton covering, and wet sheets should be wrapped around him and then quickly covered with successive layers of dry blankets. Care should be taken to leave no portion of the damp sheet projecting beyond the blankets. The time spent in the wet pack must be determined by the resulting diaphoresis. Copious perspiration usually ensues after twenty minutes or half an hour, and, under suitable conditions, this diaphoretic action will be continued after the removal of the pack, if the surface is quickly dried with warm towels and the patient again enveloped in warm blankets. Greater freedom of perspiration may be favored during the employment of the wet pack by allowing the patient to drink draughts of water from time to time.

The first application of the wet pack sometimes fails, and may indeed produce increased headache; while a second application, repeated twelve or twenty-four hours later, is often successful. In uncomplicated cases, when diaphoresis is somewhat slow in occur-

ring, it may be favored, or initiated, by the administration of relatively small doses of pilocarpine nitrate. It is comparatively rarely, however, that this drug is required in acute nephritis, and its employment should, if possible, be avoided, since it frequently causes much salivation and depression.

As the combined result of the use of hydragogue purgatives and of the above-mentioned measures, the dropsy often diminishes rapidly, and the urine increases in quantity; these improvements are indications that the renal engorgement has diminished, which is further shown by the rapid disappearance of blood from the urine. With these signs of improvement alkaline diuretics may be employed, such as potassium or sodium acetate, or citrate. The late Sir William Roberts recommended that these drugs should be employed from the commencement of the attack, and he maintained that by rendering the urine alkaline it was possible to prevent the coagulation of blood or albumin within the tubules, which, under ordinary conditions, is favored by the highly acid character of the urine.

These alkaline diuretics are converted into alkaline carbonates prior to their elimination, and thus undoubtedly they would prevent the obstruction of the tubules by coagula. This obstruction would favor the subsequent development of chronic nephritis, and these salts would, therefore, be extremely useful if it were not for their powerful diuretic action, which is undesirable in the initial stage of engorgement. Such objection to their use does not, however, obtain when the engorgement has been relieved by other measures; and these drugs are then of extreme value, and they may be employed in conjunction with small doses of digitalis, especially if the heart's action is unduly rapid.

Digitalis is, however, of greater service in the treatment of chronic nephritis associated with dropsy, since the dropsy of the later stages of chronic nephritis is often, to a large extent, due to circulatory failure.

In acute nephritis caffeine has been recommended instead of digitalis, and it has the advantage not only of being an efficient diuretic, but also of causing less digestive disturbance.

Apart from dropsy, the chief symptoms calling for special treatment are those connected with the nervous system. Headache may be severe, and it is frequently associated with much restlessness and sleeplessness. These symptoms are sometimes relieved by purgatives, diuretics, and diaphoretics, but occasionally they require spe-

cial treatment, such as the administration of bromides, of chloral, or of other sedatives. Bromides and chloral are extremely serviceable, provided that the pulse is of good quality, but when the pulse is small and the heart's action is rapid, other sedative measures must be used, as the cardiac weakness might be increased by bromides or by chloral.

Morphine and opium are contraindicated, since they have been known to favor dangerous suppression and the development of uræmic symptoms. Hyoscine hydrobromate and hyosecyamine sulphate are free from these dangers, and can be given subcutaneously in doses of $\frac{1}{200}$ grain to $\frac{1}{100}$ grain. The sleep they induce may occasionally be interrupted by dreams, but it is refreshing, and it diminishes the restlessness of the ensuing day. In severe cases these remedies may be employed during the day in small doses, as well as in larger doses at night-time to produce sleep.

Persistent vomiting is always an indication of danger, since it is most likely to arise when the eliminative functions of the kidney are seriously interfered with. If it occurs early in the course of the disease, relief may sometimes be afforded by the use of diluted hydrocyanic acid and preparations of bismuth; but, although these allay gastric irritation, they are comparatively useless when the symptom is an indication of uræmia, and reliance must then be placed upon the use of diaphoretics and hydragogue purgatives.

During convalescence persistent albuminuria may call for special attention. Persalts of iron have been given with digitalis and strophanthus to diminish the loss of albumin; but iron salts must be used with discretion, since the daily loss is sometimes increased during the time that they are taken. Various astringents have been employed with the same object, such as tannic acid and gallic acid, and occasionally I have found some benefit result from the use of ergot. Lactate of strontium has been recommended in 30-grain doses, administered three times a day, and it is said to reduce the loss of albumin, although it has no action upon the diseased process. Persistent albuminuria is, however, much more amenable to hygienic than to medicinal treatment, and it may often be reduced by a reversion to milk diet, by the avoidance of cold and of muscular and mental strain. It is during the stage of convalescence that patients require the greatest watchfulness and care, since an early resumption of solid diet may be followed by an increase of albuminuria, and possibly also by a return of hæmaturia and dropsy.

Although the chief dangers of acute nephritis are those which ensue from dropsy and from uræmia, alterations in the respiratory system and in the circulatory system may occur as serious complications ; thus, for example, pleurisy is comparatively frequent, and may occasionally pass into empyema. Pneumonia and bronchitis may develop in severe cases ; but in the milder cases, which result from exposure to cold, some degree of congestion of the lungs may arise without adding very greatly to the risks. The circulatory alterations are less frequent with acute nephritis than with chronic nephritis. Acute enlargement of the ventricles may occur, and will then serve as an indication for the use of digitalis or strophanthus. This dilatation, however, is not often an indication of marked danger, and it diminishes rapidly with the general improvement. Alterations in the blood certainly occur, but not to the extent which appears to be indicated by the pallor, the actual reduction in the number of red corpuscles being by no means to be measured by the whiteness of the skin, which results from dropsical infiltration rather than from blood changes.

During convalescence, however, the anæmia affords an indication for the use of mild preparations of iron. The stronger astringent preparations should in general be avoided, since they may increase the amount of albumin in the water, and may also favor undesirable constipation.

Yet more dangerous than the above-mentioned changes are the inflammatory affections connected with the pericardium. These may cause much distress and pain, and occasionally the accumulation within the pericardium may be large in amount. Symptoms of pericarditis will call for the use of leeches and of poultices over the pericardium, but the nature of the renal changes will contraindicate the internal use of opium.

Another fairly frequent complication of this disease is œdema of the larynx, which may develop in connection with dropsical effusion in the extremities, and may necessitate the employment of intubation or the performance of tracheotomy. Œdema of the larynx is, however, often associated with œdema of the bronchi and of the lungs—conditions which it is impossible to relieve by any operative measures other than those usually employed for dropsical affections in other parts.

Scarlatinal Nephritis. The treatment of scarlatinal nephritis differs but little from that of the foregoing disease, although some

of the symptoms occur with greater frequency; this variety of nephritis, however, occurs under such special conditions that it merits separate consideration. The intimate connection with scarlet fever indicates that it depends primarily upon the irritation of some poison peculiar to this fever, but the development of this poison and the consequent frequency of scarlatinal nephritis vary greatly in different epidemics.

In the earlier stages of scarlet fever some albuminuria is often met with, this being, in all probability, of the simple febrile form. True nephritis, however, is usually a late development or complication, and it appears to have very little dependence upon the severity of the original attack; indeed, it may occur when the attack of fever has been so slight as to have almost escaped observation. Although the development of scarlatinal nephritis is frequently attributed to undue exposure to cold, especially during the stage of desquamation, it has been found that with patients in hospitals the development certainly depends partly upon the degree of humidity of the atmosphere. Damp, cold, and muggy days are marked by the coincidence of several fresh cases, while, in the slighter forms of scarlatinal nephritis, a return of bright weather is often associated with rapid improvement.

There is some reason to believe that the onset is also favored by constipation, and it is, therefore, desirable during convalescence from scarlet fever to prevent any such tendency by the frequent administration of some mild laxative. The character of the diet, too, has some influence, and with children from three to six years old it is advisable to confine the diet mainly to milk during the time of desquamation, and to keep the patient in bed, not only with the object of diminishing the risk of spreading infection, but also to prevent any possible dangers which might result from exposure or from violent exercise.

The transition from simple albuminuria to definite scarlatinal nephritis is often somewhat abrupt—that is to say, that although a mild form of albuminuria may have been noted for many days, the distinct onset of scarlatinal nephritis is marked by a rise of temperature and by an increased severity of other symptoms, such as headache, œdema, and the characteristic alterations of the urine. Hence, during convalescence from scarlet fever it is desirable to avoid the use of any drugs—such as salicylates or potassium chlorate—which favor the development of albuminuria. The rise of

temperature to 101° or 102° , which forms the immediate prelude to scarlatinal nephritis, occurs commonly toward the end of the second or during the third week. This rise of temperature has been treated beneficially with repeated small doses of tincture of aconite. Very often, however, this initial rise of temperature may escape observation, and the disease, for practical purposes, assumes the form of acute nephritis, in which there is a great tendency to the development of symptoms of uræmia. Uræmic convulsions may occur very early, and may be followed or sometimes preceded by vomiting, drowsiness, and alterations in the frequency of the pulse.

The treatment of dropsy and of these uræmic symptoms does not differ from that already described with acute nephritis. Dr. F. Detlefsen,¹ of Chicago (*Pediatrics*, January 15, 1898, p. 47), considers that diaphoresis should be moderate and followed by the ingestion of plentiful fluids, for a favorable excretion by means of the sweat-glands is not void of danger, because the loss of fluid is too great in comparison with the amount of urea excreted. The diaphoretic he prefers is a warm bath of 98° to 100° F. for fifteen or twenty minutes or less. During the bathing cold compresses are applied to the head, and the child is afterward put into bed in a warm blanket. He recommends that if perspiration is not free, hot drinks or an infusion of jaborandi, or pilocarpine, may be given, though the latter is very depressing. Occasionally discomfort in the lumbar region may call for local treatment. Hot fomentations may be employed over the loins, or, if the pain is very severe, a few leeches may be used. The dietary is an important consideration, since the duration of the albuminuria is liable to be increased by resuming solids at too early a stage. Dr. Detlefsen considers an absolutely milk diet too rich in nitrogen, and that gruel or soups of barley and other farinacea and cooked fruits should be given. Eggs are frequently rigidly excluded from the diet; but when there is much anæmia they appear to be beneficial in the form of a light custard or if beaten up with milk. They are certainly prejudicial if given hard-boiled.

When the immediate urgency of the symptoms has passed away, benefit will often result from the use of perchloride of iron. This must be employed tentatively, and its administration checked if the albuminuria is found to be increased. Frequently, however, it not

¹ Year-Book of Treatment, 1899, p. 156.

only acts as a hæmatinic, but to some extent it reduces the amount of hæmaturia. The administration of iron, however, will entail the use of magnesium sulphate, or some other saline purgative, to counteract the liability to constipation.

Quinine is also usually beneficial in this disease when the immediate urgency of the symptoms is over, and small doses of tincture of digitalis, or of strophanthus, are occasionally of service when there is much weakness of the pulse.

Although the great majority of cases of scarlatinal nephritis recover in two to three weeks, the disease is frequently marked by complications of greater severity than in ordinary acute nephritis, and especially by an increased tendency to the development of empyema, or of purulent pericarditis. The liability to the subsequent development of chronic nephritis has also to be remembered, and must entail the greatest caution, even in the mildest form of this disease.

Chronic Nephritis. Although it is generally considered desirable to attempt to deal with the cause of any diseased process, and thus to diminish liability to the disease, this becomes especially difficult, and in many cases even impossible, in connection with chronic nephritis. The onset of this disease is usually gradual, and it is only when it appears to be dependent upon such conditions as malaria, syphilis, or continued suppuration that it is possible to attack the cause with any hopefulness. If chronic nephritis is found coexistent with chronic suppuration, benefit frequently results from the successful treatment of the suppuration, and when due to malaria or syphilis these conditions necessarily require appropriate remedies. When the disease gradually develops after an attack of acute nephritis the early treatment becomes almost inseparably linked with that of acute nephritis. Reference has already been made to the necessity for dietetic precautions whenever cases of acute nephritis are tending to a chronic course. Although many forms of routine treatment have been advocated for chronic nephritis, there is little evidence that they have produced beneficial results. The inflammatory process is not sufficiently active to require special treatment, and although, speaking generally, it is necessary to diminish the work of the kidney as far as possible, to adopt tonic measures, and to encourage exercise, yet the chief indications for chronic nephritis are to a large extent symptomatic. In saying this, however, it must be remembered that it is impossible to confine the benefits of the remedies employed to one symptom,

and that although efforts may be primarily directed to the treatment of diminution of the urine, of increased albuminuria, of excessive dropsy, or various other symptoms, yet while attacking any one of them individually an influence is probably being exerted simultaneously on others.

Considering the treatment of the symptoms in detail, one which frequently causes anxiety consists of diminished urinary excretion. If this symptom occurs without dropsical effusion it may be treated by the administration of large quantities of liquid, either water or milk, although the latter is preferable, owing to its nourishing powers. If, however, milk causes dyspeptic symptoms, or if there is much complaint of thirst, imperial drink or home-made lemonade may be given; both are frequently taken more readily if made mildly effervescent. Even in the absence of dropsy, cardiac tonics, such as strophanthus, digitalis, caffeine, or theobromine, may do good by increasing the circulation through the kidney. Sometimes, even when there is no specific history, potassium iodide may be of service, and it has been given in increasing doses until as much as 200 grains daily have been administered. This remedy, however, is more appropriately employed when there is much dropsical effusion.

Efforts are sometimes made to reduce the amount of albumin eliminated in chronic nephritis, on the assumption that the weakness which is so prominent in this disease is to be attributed to the great loss of albumin. It has been suggested that the albuminuria might be lessened by reducing the quantity of albuminous matter given in the diet. It is generally a mistake to interfere thus with the dietary, and I feel sure that if the strength and the general health improve during the administration of nitrogenous food, a slight increase of the amount of albumin eliminated is comparatively unimportant.

On the other hand, there may be distinct indications for limitation of the dietary, as, for example, when dyspeptic symptoms arise or when headache is produced during the consumption of a somewhat liberal allowance. It must be remembered that the above remarks apply only to those cases in which hæmaturia is absent, and that when any such indication of the extension of the inflammatory process occurs the case is temporarily to be treated as one of acute nephritis. The influence of alcohol is somewhat open to question; for while there is no advantage in prescribing stimulants in the majority of cases, there may be distinct disadvantages in for-

bidding stimulants to those who have been in the habit of taking them in moderation. In such patients small quantities of alcohol, well diluted, and given only at meal-times, may promote appetite and digestion. Broadly speaking, however, stimulants should be reserved for patients who have to keep in bed on account of cardiac weakness. The amount of albumin lost may sometimes be greatly reduced by keeping the patient in bed for a few days. Some writers, however, recommend the administration of astringents, with a view of reducing the loss of albumin, but the risk of interfering with the functions of the stomach must be kept in mind, since these drugs must, as a rule, be given in large doses before producing much result. Lead acetate is often recommended, more particularly when there is much hæmaturia, and astringent preparations of iron are also beneficial, though their hæmatinic effect is frequently greater than their power of diminishing loss of albumin. As in acute nephritis, ergot, tannic acid, and gallic acid have also been employed with somewhat doubtful results, and they add largely to the risk of disturbing digestion.

Dropsy is a symptom which probably calls most urgently for treatment in the majority of cases of chronic nephritis. During the early stages of the disease the degree of effusion can be influenced by medicinal remedies, and it is only in advanced conditions that the amount of effusion is likely to cause immediate anxiety. The treatment of dropsy in chronic nephritis is very similar to that in acute nephritis. It is usual to employ diaphoretics and hydragogue purgatives during the early stages, and later to use diuretics. The adoption of surgical measures may also require consideration. The action of the skin may be favored either by vapor baths, hot-air baths, hot-water baths, or the wet pack, and the selection depends largely upon the circumstances of the patient, upon the means at hand, and upon the extent of the dropsical effusion. Sometimes any of these measures may produce a sense of weakness, together with headache and palpitation. These symptoms may be averted or diminished by the employment of stimulants, or by the application of cold compresses to the head; if, nevertheless, they persist, the baths should be discontinued and other modes of inducing diaphoresis should be adopted.

One of the simplest and easiest ways of promoting diaphoresis consists in placing a metallic spirit-lamp under the centre of the chair upon which the patient is seated, enveloped with blankets which reach down to the ground. In spite of its simplicity, however, this

method is somewhat dangerous, since the size of the flame may increase suddenly, and it has also the disadvantage of being inapplicable to patients who are much weakened by disease. An alternative plan is to place the lamp upon a plank in the centre of the bed, and to raise the bedclothes by means of a surgical cradle; but it is safer, when possible, to keep the lamp altogether outside the bed, and to convey the heated air to the interior by long pipes similar to those employed with bronchitis-kettles. Even with this precaution, care must be taken, as there is still the risk of causing blistering of the limbs if the pipes are allowed to come into contact with the skin. This is peculiarly prone to occur, since there is much diminution of cutaneous sensibility, owing to the dropsical effusion. Upon the whole, although it perhaps involves more trouble, I am in favor of the use of the wet pack in preference to the vapor bath, and the mode of employing this has been already fully described.

The free action of the skin is sometimes favored by the frequent administration of diaphoretic drugs as well as by the occasional employment of hot baths or wet packs; it was once thought that pilocarpine might be sufficient to produce free diaphoresis even without the employment of baths. At the present time this drug is not very much used, since it may promote dangerous pulmonary œdema. When, however, it is difficult to excite the action of the skin by baths or wet packs, benefit may sometimes result from the employment of small doses of pilocarpine, which thus serve as a starting-point of diaphoresis. Simultaneously with the employment of these diaphoretic measures, hydragogue purgatives should be used. Simple salines, such as sodium sulphate, potassium bitartrate, and potassium and sodium tartrate, are sometimes beneficial when administered in concentrated solutions; but greater benefit frequently results from the use of jalap, either in the form of the compound jalap powder of the *Pharmacopœia* or with small quantities of scammony. The employment of these, however, should be limited by the presence of dropsical effusion, and they should be reduced or discontinued in accordance with the symptoms. Diuretic measures may be adopted in cases of chronic type when the use of hydragogue purgatives has not been attended with much advantage. Lithium carbonate and potassium citrate, or sodium citrate or tartrate, may often give rise to an increase in the amount of water eliminated, and may thus produce diminution of dropsy.

Although uræmic symptoms are perhaps less usual with this dis-

ease than with cirrhosis of the kidney, they occur with sufficient frequency to call for notice here. They are most prone to develop when there has been long-continued diminution in the daily excretion of urine. Hence, they are generally to be treated by diuretics, diaphoretics, and by purgatives. Of the two forms of uræmia, acute and chronic, the latter is most commonly met with in connection with chronic nephritis, and it is, happily, the form which is most readily affected by diaphoretic and diuretic measures. Should there be much complaint of persistent headache or of sleeplessness, various nitrites may be used, and these, as already described in connection with angina pectoris, may be administered either by inhalation or by the mouth. Nitroglycerin is perhaps preferable to amyl nitrite, as the effect, though it is produced more slowly, is more lasting; recently erythrol tetranitrate has been recommended on account of its power of causing prolonged reduction of the blood-pressure. The sleeplessness, like that of acute nephritis, may be treated with bromides, chloral, or with hyoscine. Dr. Stephen Mackenzie¹ has recommended morphine as a palliative in cases marked by uræmic symptoms, and this treatment has been indorsed by some other observers, although the use of morphine or opium in connection with chronic nephritis is usually regarded with anxiety. When vomiting and diarrhœa occur spontaneously late in the disease they may cause considerable weakness and may be very intractable. Small quantities of strong beef-tea, given at frequent intervals, may occasionally reduce the urgency of the symptoms, but uræmic vomiting has often to be met by nutrient enemata. Urgent diarrhœa is occasionally to be controlled by the repeated employment of enemata containing opium, but the use of astringents by the mouth is rarely attended by success. Uræmic dyspnœa has to be dealt with according to the light thrown upon the symptom by the condition of the lungs and heart. When the dyspnœa is associated with heart weakness it may be treated with digitalis, alcohol, ether, or other forms of cardiac stimulant; while, when associated with much lung engorgement, expectorant measures, such as mixtures containing aromatic spirit of ammonia and ether, give better results. Sometimes, however, cases of dyspnœa occur which appear to be of an undoubted uræmic type, and these improve with the use of diaphoretics and diuretics, rather than with expectorants or cardiac stimulants.

¹ Lancet, August 10, 1889.

In the above pages attention has been mainly directed to those cases which are of sufficient severity to interfere wholly with the ordinary occupation, and, indeed, to necessitate the patient remaining in bed. When, however, patients come under observation at an earlier stage, much benefit may result from some rearrangement of the habits and occupation. It is distinctly undesirable to continue any occupation involving great physical strain or constant worry and mental excitement, but it is also inexpedient to insist upon complete separation from work before this is necessitated by the patient's condition. Those suffering from chronic nephritis are frequently prone to take a gloomy view of life, and this natural tendency is increased when they are forced to keep in bed; accordingly the appetite and general well-being are likely to suffer severely from premature interference with the ordinary habits of exercise. If it is possible, the work undertaken should be of a light and interesting character, and it is especially important that it should be arranged so as to involve no undue exposure to cold and no short periods of overstrain. During the early stages of chronic nephritis the chief risks incurred are those which result from subacute attacks marked by hæmaturia. The frequency with which such attacks occur may to some extent be reduced by sheltering the patient from rapid alternations of temperature; some benefit, therefore, is likely to result from the use of woollen garments and from the adoption of the broad flannel belt over the loins, similar to that worn by Europeans in tropical climates. When circumstances permit, these patients should be sent to a warm climate during the winter months. San Diego, Cal., Torquay, Ventnor, or Bournemouth may be recommended, though sometimes greater advantage may be derived from a winter sojourn in Egypt or in Algiers.

Cirrhosis of the Kidney. The treatment of renal cirrhosis to some extent resembles that of chronic nephritis, but this resemblance is mainly characteristic of the later stages of the disease, the earlier conditions frequently necessitating special forms of treatment. It is very rarely possible to deal directly with the cause of the disease, though when due to gout, to lead poisoning, or to syphilis these various conditions should be treated on general principles, and the urgency of the renal symptoms will often be found to diminish to some extent, as the disease with which they are associated yields to the treatment. In general, however, the recognition of cirrhosis of the kidney is only made at a stage when the disease has probably

been already in existence for some months or even years; and although it is still necessary to ascertain and to treat, so far as possible, the cause of the renal affection, there is little likelihood that benefit will result from measures primarily directed against the cause, and the treatment therefore must chiefly be symptomatic.

The most hopeful class of cases to deal with is that dependent upon gout, or associated with alcoholic excesses, since both these tendencies may be counteracted, and accordingly the continued irritation of the kidney may thus be reduced. In this particular form of Bright's disease it is very rarely necessary to consider the advisability of attempting to reduce the amount of albuminous loss, since frequently this loss is extremely small, and albumin may even be absent from the urine for days or weeks; the diagnosis must, therefore, be based upon other associated conditions, such as changes in the vascular system, and upon the development of other indications of interference with renal elimination.

The risks of cirrhosis of the kidney are undoubtedly influenced by external conditions. It has been recommended that ordinary occupations should be entirely given up, this recommendation being based on the hypothesis of the frequent dependence of this condition upon nervous strain and worry. It is, however, very rarely advisable to attempt to completely alter the mode of life in this way. Often such change is precluded by the circumstances of the patient, but even among the more wealthy it is undesirable to insist upon enforced inactivity, since this disease, like chronic nephritis, is frequently characterized by considerable mental depression, and, therefore, if the daily routine is fairly free from anxiety and worry, it is better for the patient to continue his usual occupation.

In advanced forms of renal cirrhosis, residence during the winter months in warm or temperate climates is advisable, since it not only avoids the danger of exposure to cold and of the extension of the disease, but also affords brightness and interest, free from the ordinary course of a busy life. When expatriation is impossible, it is still advisable to avoid the risks of chills by insisting upon warm clothing, especially upon the use of flannel or woollen garments to be worn next the skin.

The administration of remedies intended to control the cirrhotic changes within the kidney is often advocated, and foremost among these potassium iodide is to be mentioned. This is frequently given in comparatively large doses for a length of time, and if the disease

is dependent upon syphilis it appears to be somewhat beneficial ; but under other circumstances there are distinct disadvantages in the continued use of this remedy, since it is not only depressant, but it is extremely liable to cause disorder of digestion and to increase any dyspeptic symptoms which may already be in existence. American observers sometimes speak highly of the use of chloride of gold and sodium, which is official in the *United States Pharmacopœia*. This is given in doses of from $\frac{1}{30}$ grain to $\frac{1}{10}$ grain once or twice a day, and it is used not only in cirrhosis of the kidney, but also in cirrhosis of the liver. Compounds of gold, however, have not been received with much favor in England, although they have been said to improve the character of the urine, to diminish the frequency of nocturnal micturition, and to increase the general well-being.

With regard to the symptomatic treatment, one of the early symptoms to attract attention is the increase in the amount of urine passed, which often leads to nocturnal micturition, of which complaint may be made. Although this symptom will attract attention, it is not advisable to attempt to diminish the polyuria ; but, on the contrary, it should be favored, since attempts to reduce the daily excretion of urine are likely to entail a diminished elimination of nitrogenous waste.

The loss of albumin in any considerable quantity is a comparatively rare occurrence in cirrhosis of the kidney. In such cases it will be advisable to limit the amount of nitrogenous food ; but any alteration of diet must be made with great care and circumspection, since the appetite is commonly poor and capricious, and may fail if the dietary is rendered too plain and uninteresting. It should be remembered that, throughout the course of this disease, dyspeptic symptoms are frequent, and there is strong reason for believing that the condition may be favored by chronic dyspepsia, such as may result from deficient mastication ; on the other hand, dyspeptic symptoms also occur in a late stage, as indications of uræmia, vomiting of rebellious character being frequently a prelude to the fatal termination. On all grounds, therefore, in dealing with cirrhosis of the kidney, it is advisable to diminish the amount of work to be performed by the kidney, both by reducing the amount of nitrogenous foods and by the use of simple diuretics.

Persistent headache is an early symptom which often demands treatment. This, in general, appears to be due to altered vascular tension rather than to retention of nitrogenous waste. In the ear-

liest stages of cirrhosis of the kidney the headache is certainly mainly due to the former condition, though perhaps in the later stages it may be an indication of uræmia. Persistent headache may sometimes be very markedly relieved by the use of mild purgatives, but when it resists the action of simple salines it will be advisable to use other remedies which reduce the vascular tension, such as nitroglycerin or one of the official nitrites. Nitroglycerin is fairly readily taken, and may be used either in the tabellæ or as the spirit of glonoin. Occasionally either of these, if used in too large a dose, appears to provoke headache, but frequently the dose can be adjusted so as to obtain relief.

Erythrol tetranitrate has been used with the same object, and is credited with the power of causing reduction of the blood-pressure of a somewhat persistent character. When the prolonged effect of the nitrite is desired, sodium nitrite is also frequently employed; it may be given in doses of from 1 to 5 grains. This remedy occasionally causes unpleasant symptoms, and hence it is advisable to commence with small doses, and to increase the quantity, if necessary, after the susceptibility of the patient has been ascertained.

The persistent headache of renal cirrhosis is often associated with insomnia, which will necessitate the employment of some hypnotic. The use of opium has occasionally given satisfactory results, but if the specific gravity of the urine is very low, and the insomnia is associated with headache, there is some risk in the employment of opium, or any of its preparations, and it is better to employ a hypnotic which is free from risks of interfering with the renal excretion. Hyosecyne hydrobromate has given good results in this form of insomnia, but, as it occasionally causes symptoms of mild delirium, it is not perhaps so largely employed as it might be.

Of the other hypnotics, sulphonal and paraldehyde can be recommended. In favor of the former may be mentioned the fact that after the habit of sleeplessness has been overcome by the use of a moderate dose, the amount of sulphonal administered nightly may be reduced. Against sulphonal the chief disadvantages are the tardiness of action and the occasional failure to produce sleep, with the subsequent development of mild ataxic symptoms.

Paraldehyde has given good results in the insomnia of renal cirrhosis, but the persistent odor is a strong objection to its frequent employment, although this may form a safeguard against the establishment of a drug habit.

Reference has already been made to the frequency of dyspeptic symptoms in the course of renal cirrhosis. These may be dealt with either by the use of drugs or by modifications of diet. If the dyspeptic symptoms are of the ordinary type, and dependent upon mild gastritis, advantage will follow the employment of salts of bismuth, or of sodium bicarbonate, which may be given in conjunction with gentian, or with diluted hydrocyanic acid. Frequently, however, especially in advanced forms of cirrhosis, dyspeptic symptoms persist in spite of these gastric sedatives. Occasionally they appear to be increased by the use of any highly nitrogenous form of dietary, and it will then be desirable to encourage the sparing use of meat, or even its avoidance. Dyspeptic symptoms sometimes improve when the patient is put, even for a short time, upon an exclusive milk diet. Frequently, however, a rigid milk diet causes loss of appetite, and a diet of carbohydrates has to be substituted. Small quantities of fish or of poultry will sometimes be beneficial, and should be used when the appetite is failing, unless they are found to increase discomfort and to cause vomiting.

Vomiting is frequently a somewhat late symptom of renal cirrhosis, and, unless dependent upon gastritis, it is often extremely rebellious to all forms of treatment. Occasionally it yields to the action of minim doses of tincture of iodine, given every half-hour until the vomiting ceases; while, if dependent upon gastritis, it may be treated with silver nitrate, or silver oxide, given as a pill, or with creosote or carbolic acid. When it resists the action of these remedies, vomiting is in all probability a distinct symptom of uræmia, and can only be alleviated by measures which favor the elimination of nitrogenous waste, such as the use of vapor baths, of the wet pack, and the frequent administration of hydragogue purgatives.

Diarrhœa may sometimes occur in the early stages of the disease as the result of gastro-enteritis; it is then to be treated in the ordinary way with astringents and sedatives. When, however, it occurs late, although these remedies are sometimes of service, it often persists in spite of their use, and necessitates the employment of enemata of starch and opium and the use of milk diet. Some degree of looseness of the bowels is, however, frequently an advantage in connection with the late stages of renal cirrhosis; hence, unless the diarrhœa is very exhausting, it is better not to attempt to check it too suddenly.

With regard to the changes in the circulatory system, apart from

the high tension already mentioned, there are frequently no indications for treatment until late in the course of the disease, when, perhaps as the result of exhaustion produced by vomiting or by diarrhœa, the pulse tension will fail and the heart's action may become weak and irregular. These symptoms will be indications for the use of digitalis, of strophanthus, and perhaps of citrated caffeine, and they will also be found to improve somewhat during the administration of alcohol. When cardiac irregularity persists in spite of these remedies, more direct sedative measures are sometimes of service, such as the cautious administration of morphine or cocaine hypodermatically.

Cardiac irregularities are often associated with recurrent attacks of dyspnœa. This dyspnœa is apparently dependent sometimes upon degeneration of cardiac muscle, sometimes probably upon alteration in the character of the smaller bronchi, and possibly it may also be an indication of definite uræmic poisoning. I have dealt with these varieties of dyspnœa elsewhere at length.¹

The treatment of spasmodic attacks of difficulty of breathing will to some extent be dependent upon the estimation of its cause. Nitroglycerin and amyl nitrite have sometimes been used, while cardiac tonics, such as digitalis and citrated caffeine, give more general relief. When the dyspnœa is dependent upon œdema of the lung, or upon an accumulation of fluid within the pleural cavity, appropriate measures must be adopted. In the latter case, aspiration of the thorax is sometimes followed by considerable relief; but occasionally, although the prominent distress of breathing improves after aspiration, the paroxysmal attacks may remain and require further treatment. Under such circumstances I have known pilocarpine prove of considerable service, though this remedy must be administered cautiously if there is much cardiac weakness or bronchial catarrh.

If, during the attacks of uræmic dyspnœa, the elimination of urine is found to be much below the normal standard, relief may follow the use of diuretin, which may be administered either alone or in conjunction with digitalis or strophanthus. It is sometimes found, however, that uræmic dyspnœa resists most forms of treatment, except those which directly favor an increased elimination of nitrogenous waste, such as hydragogue purgatives, vapor baths, and the wet pack. If the physical signs show the coexistence of bron-

¹ See Albuminuria and Bright's Disease, p. 196 (Smith, Elder & Co., 1899).

chitic changes, or indications of engorgement, stimulant expectorants are indicated.

Pericarditis with or without effusion is often a late symptom in the course of renal cirrhosis. Though in some cases this change may be only discovered as the result of repeated examinations, there may be sometimes much complaint of pain, and this must then be relieved either by the application of two or three leeches over the cardiac area, or by the use of fomentations or of poultices.

In view of the comparative frequency of cerebral hemorrhage during the course of renal cirrhosis, neuralgic headache always attracts considerable attention, since it is often regarded as a forerunner indicative of the danger of hemorrhage; hence, whenever patients complain of recurrent attacks of migraine or of neuralgic pain, either frontal or occipital, immediate measures must be taken for the relief of this symptom. Nitrites or nitroglycerin may occasionally be beneficial; but the pain is frequently more readily controlled by the use of antipyrin or antifebrin, though, on account of their influence upon the pulse, these remedies must be employed in moderate doses and with due precautions. Should symptoms of cerebral hemorrhage occur, the case must be dealt with on ordinary principles, but the prognosis is rendered much more serious by the coexistence of renal changes.

Although cerebral hemorrhage is the most serious result of high tension and of degenerative changes in the walls of the bloodvessels, many other forms of hemorrhage may arise. The retinal hemorrhages are of diagnostic value, but do not call for special modification of treatment. Epistaxis is, however, fairly frequent, and although it may sometimes be checked by rest, by ice, or by tannic or gallic acid, it may occasionally necessitate plugging of the nares. Plugging the anterior nares is usually sufficient, as the hemorrhage mostly comes from the septum, at no great distance from the nasal orifice; hence, it is fairly easy to compress the bleeding vessels. When the hemorrhage persists, it will be advisable to remove the anterior plug, and to plug both the posterior and anterior nares. Gastric and intestinal hemorrhages leading to hæmatemesis and melæna occur more rarely, and are to be dealt with on general principles. Sudden hæmaturia may also result from rupture of renal vessels, owing to high tension and vascular degeneration; but this symptom is in general an indication of the onset of a subacute inflammatory attack.

Impairment of muscular strength is not so great with renal cirrhosis as with chronic nephritis; it also occurs more gradually. It may, however, be of sufficient importance to call for the use of tonic remedies and for modifications of those ordinary occupations which involve much muscular strain. The loss of power is most marked toward the end of the disease; during the earlier stages it is often scarcely appreciable, and may to a great extent be retarded or counteracted by moderate exercise and by gentle gymnastics. Many instances have come under my notice in which, by suitable out-door exercise, and by regulation of diet and of stimulants, life has been prolonged for many years, in spite of the constant small drain of albumin.

As the disease progresses uræmic symptoms become more marked and more constant, and the progress may be interrupted by one or more uræmic convulsions. Occasionally these may be sufficiently severe to cause death, but the end is often reached through inflammation of some other internal organ; thus a low type of pneumonia may creep on without much rise of temperature, while pleurisy with effusion, hydrothorax, and dry pleurisy are not uncommon. During uræmic convulsions very little can be done to relieve the condition. In the acute attack nitrites and amyl nitrite have been recommended, but these have not, as a rule, been found to be of much service, and they certainly do not shorten the comatose condition which follows the convulsive attack.

When convulsive attacks succeed each other with great rapidity, chloroform may be administered; but it must be given with considerable care, since the heart is so frequently in a weakened condition. With a rapid succession of convulsions the hypodermatic injection of morphine has been recommended; but although this drug may diminish the severity of the convulsive seizure, it appears to influence the excretion of urine prejudicially, and to favor the retention of toxic materials. It will generally be found that during the convulsions the excretion of urine is comparatively limited, and that a relatively large proportion of albumin is present. The treatment, therefore, has to be based upon an effort to obtain elimination of nitrogenous waste through other channels. Even when there is little or no dropsical effusion, it is perhaps better to use hydragogue purgatives; and croton oil, which can be easily given on account of the smallness of the dose, is usually selected.

As the convulsions and coma pass off, diaphoretic measures can be adopted. Pilocarpine has sometimes been used in this stage, and, if

given in small quantity, it is a valuable agent to initiate diaphoresis, which ought subsequently to be continued by the use of the wet pack or of other diaphoretic agents ; but pilocarpine should rarely, if ever, be employed during the stage of unconsciousness, since it promotes considerable secretion from the salivary glands and from the bronchial mucous membrane, and in an unconscious patient these secretions may very seriously impede respiration. The routine employment of pilocarpine in connection with uræmic convulsions must be strongly deprecated. Diuretics may be given when the urine is free from blood.

Professor Ewald, of Berlin, recommends the use of venesection both for the ordinary symptoms of uræmia and for the uræmic convulsions, and he considers that, although the strength of the patient may to some extent be reduced, the restoration to consciousness is favored by the removal of toxic material. If this treatment is adopted it will be well to inject water into the rectum, or into the subcutaneous tissues, so as to further dilute the toxic equivalent of the blood and to replace fluid that has been removed.

With regard to the other common complications of the later stages of renal cirrhosis, such as those connected with the lungs or with the pleura, these may be dealt with on general principles. Hydrothorax may require repeated tapping ; dry pleurisy, on account of pain, must be treated with fomentations or local anodynes ; while pneumonia will call for the administration not only of stimulant expectorants, but also of a fairly liberal allowance of alcohol, since this low form of pneumonia is frequently associated with rapid diminution in the strength of the pulse.

The dropsy which occasionally complicates the closing scenes of renal cirrhosis must often be regarded as of cardiac rather than of renal origin, and it necessitates the use of cardiac stimulants and diuretics, such as digitalis, caffeine, strophanthus, and diuretin, rather than the repeated employment of hydragogue purgatives. Occasionally some preparation of squill may be added with advantage to any of the foregoing, since, with the supervention of cardiac dropsy, œdema of the lung is very likely to occur ; and when this is the case the expectorant action of squill is of considerable service. The success of the treatment to a large extent depends upon the recognition of this cause of dropsy, since hydragogue purgatives, by their weakening influence, may greatly reduce the patient's strength and promote increased embarrassment of the circulation.

CHAPTER XVI.

NERVOUS DISEASES.

Hysteria—Neurasthenia—Hystero-epilepsy—Enuresis—Chorea—Epilepsy—
Locomotor Ataxia—Infantile Paralysis—Neuralgia.

Hysteria. Under this name numerous conditions are included which vary in intensity, from severe convulsions or the paralysis of special sets of muscles on the one hand, to emotional disturbances on slight provocation on the other hand; the latter being perhaps constitutional, or the results of deficient educational control, rather than actual indications of disease.

It is unnecessary here to enter into a consideration of the leading symptoms of hysteria; indeed, the disease, although well recognized among medical men, is enshrouded in so much mystery, both concerning its predisposing and its exciting causes, that in general the term "hysteria" is rarely employed, either to the patient or to the patient's friends. By long custom the word has become somewhat misunderstood, and it is often regarded as indicating a perverted mental condition, capable of control, to be dealt with by harsh measures, and perhaps by scolding. This is distinctly unfortunate, since the adoption of such a mode of treatment is frequently followed by an increase in the severity of the symptoms, which may sometimes even extend over the border-line which separates this disease from the exaggerated self-consciousness and habits of introspection which so often form the early indications of more serious perversion of the mental faculties.

In the treatment of hysteria it is of primary importance to maintain the general health of the patient, and this is broadly true for all forms of hysteria, ranging from the mild manifestations to the occurrence of hysterical convulsions, or to the condition which has of late years been designated neurasthenia.

To promote healthy conditions it is essential to make careful inquiries as to the habits of the patient, and to some extent the indications for treatment will be derived from the history of the individual. Frequently it is advisable to recommend exercise in the

open air, and for those patients who find that they are unable to walk, carriage exercise, riding, or bicycling may be of considerable service. It is important, however, to remember that in a large number of cases adequate rest is almost as essential as sufficient exercise.

Hysterical conditions are apt to be developed among those who "never have a moment to themselves," but who rush about from one occupation to another, and do not allow themselves sufficient time either for eating or sleeping. It is on this account, therefore, that it is imperative to be fully acquainted with the patient's habits, both as reported by themselves and also by their friends, before attempting to lay down any hard-and-fast directions. On the other hand, the condition is frequently found to arise when there are no definite duties or occupations to maintain the interest in life, and when, accordingly, nerve energy is thrown away upon literature of an exciting character or upon an undue expenditure of sympathy in the real or imaginary sufferings of neighbors and friends. In these cases it is necessary to devise some form of interest and occupation which should be of a particularly unexciting character.

Frequently it will be found that the digestive functions demand treatment. It is sometimes necessary to encourage a more rational form of dietary in order to insure a sufficiency of nourishing food, while various irregularities, either of the functions of the intestine or of the stomach, may call for attention. Companionship is almost always desirable, but in exaggerated forms of hysteria the companion should, if possible, be carefully selected, so as not to encourage introspection by undue sympathy. Very little advantage results ordinarily from undue severity or from total lack of sympathy, both of which favor the fancy that the condition is misunderstood, and increase the idea of martyrdom, which it is so desirable to avoid. Perhaps the best companion is one who has some definite work in which she may be aided by the patient.

The use of drugs in the treatment is of comparatively small importance as compared with the general control and modification of habits; and, moreover, it is somewhat difficult, in considering a disease which varies so greatly in intensity, to lay down any special recommendations of drugs which will be suitable to the majority of cases. To a great extent the drugs must be selected in accordance with the indications afforded by the individual; thus, for example, tonics are frequently of service, and occasionally, in addition to these,

laxatives must be used. The remedies which are most commonly recommended are various forms of valerian, lobelia, or of asafœtida, but the *routine* administration of these remedies is not likely to be attended by much benefit, especially if the habits of the individual are not suitably modified. The following mixtures may, however, be useful :

R.—Tincturæ valerianæ ammoniatæ	3 ss.
Spiritus chloroformi	℥x.
Quininae sulphatis	gr. ij.
Acidi sulphurici diluti	℥v.
Aquæ q. s. ad	℥j.
R.—Tincturæ lobeliae	℥xv.
Aquæ camphoræ q. s. ad	℥j.

As a rule, it will be found, especially in the more advanced forms of neurasthenia, that the consumption of food has fallen far below the physiological requirements of the body, and under such circumstances the treatment recommended by Weir Mitchell is frequently productive of the best results. This includes total isolation from friends, and, during the time that the treatment lasts, all communications, even with relations, should be forbidden.

The Weir Mitchell treatment entails absolute physical rest during the earlier weeks, while the quantity of food given is gradually increased, in spite of protests, and given in concentrated form. During the earlier period, laxatives are frequently required. To favor metabolism and to increase the strength of the wasted muscles, massage is used daily, the duration being gradually increased. It is impossible here to give full details as to the mode of performing massage—a form of treatment which is extremely valuable, in spite of the many abuses which have of late thrown some discredit upon its use. Different forms of electrical currents are also commonly used as part of the treatment, the duration being adapted to the patient's power of endurance. The amount of improvement that occasionally follows the Weir Mitchell treatment is sometimes surprising. There is commonly considerable increase in weight at the end of the active treatment, and this increase is generally maintained if judicious exercise and food are persisted with, after leaving the institution where the treatment has been carried out. As a rule, before returning home, the patient is sent to some bracing climate, where the surroundings encourage cheerfulness and exercise, and it is usually advisable that this return to activity should be made under

the guidance of a judicious, well-trained nurse, rather than in the companionship of a relative or friend.

With regard to the other manifestations of hysteria, for instance when convulsions occur, the treatment will require to be somewhat different. During the convulsions it is essential to clear the room of sympathizing onlookers, and, if necessary, to find some occupation for each and all of them. The attack of convulsions may speedily come to an end when the patient is left alone with the doctor or nurse, but if the attack continues it may be advisable to endeavor to check the fit. The most rapid method of attaining this object is by the sudden application of cold to the face. A glass of cold water thrown suddenly in the face will sometimes prove effective, especially if the practitioner announces his intention to repeat the treatment if necessary. Should this fail, a larger quantity of water may be poured slowly over the face, but occasionally it may be necessary to resort to other devices.

In severe forms of hystero-epilepsy the administration of an anæsthetic is sometimes almost the only measure which can be trusted to cause an arrest of convulsions, but as the patient regains partial consciousness the convulsions may recommence. Other methods have often been advocated, and of these perhaps the most interesting is the application of pressure over the ovarian region. This has been strongly recommended by Charcot, but it is sometimes found to cause an increase rather than an arrest of the severity of the convulsions.

In milder forms of convulsions the production of partial asphyxia, by forcibly closing the nostrils and the mouth, has sometimes been found to succeed; while some practitioners recommend the administration of an emetic, and if the patient is unconscious and unable to swallow, they do not hesitate to inject apomorphine subcutaneously.

In my own experience, hysterical convulsions are best dealt with by more simple methods, such as the isolation of the patient in a darkened room, and perhaps the use of the cold douche. I have very rarely been forced to use an anæsthetic.

Another form of hysteria which calls for special treatment is that associated with paralytic symptoms. These may affect any physiological group of muscles. Perhaps the most common form is that affecting the laryngeal muscles and producing aphonia. This condition can frequently be recognized by the sudden onset of aphonia

without any evidence of laryngeal obstruction, while laryngoscopic examination will often set the question at rest. Paralysis may, however, affect any group of muscles. The extensors of one forearm may sometimes be affected, and the prolonged inaction may lead to so much degeneration of muscular tissue as to obscure the true nature of the disease. These forms of paralysis must necessarily be dealt with according to the muscles affected. With hysterical aphonia a single strong electric shock is usually sufficient to restore the voice. This is ordinarily applied with one pole on the outside of the larynx and the other introduced between the arytenoid cartilages, the shock being passed as soon as the second pole is in position. This is more effectual than the use of a continuous current applied across the outside of the larynx, or even sent through the larynx with one pole at the nape of the neck and the other at the thyroid cartilage.

For the paralysis of extensor or other muscles the frequent use of a cold douche, of local massage, and of the interrupted current will probably suffice to effect a cure. As, however, these forms of local paralysis are, to some extent, subject to the will of the patient, this treatment may require to be continued for a length of time, and may, indeed, fail, unless the patient is put into a nursing home and perhaps completely isolated.

During the intervals in the treatment of any of these forms of hysteria the use of valerianates, of asafoetida, and of quinine must be continued, though if used alone these remedies will generally prove of but little service.

Enuresis. Enuresis is a term employed to indicate a condition which is frequent among children, more particularly among those who sleep heavily, and yet, during waking hours, are of a nervous, excitable temperament. It is the affection commonly termed nocturnal incontinence, though there are many objections to this term, the foremost being that observation shows that the bladder quickly empties itself, as in the act of micturition, instead of permitting constant outflow, as in ordinary incontinence. Enuresis is the natural condition of infants who have not learned to control the action of the bladder. The retention of urine for some hours is undoubtedly an acquired art, the result of management and of education. Frequently the lack of control is to a great extent to be attributed to want of proper care, and it only constitutes a condition calling for treatment when it persists after the age of two years.

To a large extent this persistent difficulty is, then, due to habit ; though frequently, when the condition occurs after the habit of control has been formed, the starting-point of enuresis is to be found in some form of irritation, either in the urinary passages, such as would be afforded by an abnormally small orifice or an unduly long foreskin, or else by irritation from the rectum or from the vagina, produced by worms ; and in these children, even after the removal of the exciting cause, the habit has still to be conquered.

The treatment of the condition naturally resolves itself into two parts : First, an inquiry into the nature of the exciting cause, which, if necessary, may be dealt with by surgical measures ; and, secondly, the treatment of the habit by medicinal and other measures. Of the other measures the most hopeless is that which depends upon an erroneous estimate of the condition, and leads to scolding and other forms of correction for what, in reality, is a form of physical weakness. Kindly management is much more hopeful, and this is frequently effected by reducing the amount of liquid taken in the evening and by rousing the child at intervals to relieve the bladder. Even this method often fails, and it is found that a child who has recently emptied his bladder may, within an hour or two, while deeply asleep, once more become deluged. This is undoubtedly due to a lack of balance between the contractile power of the sphincter and that of the wall of the bladder, and this loss of control is most marked among children who sleep heavily. Assuming that sources of reflex irritation have been removed, the treatment must in these cases be purely medicinal, and should be one which will control the undue activity of the expulsive functions of the bladder. *Belladonna* is the drug which possesses the greatest power in this direction, but opinions differ as to the best mode of employing it, some practitioners preferring the tincture, others the extract.

For many years in the out-patient room of the Evelina Hospital I carried on comparative observations on the use of this drug, and although the result showed that in most cases either the tincture or the extract will suffice to effect a cure, I arrived at the conclusion that the extract was the easier remedy to employ. My chief reason for this preference is that to be effectual the amount of the drug must be gradually increased until some influence on the habit is evident ; and to effect this without producing marked physiological symptoms, the quantity of *belladonna* must be at first small, and the dose must be increased gradually so long as no symptoms of

discomfort are produced. It is obviously somewhat inconvenient in out-patient practice to supply a fresh bottle of medicine each time that the dose of belladonna is to be increased, and it is still more difficult to reduce the amount, if necessary, when given in solution. On the other hand, it is comparatively easy to give small doses of extract of belladonna in pill form, and it is easy to vary the dose by increasing or diminishing the number of pills given. The only trouble that I have ever encountered in connection with the use of pills in the treatment of nocturnal micturition has been to persuade the parents that drugs administered in the form of pills were not necessarily purgative. As a rule, children bear belladonna well; and if the dose is increased gradually, comparatively large amounts of the extract may be given without causing dilatation of the pupils or dryness of the throat.

Ordinarily, I employ pills containing $\frac{1}{8}$ grain of the extract, and I give these at bedtime every night. When dealing with a child of seven or eight years old, I commence with two of these pills; but for younger children one pill for the first two or three nights will be sufficient, after which two pills may be taken. At the end of a week, if no alteration in the frequency of nocturnal incontinence has occurred, another pill is given every night, and at the end of the second week a fourth pill is given. During this week some change in the nightly incontinence is usually manifest, and the same dose is accordingly maintained for the next fortnight. If, however, no improvement and no toxic symptoms have occurred, the dose is increased. Should the incontinence cease entirely the parents must be warned not to check the administration of the belladonna suddenly, since if this is done the whole trouble returns, and the effective dose will once more have to be reached by gradual increase. On the other hand, when the condition appears to be arrested, the number of pills given at night should be gradually decreased, and any return of the trouble should be regarded as an indication for maintaining the amount of belladonna, or even for again increasing it. If the tincture is used it must be given in similar fashion; but, as already indicated, it is somewhat more troublesome to moderate or to increase the amount administered.

During this treatment it is often advisable, though not always essential, to employ tonic measures during the daytime, such as the use of cod-liver oil, or of iron and ammonium citrate, or of chloride of iron. These are frequently of service, since, although at the time

that the nocturnal micturition occurs the child is sleeping soundly, the comfort and rest are disturbed, and the health accordingly suffers. In addition to these remedies, preparations of *nux vomica*, either the tincture, the extract, or a solution of strychnine, may be used, especially if the appetite has been failing. Since this condition is most frequent among children of nervous temperament, the use of bromides is occasionally advocated. It should be remembered, however, that the indications of nervousness may, to a great extent, result from the so-called moral treatment to which the child has already been submitted; and bromides are certainly not required at night to assist sleep, since the little sufferers almost invariably sleep very heavily indeed the first hours of the night.

When the urine is found to be highly acid, alkaline remedies will occasionally serve to reduce its irritating character, and accordingly small doses of solution of potash or of sodium bicarbonate may be given to render the urine either neutral or less acid. It is rarely advisable to increase the amount sufficiently to cause distinct alkalinity of the urine.

In these days it is scarcely necessary to add that the blistering of the sacrum, or other measures to prevent the child from sleeping on the back, are not to be recommended. The incontinence appears to be quite independent of the position in the bed.

Chorea. The treatment of chorea will depend upon the type of the disease, and also to a great extent upon the age of the patient and the conditions under which the disease has arisen. It is most frequent in children, and it most commonly appears in nervous, excitable children who are over-anxious with school work. It may also develop in women of the same type, particularly during pregnancy.

The connection of the disease with acute rheumatism has long been maintained; chorea in childhood is regarded by many physicians as one of the manifestations of an attack of acute rheumatism, though by others it is regarded as a sequel, or as the individual expression of a rheumatic diathesis in a member of a distinctly rheumatic family. Frequently some definite nervous excitement or shock may be found to precede the onset of the symptoms, and inquiry should always be made for such a starting-point, since there is some probability that after a fright the sleep may be disturbed by nightmares, and such an occurrence affords a valuable indication for treatment.

The disease assumes three principal types : (1) The mild type, in which the movements show some slight inco-ordination, and the child appears to be careless rather than ill ; (2) the severe type, in which the choreic movements are more wide-spread and violent ; (3) the maniacal type, in which, in addition to violent movements, there may be acute delirium. This last form is of comparatively uncommon occurrence in children, though it is frequent in adults, especially during pregnancy. With this form there is often considerable constitutional disturbance, the temperature rising sometimes to 104° or 105° . When the disease assumes this severe type the ensuing exhaustion is extreme and may lead to a fatal termination. I have seen several instances, however, of the maniacal type of chorea develop in children during attacks of acute rheumatism with pericarditis and endocarditis, but in my experience these severe symptoms have not always foreboded a fatal termination.

From the above brief account of the chief types of the disease it is obvious that energetic treatment must commonly be adopted, though in the great majority of cases the disease appears to terminate naturally toward the eighth or tenth week. The primary indication is to be found in the maintenance of rest and in the avoidance of all forms of nerve strain and excitement ; hence, whenever a patient is brought under treatment soon after the commencement of the disease, when possibly only the hands and the arms are affected, it is well to insure complete rest, without waiting for the extension of the disease to the face and to the lower extremities. Whenever possible, it is better to place the patient entirely in the hands of nurses to the exclusion of members of the family, since experience shows how frequently comparative isolation in a hospital ward is followed within a day or two by very marked improvement, even in the absence of definite medicinal treatment. This improvement is in part due to the hygienic surroundings ; but the value of control, with the absence of noisy sympathy, cannot be ignored.

Even in the mildest cases of chorea the child should be removed from school and from all excitement of lessons and competition ; it is also desirable to employ purgative remedies from time to time, since constipation is often present and causes diminution of appetite. Further, since chorea is most frequent among children of a somewhat weak constitution, benefit is usually to be obtained from the administration of cod-liver oil and of non-astringent forms of iron, which should be given in repeated doses so long as any weakness continues.

In the more severe forms of chorea it is customary to employ arsenic, and it has been recommended that the dose should be increased to the limit of toleration. Since children bear this drug well, the treatment may commence with the administration of 5 drops of liquor potassii arsenitis, the amount being increased rapidly after the first two or three days. Many observers lay great stress upon the employment of massive doses of liquor potassii arsenitis, and both Osler and Whitla speak of the use of 25 drops three times a day. I have never employed doses as large as this, and I do not consider that they are devoid of risk, since numerous cases of arsenical neuritis have now been collected as the result of injudiciously large doses. My practice has been to increase the dose up to 12 or 15 minims, and simultaneously to employ every night some form of sedative remedy, such as chloral, to insure quiet sleep. The use of chloral on two or three successive nights has afforded the greatest satisfaction when chorea appeared to have originated in some definite fright, and I have no doubt that owing to this remedy I have been enabled to employ smaller doses of liquor potassii arsenitis.

For the more severe cases treated in hospitals it is well to surround the bed with a screen for a few days, so that the child may not be disturbed by the attention and mimicry of others in the ward.

Since the employment of liquor potassii arsenitis for out-patients, or for children in a poor position treated at home, involves certain risks, efforts have frequently been made to replace this drug by some safer remedy. For many years in out-patient practice I employed zinc sulphate, in doses of 2 to 4 grains three times a day, commencing with small doses and increasing with the establishment of toleration; but, upon the whole, it appeared that the results were not much better than those which were obtainable from the use of citrate of iron and ammonium with cod-liver oil.

There is considerable evidence, however, in support of the value of zinc valerianate in adult patients suffering from chorea, especially if complicated with hysterical symptoms. Zinc valerianate can be employed in doses of from 1 to 3 grains, and it is most conveniently administered with mixtures containing chloride of iron. In all probability the benefits obtainable with this drug are the result of its action both on the nervous and on the circulatory system.

Advocates have been found for the employment of silver nitrate, or of potassium bromide, which may perhaps be mentioned together,

as they are also often used as alternative remedies for epileptic seizures. These two drugs, however, differ in action, the former being a tonic to the nervous system, while the latter depresses the reflex excitability. I must confess that I have been somewhat disappointed with the results of treatment with potassium bromide. It certainly checks the violence of the movements, but it does not appear to curtail the course of the disease.

Belladonna is another remedy that has been highly vaunted, and its action resembles that of potassium bromide. I have already mentioned the value of chloral hydrate when employed in hypnotic doses when sleep appears to be disturbed by dreams, or when the case has originated in fright. This drug is, however, sometimes given in smaller doses throughout the day; but although the movements become less violent, it does not, when employed in this way, appear to influence the duration of the disease.

Cimicifuga has been recommended, mainly by American observers, as being almost the best remedy for chorea, especially when the disease is dependent upon uterine trouble of rheumatic taint. This drug, however, has not been much employed in England. It must be admitted that the wide range of diseases for which it has been recommended, and the uncertainty of its physiological action, do not inspire much confidence.

In mild cases of chorea as well as in those of more severe type, massage is frequently of considerable service, the nutrition improving during its employment, while the muscles regain tone.

For the most severe forms of chorea—those associated with maniacal symptoms—it is essential that some protection should be afforded to prevent injury during the violent movements. In children this object may be attained by padding the sides of the bed and restraining movement by sheets passed over the body and held in position with sandbags; but it is sometimes even necessary to fasten the limbs to the sides by means of strips of bandage passed across the body and tied below the bed.

These limitations of movement, though frequently essential, are merely protectives, and at the same time benefit may usually be gained from fairly large doses of chloral hydrate, or, when dealing with adults, of some form of morphine. In these maniacal cases tepid sponging may also be every beneficial, more particularly when there is some rise of temperature; and if these measures fail, still further soothing influence may result from the use of the wet pack,

provided that indications of grave cardiac lesions are absent. The danger in the maniacal form of chorea is twofold, depending partly on hyperpyrexia, partly on exhaustion. Hence, the treatment must be directed toward the reduction of fever whenever the temperature is raised, as well as toward the arrest of movements, so as to facilitate the administration of food.

With adults it is sometimes necessary to employ chloroform vapor to insure rest, but this obviously is only a temporary measure, and must be followed by the administration of some other sedative. If there are any contraindications to the use of morphine, hyosine and hyoseyamine may be injected subcutaneously to produce sleep; while in less exaggerated forms of the disease, preparations of belladonna occasionally serve to quiet restlessness. Among other remedies that have been employed in the treatment of all types of chorea may be mentioned antipyrine and antifebrine. The evidence of their value is somewhat conflicting. My own experience is that, even when given in doses sufficient to produce cutaneous rashes, these drugs have not appeared to influence the severity of the attack or its duration.

During convalescence change of air, as well as the use of tonic remedies, is of frequent service, and in children a mild course of gymnastic exercises will often serve to develop greater precision of movement and more power of control.

It should, perhaps, be mentioned that the cardiac murmurs which are so frequently heard during the height of an attack of chorea do not call for the employment of any of the so-called cardiac tonics. In a large proportion of cases these murmurs appear to be functional, and they disappear during convalescence; and, on the other hand, even when they are evidently the result of endocarditis, either recent or developed during the course of the attack, they do not necessitate modifications of treatment, provided that the patient is already being kept absolutely at rest.

In conclusion, it may be well to warn patients and their friends of the risks of recurrence of chorea under conditions of excitement, or as the result of exposure, or of the further development of the rheumatic taint.

Epilepsy. This disease is marked by the occurrence of attacks of unconsciousness of short duration, which are sometimes, but not invariably, accompanied by convulsions. The chief characteristic of the epileptic seizure is the short duration, which renders most

attempts to treat the patient during the attack absolutely futile. The attacks commonly occur with very short warning, and the utmost that can be done is to adopt measures to protect from injury during the convulsive seizure. With the onset of the epileptic seizure the patient should be placed upon the floor, or in a horizontal position on a bed or couch, provided that assistance is at hand to prevent him from falling during the irregular spasmodic movements. If available, a piece of cork or of hard india-rubber should at once be placed between the teeth, so as to diminish the risks of injury to the tongue during the fit. In some published instances the handle of a spoon is said to be sometimes used with the same object, but this may serve to loosen or even break the teeth. A piece of soft wood might be substituted, but in a large number of cases the tongue is injured quite at the commencement of the attack, and any precautionary measure is, therefore, of little service.

When the fits succeed each other with great rapidity and the patient is in a hospital, amyl nitrite may be administered by inhalation; but in general, even in hospitals, the fit is often over before it is possible to employ this remedy, and, therefore, it is scarcely necessary to consider any treatment except that to be adopted with the view of reducing the frequency of the fits.

Occasionally careful inquiry will demonstrate some probable reflex cause of irritation which is capable of correction. These epileptic seizures may commence during dentition, or in older children they may occur from reflex intestinal irritation due to entozoa, and the discovery of this condition will naturally lead to the adoption of the appropriate measures. More rarely the fits appear to be connected with the irritation due to an adherent prepuce, while some cases of reflex irritation from foreign bodies in the external auditory meatus, or from accumulations of cerumen, have been described. In other instances, again, the epileptic seizures can be traced to some injury, as, for example, some fall or blow upon the head, which may have fractured the inner table of the skull, and thus caused cortical irritation. In the large proportion of cases, however, no definite reflex cause can be traced, and the range of possible treatment is thus considerably limited.

In the milder forms of epilepsy—those unassociated with convulsive seizures—the fit frequently occurs during sleep, and thus may escape observation until in all probability the epileptic condition has lasted for a great length of time. After the occurrence of

one definite epileptic seizure, these nocturnal fits may be suspected when, on first rising, the mental condition is somewhat obscured and the individual is somewhat drowsy throughout the day. On account of the frequency of nocturnal fits in this disease the dietary requires attention; heavy suppers or indigestible articles late in the day should be avoided, since if digestion is not complete at bedtime the food may serve as a source of reflex irritation. Even with more marked forms of epilepsy it is advisable to encourage the use of a light, moderate, and easily digested form of diet, and to lay stress upon the importance of regularity of meals as well as of life and occupation. There is no doubt that the epileptic tendency is to a large extent influenced by business worries or other forms of mental excitement.

The medicinal treatment is usually only palliative. It is extremely rare for an epileptic to be entirely cured by any treatment, unless perhaps the cause of irritation can be removed by some surgical measure; but, on the other hand, with the continuous use of different bromides the frequency of the epileptic seizures can be greatly reduced, and enormous quantities of bromide may be tolerated, and may even be required to keep the disease in check. Of the three principal bromides employed in medicine—sodium bromide, potassium bromide, and ammonium bromide—the potassium bromide is perhaps the most largely employed, though of recent years there has been a great tendency to discontinue this drug in favor of the others.

Potassium bromide is often credited with the power of producing intense depression, both of the circulatory and of the nervous system, this depression being ascribed mainly to the potassium, and it has been asserted that ammonium bromide is free from this objection, being indeed stimulant rather than depressant; while sodium bromide is neither stimulant nor depressant, and may, therefore, be employed without reference to any deleterious action upon the circulatory or the nervous system. I have for many years endeavored to test the truth of these supposed distinctions of action, and my experience has convinced me that after the prolonged use of any one of these remedies there may be some advantage in change to any other; thus, even after ammonium bromide has been employed for some months with a certain degree of benefit, still greater benefit will appear to follow the use of either sodium or potassium bromide.

I have also employed various combinations of these three drugs, and the conclusion that I have arrived at is that to some extent the benefit of change of medicine depends not so much upon the drug employed as upon its moral effect. In all probability, after taking any of these drugs for weeks, or months, a change of medicine will at any rate introduce the element of hope.

In the treatment of epilepsy with bromides, the dose should be increased until mild symptoms of bromism arise. Ten to 30 grains of any one of the bromides may be administered three times daily, and, with toleration, these quantities may often be greatly exceeded. Although bromides are commonly administered with syrup of orange or of lemon, the unpleasant taste is scarcely concealed by the syrup, and patients frequently prefer to be supplied with powders containing the prescribed dose, and to dissolve the powder in some effervescent water, such as soda water, or even perhaps in milk, when the saline taste is by no means unpleasant.

In the course of treatment of severe cases of epilepsy it is often imperative to continue the use of bromides almost indefinitely, since whenever their administration is checked the seizures become more frequent. Even when the disease appears to have been cured, and when long periods elapse without the recurrence of fits, the bromide should still be administered for a year or more after the date of the last fit.

Numerous other remedies have been recommended for this disease, and the best is perhaps one of the compounds of zinc, preference being generally given to the sulphate or the acetate. In the *United States Pharmacopœia* zinc bromide occurs, and this has been employed in doses of from 1 to 25 grains; but Sir William Gowers states that it appears to be of little value and to be badly borne. The dose commonly recommended is from $\frac{1}{2}$ to 2 grains.

In the form of nocturnal epilepsy, chloral hydrate has been employed in hypnotic doses at night-time; in other cases smaller doses may be repeated during the day. This drug does not, however, appear to be possessed of any curative properties for this disease, though it may perhaps moderate the violence of the paroxysms. Nitroglycerin has also been recommended on theoretical grounds, but the reports of its action in epilepsy afford little encouragement. It may, however, be tried during intervals, when it has been deemed desirable to check the administration of bromides for a time. Cannabis indica is credited with having been of some ser-

vice, but this drug frequently varies in strength to such an extent as to render its employment for epilepsy somewhat dangerous.

When an epileptic seizure is preceded by a definite aura proceeding from one or other of the extremities, the fit may be occasionally averted by the forcible application of a ligature above the site of abnormal sensation, and in these cases benefit sometimes appears to ensue from the application of blisters along the course of the nerves through which the aura proceeds. In a very large proportion of cases of epilepsy, however, these warning sensations are absent, or are so rapidly followed by the seizure that there is no time for the adoption of any local measures, and the utmost that the epileptic patient can do is to place himself in some position of safety with the first warning of the attack.

Reference has already been made to the surgical treatment of epilepsy and to the occasional cures which have ensued after the removal of a depressed portion of the skull which had been irritating the cortex of the brain. Independently, however, of histories of injury, when the aura has been found always to be referred to the same site, attempts have been made to relieve epilepsy by the removal of the nerve centre. The propriety of this operation is, however, somewhat doubtful, and the possible prospects of relief, together with the dangers incurred, should be discussed in every case as it arises.

Locomotor Ataxia. The presence of a definite lesion in this disease and the common absence of any certain indication of the origin, render treatment somewhat hopeless. The lesion, which affects the posterior columns of the spinal cord, is not directly amenable to treatment, although in some rare instances the progress of the disease has appeared to be retarded by the measures adopted. The most hopeful cases are those in which there is a distinct history of syphilis; and since such a history can be obtained in a fairly large proportion of cases, antisyphilitic treatment should be adopted whenever the patient comes under observation at a fairly early stage. With more chronic cases the treatment has to be directed mainly to the relief of the more prominent symptoms, and of these the chief are the lightning pains and the so-called gastric crises.

Observation has shown that both mental and bodily fatigue are capable of exerting a prejudicial influence upon those who are suffering from locomotor ataxia, and accordingly, with the view of retarding the progress of this disease, all occupations or conditions

which promote bodily and mental strain should be altered. In a fairly large number of those affected, however, the intellect remains clear, and, provided that the occupation can be pursued without overstrain and worry, it is better not to encourage a life of total inactivity. All forms of excess should be avoided, and the necessity of leading a quiet, equable life should be impressed upon the patient.

It is sometimes found that the disease appears to be retarded by a short course at a hydropathic establishment; but there is little reason to doubt that it is the regularity of life there that contributes very largely to the success of the treatment.

Of the curative agents that have been recommended silver nitrate is perhaps the one which has been most largely employed. This may be given in comparatively large doses for a great length of time; but there are two great objections to its continued employment—the development of a bluish tint in the skin and the probable supervention of symptoms of gastric irritation. To avoid the latter discomfort the oxide is sometimes used; the former symptoms, however, is not influenced by this change, as it appears to be dependent upon the total quantity of silver that has been used medicinally, although the amount of the doses employed at any given time has very little influence. Hence, with the slightest tingeing of the skin both the nitrate and the oxide must be discontinued.

Extract of *physostigma*, in doses of $\frac{1}{4}$ to $\frac{1}{3}$ grain, has been given in this as in many other spinal affections. I have known it to be employed over several years; but, although it serves to satisfy the craving for treatment, I am afraid that it has not done much, so far as my observation goes, in the way of retardation, still less of cure.

Arsenic has also been employed, with the view of obtaining its alterative and nervine tonic effects; while ergot and chloride of gold have also, at various times, been strongly recommended.

As already indicated, the most hopeful treatment at the commencement of the disease consists in the administration of corrosive mercuric chloride and potassium iodide—the former, if there appears to be some probability that the patient has suffered from syphilis, and has been insufficiently treated; the latter, if he has already exhibited symptoms of tertiary syphilis. In cases of doubt the two are frequently used in combination, $\frac{1}{32}$ grain of corrosive mercuric chloride being given with from 10 to 15 grains of potassium iodide. The amount of iodide may, however, be increased when it is admin-

istered alone, but it is desirable to watch carefully for signs of iodism or for any interference with the appetite or digestive power, since these symptoms may frequently follow during the administration of large doses of potassium iodide.

Not many years ago attempts were made to influence the changes in the spinal cord by the "treatment by suspension," and the accounts of the results obtained were so laudatory that for a length of time most patients with locomotor ataxia were treated on this principle. The *rationale* of the treatment was explained as depending upon extension or elongation of the spinal canal, owing possibly to some increased stretching of the intervertebral substance, and owing, also, to a resulting straightening-out of the normal spinal curves, which caused an appreciable increase in the length of the spinal canal. This treatment is now comparatively rarely employed, and in spite of the advantages which have been claimed for it, it appears possible that the benefits attributed to its use might perhaps be referred either to a cessation of the severity of the pains and other prominent symptoms, which might have occurred with or without the treatment, or else to the results of a psychical influence, akin perhaps to that of suggestion during hypnotism.

Turning next to the treatment of special symptoms occurring in the course of this disease, the lightning pains which arise at a comparatively early stage are primarily to be dealt with by absolute rest in the recumbent posture. When extremely severe and of long duration, they may call for the subcutaneous injection of morphine. In general, however, it is advisable to avoid the employment of morphine, since, as the disease develops, its hopelessness renders the use of morphine peculiarly dangerous. If possible, it is better to control the pains by other measures, such as the employment of counter-irritation along the course of the affected nerves by a line of flying blisters, or by the application of stimulating liniments. The actual cautery has sometimes been recommended, with the view of producing counter-irritation; but the pain of this treatment is, perhaps, almost as severe as the condition which it is intended to relieve. To some extent the pains may be diminished by warm fomentations along the course of the nerves affected, and occasionally the use of a vapor or a Turkish bath may give considerable relief. It should be remembered that the lightning pains of locomotor ataxia sometimes cease quite abruptly, independently of treatment, and the practitioner should, therefore, be upon his guard

against attributing the cessation of pains to any particular measures that may have been adopted, and consequently expecting similar benefits always to follow the employment of the same remedies under similar conditions.

The gastric crises may sometimes be relieved by the use of ordinary gastric sedatives, such as bismuth and hydrocyanic acid, and by the adoption of a carefully regulated diet. Frequently, however, the symptoms continue in spite of these measures and necessitate the employment of morphine in fairly large doses.

Occasionally, in the course of this disease, laryngeal crises may occur. These are characterized by spasm of the glottis, which induces considerable dyspnoea and noisy respiration. These symptoms, though alarming, are not usually dangerous, although an instance has been mentioned in which the patient died during the attack. The reflex spasm may be relieved by the application of cocaine, either as a spray, or, if more convenient, by the direct application with a brush of a 2 or 4 per cent. solution. Frequently, however, it is far easier to administer chloroform during the attack, or to cause the patient to inhale amyl nitrite; under either of these forms of treatment the spasm will often be reduced.

In the late stages of the disease bladder symptoms are likely to arise and necessitate the frequent employment of the catheter, since expulsive power is so greatly diminished. It is convenient when the patient can be taught how to employ the catheter himself, but the risks attending upon lack of cleanliness and care in sterilizing the instrument should be fully explained to him, since otherwise severe cystitis may result.

Infantile Paralysis. Infantile paralysis forms the frequent sequel to an attack of convulsions, but it is comparatively rare for the condition to be recognized at the commencement of the disease. In general, it is found that the paralytic condition is only noticed as the child becomes older.

The disease depends upon degenerative changes affecting the gray matter of the cornua of the spinal cord. Sometimes the onset is marked by febrile symptoms, and sometimes the paralysis is developed gradually, the condition being at its worst within twenty-four hours from the commencement; after this period some degree of improvement may gradually follow, though special groups of muscles in one or more limbs may remain affected.

The early treatment will probably have to be undertaken before

an accurate diagnosis has been made, and it should involve the use of diaphoretics or purgatives and the maintenance of absolute rest.

When the paralytic element has been recognized, various forms of treatment may be adopted. At the commencement of the affection massage or friction of the affected muscles will frequently be of service, and these measures will serve to some extent to maintain the nutrition of the affected muscles and perhaps to influence the electric reaction of the muscle.

With the view of promoting efficient friction of the limb it is well to advise the inunction of some stimulant application. Among out-patients at the Evelina Hospital, I have frequently used mercurial applications, and advised that these should be rubbed in after the child has had a warm bath. I do not attach much importance to the special form of ointment or of liniment employed, but consider that the value of inunction depends mainly upon the stimulation of the muscle by friction.

The internal medication to some extent is regulated by the condition and age of the child. Frequently tonic and nutritive remedies, such as cod-liver oil or the compound syrup of the hypophosphites, will be of service; and for older children, or for those brought for treatment some time after the condition has been in existence, other tonics, such as salts of quinine or of iron, or liquor potassii arsenitis, may be beneficial. In the early stages, however, potassium iodide and potassium bromide appear to give somewhat better results, the bromide being used to allay nervous irritation, rather than from any dread of the recurrence of convulsions.

Power in the affected limb may sometimes be promoted by the use of electricity, and this treatment should be commenced as early as possible. Interrupted galvanic currents are of some service from the outset of the disease; the faradic current may also be useful for the muscles that are only slightly affected and still respond to faradic stimulation. For those which fail to react to the faradic current an interrupted galvanic current should be used daily, and the best results are obtained when alternations of the current are found to cause contraction of the muscle. These electric applications should be made solely over the affected limb or muscle, since it does not appear that any advantage lies in the attempt to pass the current through the spinal cord. Infantile paralysis is often productive of serious deformities which require treatment by suitable apparatus and not uncommonly call for operative interference.

Neuralgia. Neuralgia is so frequently symptomatic of some constitutional affection that it is essential to consider the treatment with due regard to the cause to which the individual case is to be assigned. The treatment, therefore, should primarily be directed to the relief of various constitutional conditions, and secondarily to that of the special form of neuralgia from which the individual suffers. For the latter purpose the remedies employed include drugs which are given internally as well as the adoption of local treatment.

Very frequently neuralgia is found to arise as an indication of anæmia, or at least in connection with this condition. In these cases the primary indication is to adopt measures for the relief of anæmia; indeed, treatment which ignores this condition is not likely to be successful. The treatment of anæmia ordinarily involves the employment of some form of iron or of arsenic, or the two may be given in conjunction, either as iron arsenate, or, if desired, iron arsenate may be made into a pill, either with ferrous sulphate or with the saccharated iron carbonate.

Hygienic measures must, as a rule, be simultaneously employed, such as exercise in the open air, change of air from town to country, or even seaside, the benefit being also due generally to the change of society and of occupation which absence from home ordinarily involves.

When the appetite fails it may be promoted by small doses of *nuxvomica*, strychnine, or quinine, which may be given together with the iron as a pill. The treatment of anæmia and of chlorosis has, however, been already dealt with so fully that it is unnecessary now to enter into greater detail. In neuralgic patients anæmic conditions are, however, frequently a prelude to neurasthenia, which in some of its forms is intimately linked with neuralgia. This may entail the use of the Weir Mitchell treatment, either in its complete form or in such modification as may seem to be advisable. The Weir Mitchell treatment involves the complete separation of the patient from her friends, together with absolute rest, over-feeding, and massage. Unless the neurasthenic element is very strongly marked and the patient is in a condition of great emaciation, this treatment may be much modified; thus, for instance, it is often found that massage and over-feeding will together produce considerable benefit.

Closely connected with this type of neuralgia is the form which ensues with nervous exhaustion after prolonged overwork. These

patients require rest, or, preferably, change of occupation, since, in general, enforced mental inactivity leaves the mind to brood, and perhaps, by introspection, to develop new symptoms; while these undesirable conditions may be avoided by the substitution of some new interest. I have often with good effect advised bicycle riding in this form of neuralgia, and the benefit seems to be largely the result of the necessary diversion of attention from ordinary business worries or other sources of annoyance.

Different forms of neuralgia are frequently associated with other constitutional conditions, such as may result from malaria, from gout, or from rheumatism; and the treatment for these respective conditions, by the administration of quinine, of salicylates, or of alkalies, iodides, and colchicum, must be determined by the consideration of each individual case. In most of these conditions, anæmia will demand attention, but the use of tonics is rendered more effectual when specific treatment is simultaneously employed.

Should there be a distinct history of syphilis, mercurials or iodides should be used, either singly or in combination, according to the stage of the disease and the previous treatment for this condition.

Turning next to the remedies which may be employed at the time of an attack, with the view of giving immediate relief from pain, the most important perhaps consists of the group of so-called antipyretics—antipyrine, acetanilide, and phenacetin. The value of these remedies has been widely recognized by the public, and has led to their somewhat indiscriminate and incautious employment. It must not be forgotten that there are certain risks attendant upon the employment of overdoses of these aniline derivatives, and these dangers may be increased, even when medicinal doses are employed, if exercise is indulged in immediately after the drug has been taken.

Phenazone or antipyrine may be given in doses of from 5 to 20 grains; acetanilide or antifebrine in doses of from 1 to 3 grains; phenacetin in doses of from 5 to 10 grains. After the employment of any of these remedies the patient should be instructed to remain in a recumbent posture for a few hours, as otherwise considerable depression of the circulation may ensue, and larger doses may be required for the relief of pain. I have known clergymen and barristers who were in the habit of taking comparatively large doses of these drugs to enable them to perform their duties in spite of an attack of neuralgia, and in general, although the appointed task has been fulfilled, considerable subsequent depression has resulted.

These remedies are of the greatest value in forms of neuralgia affecting the head and leading to migraine. If used under such conditions, a fairly large dose should be taken at the commencement of the attack, and should, if necessary, be followed by a smaller dose after three or four hours.

Recently exalgine has come into considerable favor for the treatment of various forms of neuralgia. This drug is sparingly soluble in cold water, though it dissolves readily in diluted alcohol, or in the presence of an equal weight of sodium salicylate. Like the foregoing, if used recklessly, it is likely to produce much palpitation and physical prostration, accompanied by intense pallor. This drug has been found to be of considerable service in numerous forms of neuralgia, especially in those associated with a rheumatic or gouty diathesis, but if employed for any length of time the dose must be increased. Ordinarily from 3 to 5 grains are administered three times a day, this dose being employed either in solution with sodium salicylate, or dissolved in some form of alcohol, or administered in capsule.

Potassium bromide and caffeine citrate are often used by those who suffer from repeated attacks of neuralgia of the type of migraine, while in cases of neuralgia of the fifth nerve butyl chloral hydrate is frequently used. The latter drug is credited with special power of controlling neuralgia of the fifth nerve, but it is not always successful, even when the usual dose is considerably exceeded.

Butyl chloral hydrate is often given in combination with gelsemium, $\frac{1}{4}$ or $\frac{1}{2}$ grain of the alcoholic extract being made up in pill form with 2 or 3 grains of butyl chloral hydrate; the tincture of gelsemium may also be administered alone, in doses of from 5 to 15 minims.

Cannabis indica is another drug which is frequently used; and the extract, in doses of $\frac{1}{4}$ to 1 grain, may be given with butyl chloral hydrate three or four times a day. It is well to remember, however, that this preparation is of variable strength, and it is accordingly always advisable to commence with small doses, since toxic symptoms may readily be induced.

Nitroglycerin has been recommended as an antineuralgic, especially in cases of inveterate sciatica. It can best be given in a 1 per cent. alcoholic solution, of which the dose is about 3 drops per day, or the following formula may be employed :

R.—Spiritus glonoini	℥lxxv.
Tincturæ capsici	ʒjss.
Aquæ menthæ piperitæ	q. s. ad ʒss.

S.—Five to 10 drops in water three times a day.

The different members of the belladonna group are also occasionally employed internally for the relief of neuralgia, and of these extract of belladonna is the most constant in strength, and, therefore, the most reliable. Preparations of belladonna are, however, more frequently employed externally than internally for this condition. For the hysterical forms of neuralgia preparations of valerian are often useful, and of these zinc valerianate is perhaps of greatest service if given in conjunction with quinine and iron. Zinc valerianate, in doses of from 1 to 3 grains, is commonly administered as a pill, on account of its slight solubility in water.

Preparations of cimicifuga have long been credited with the power of controlling neuralgic pains, more particularly those associated with a rheumatic tendency. There are three official preparations of cimicifuga—the fluid extract, to be given in doses of from 5 to 30 minims; the tincture, in doses of from $\frac{1}{2}$ to 1 fluidrachm, and the extract, in doses of from 1 to 5 grains.

For the relief of that form of neuralgia which occurs as the result of excessive mental application, and which does not appear to be connected with any special diathesis, phosphorus may sometimes be employed. The phosphorus pill of the *Pharmacopœia* contains $\frac{1}{100}$ grain of phosphorus in each pill; while the phosphorated oil—a solution of 1 per cent. of phosphorus in almond oil—may be given in doses of from 1 to 5 minims. Although many observers speak highly of this remedy, it has not given very satisfactory results in my hands, and I feel considerable doubt of its therapeutic value. Possibly some of the benefits ascribed to phosphorus should more correctly be attributed to the cessation of mental work or to some other active remedy given in combination, such as quinine or nux vomica, than to the phosphorus.

Various local measures may be used in addition to the foregoing. These necessarily are only employed at the time of the attack, while many of the forms of internal treatment already mentioned should be continued during the intervals between separate attacks, although they may require to be given in larger doses during the time of pain. Relief may frequently be obtained by measures which affect the local circulation, and in any individual case it is often impossible to say

whether greater benefit will follow from the application of cold or from measures calculated to increase the size of the vessels. As a rule, cold applications produce more immediate relief, though this may not always prove to be of a lasting nature.

Pounded ice, or a mixture of pounded ice and salt, may occasionally be extremely beneficial when the nerve affected is superficial; cold may also be produced by the rapid evaporation of ether or of methyl chloride. The last-named should be used only for a few seconds at a time, on account of the tendency to cause sloughing if the application is more prolonged.

With more deep-seated forms of pain, relief may sometimes be obtained by the application of warm poultices, or of other forms of counter-irritation, such as blistering fluids or a blistering plaster. Any of these forms of counter-irritation must, however, be used somewhat tentatively, since they frequently increase the pain instead of diminishing it.

Of the local anodynes, menthol is perhaps the favorite in the mild forms of neuralgia. Aconite is, however, frequently employed, but it is wholly unsuitable when the neuralgia affects the face, on account of the extreme frequency with which œdematous swelling ensues after its application. Even when applied at a considerable distance from the eyes I have known intense ocular pain and irritation ensue from the use of aconite.

For neuralgia affecting the intercostal nerves or the sciatic nerve the tincture of aconite is, however, a valuable remedy, speedily producing a local tingling and then numbness, which replaces the pain. In extreme forms of neuralgia morphine is sometimes injected locally. It should be remembered, however, that neuralgia frequently occurs under conditions when the formation of a drug habit is likely to be a temptation; hence, it is well to defer the use of morphine if possible. The same remark applies to the local injection of cocaine. The frequency with which neuralgic attacks recur increases the tendency to self-medication.

In some intractable forms of neuralgia relief is occasionally afforded by the deep injection of a small quantity of pure water, while in sciatica and lumbago acupuncture has frequently been employed; this consists in driving a stout needle deeply into the tissues in the course of the affected nerve, so as, if possible, to reach the nerve.

Numerous surgical measures have been recommended at various

times for the relief of obstinate forms of neuralgia, and these vary in severity according to the nature of the case. The affected nerve may be stretched or a portion of the nerve may be removed, and some success has been claimed for the removal of the Gasserian ganglion. It must be admitted, however, that frequently, in spite of these somewhat formidable operations, the neuralgic pain returns and has yet to be controlled, either by medicinal means or by hypnotic suggestion.

CHAPTER XVII.

NERVOUS DISEASES—*Continued.*

Headache—Insomnia—Alcoholism—Acute Alcoholism—Chronic Alcoholism—Alcoholic Neuritis—Delirium Tremens—Apoplexy—Meningitis—Tubercular Meningitis.

Headache. In the preceding pages numerous references have been made to headache, and it will perhaps be helpful to summarize here the chief conditions under which this symptom may arise.

Headache may be dependent upon disorders of the digestive system, disorders of the circulatory system, of the nervous system, or of the kidneys, and it is frequently symptomatic of different febrile affections, as, for example, of typhoid fever.

It is obvious from this brief enumeration that the treatment must depend upon the cause. Attempts are often made to distinguish the different forms of headache by the area affected; thus, frontal headache has been considered to be of digestive origin; headache affecting the vertex has been referred to defect in the blood-supply, either resulting from alterations in the blood, as, for example, anæmia and chlorosis, or from alterations in the character of the circulation; while occipital headaches have been commonly ascribed to neuralgic conditions or to other changes in the nervous system. Although these distinctions are occasionally of service, they are extremely arbitrary; and many forms of headache of nervous type may affect the frontal region or even the vertex, while digestive headache is frequently of a diffuse character which defies accurate localization.

The headache which results from constipation and that which is dependent upon deficient action of the kidney may be regarded as due to defective elimination or at least to the retention of some toxic material. Both these forms of headache are to be treated by eliminative measures, the former by mild purgatives, the latter by purgatives and perhaps also by diaphoretic measures. The headache of dyspepsia is, in addition, to be dealt with by the use of alkaline remedies and by gastric sedatives whenever there is any indication of defective gastric function. On the other hand, although the headache of anæmia is best treated by hæmatinics and by tonics, these

remedies are employed specially for the cure of the anæmia, and other local or general sedatives may be adopted for the immediate relief of the headache.

The headache of febrile affections is, in all probability, comparable to the toxic forms of pain above mentioned, and is dependent upon the presence of waste products in the blood. Frequently very little can be done to relieve this form of headache; for example, in typhoid fever the pain may perhaps be reduced by quiet and by the avoidance of mental excitement, and sometimes antipyretic measures are found to be beneficial. In general, however, the adoption of these measures is determined rather by the high fever than by the amount of headache.

In disease of the kidneys persistent headache appears occasionally to depend upon high blood-pressure, and this may be relieved by the use of nitroglycerin or of erythrol tetranitrate. These remedies are of the greatest service when headache arises in connection with cirrhosis of the kidney, but they are less valuable for the relief of the headache of acute nephritis or of that which occurs during the exacerbations of chronic nephritis, these conditions being more likely to give rise to headache of a toxic nature than to headache of high tension.

The headache primarily dependent upon affections of the nervous system is perhaps the form which is most readily amenable to treatment. When caused by excessive mental strain, and especially if associated with sleeplessness, hypnotics and sedatives may be of considerable service. As a rule, it is better to avoid the use of opium for the treatment of headache, since, by favoring constipation and other dyspeptic troubles, it may increase the discomfort, even though it affords temporary relief. Small doses of chloral hydrate and ammonium bromide are frequently of great service for the headache of worry and sleeplessness; this condition, however, often necessitates the cessation of ordinary occupations and change of surroundings.

The following mixtures may be prescribed:

R.—Potassii bromidi	gr. x.
Ammonii carbonatis	gr. iiij.
Aquæ menthæ piperitæ	℥j.
R.—Potassii bromidi	gr. xx.
Tincturæ cardamomi compositæ	℥x.
Aquæ cinnamomi	q. s. ad ℥j.

Although it is not usual to combine strychnine and a bromide, the following occasionally proves valuable :

R.—Potassii bromidi	gr. xv.
Ammonii chloridi	gr. xv.
Strychninæ hydrochloratis	gr. $\frac{1}{3}$.
Infusi gentianæ compositi	ʒj.

The form of headache which has been described as nervous is sometimes fairly rapidly relieved by the use of acetanilide, phenacetin, or phenazone, which should, however, be employed under medical advice only and taken when the patient can go to bed or remain at rest after the use of these drugs. These remedies will sometimes relieve the form of headache described as migraine or megrim, but for this condition rest is essential ; frequently, also, caffeine may be found to be of service. In attacks of migraine this drug may be prescribed with sodium salicylate :

R.—Sodii salicylatis	gr. xx.
Caffeinæ citratæ effervescentis	ʒij.

Ft. Dosis. To be taken in half a wineglass of water, and repeated every two or three hours until the headache is relieved.

Migraine is, however, to be regarded as a condition in which the individual temperament plays an important part, since remedies which may be highly successful for some patients fail absolutely with others. It is well known that with some forms of migraine relief follows the act of vomiting, and measures to promote this may sometimes be of service. In every case, however, relief ensues with sleep, and accordingly the patient instinctively retires to a darkened room to try to procure sleep. Every now and then, however, it will be found that the horizontal position appears to increase rather than to diminish pain, and under such circumstances greater relief is often obtained by the use of evaporating lotions of menthol than from any of the above-mentioned drugs.

Although headache is frequently best dealt with by rest, yet when it results from incessant mental application or from prolonged bodily inactivity, brisk muscular exercise is often of considerable value, partly perhaps on account of the aid to the eliminative work of the various excretory organs and partly from the change of occupation enforcing repose for the overworked portions of the brain. If headache returns whenever the patient attempts to undertake any study, the possibility of ocular affections should be borne in mind ; the sight

should be carefully tested, and any errors of accommodation should be dealt with by appropriate spectacles.

The headache of the gouty diathesis is, as a rule, best treated by purgatives and by exercise, though many observers strongly advocate the use of sodium salicylate and the avoidance of animal food.

Insomnia. Insomnia is symptomatic of so many conditions that, although it is not to be regarded as a disease, it may save time and reference to different parts of this book to consider the treatment of this symptom in one place.

No treatment of insomnia is satisfactory which ignores the conditions under which the symptom arises. It may originate in some trifling error of diet or of habit, or it may be a symptom of some serious organic disease, and it is obviously impossible and irrational to deal with all forms of insomnia by the routine administration of hypnotic remedies without endeavoring to ascertain the exciting cause. With regard to the errors which are capable of alteration, the chief, perhaps, are those which depend upon consumption late in the evening of some indigestible article of diet or some cerebral stimulant. Strong tea, or strong coffee, will frequently cause insomnia, and a full meal taken late at night may have the same effect. On the other hand, however, sleeplessness sometimes results from an insufficiency of food. Those who dine early and work late at night frequently suffer from sleeplessness, which can readily be controlled either by discontinuance of work for an hour or so before retiring to rest or by taking some slight nourishment just before going to bed.

Those who lead sedentary lives are apt to be troubled by weak circulation, and may suffer from sleeplessness produced by deficient circulation through the feet—a condition which may be prevented either by sitting with the feet in a rug, or by wearing warmer clothing, or by some hot drink taken late at night. Sleeplessness arising from this cause can often be treated satisfactorily by drinking a small quantity of hot water or hot milk, or by taking a brisk walk shortly before retiring to rest. Should these measures fail, a hot-water bottle will sometimes succeed, or benefit may be derived from bathing the feet in hot water and either wearing warm woollen socks or sleeping between blankets.

When the habit depends upon disorders of digestion, such as acidity, or upon habitual constipation, these conditions can readily

be dealt with, the former by the use of a little sodium bicarbonate with hot water, the latter by purgatives.

Sleeplessness frequently ensues when the occupation involves intellectual work which is continued until bedtime. This can only be satisfactorily dealt with by total alteration of habits of work. Some individuals may find the cessation of the ordinary occupation and a short period spent over light literature suffice to distract the attention from the engrossing thoughts of the day. Some find that tobacco will exert a sedative influence, though for others the result of smoking is to cause palpitation and sleeplessness. For the emotional causes, which include a considerable number of the victims of insomnia, it is impossible to lay down any general rule for guidance. Change of air and scene may perhaps be beneficial in some cases, but the curative value of time cannot be ignored.

When sleeplessness depends upon the existence of pain of a physical character, appropriate remedies must be employed, according to the cause, if the condition is one which is capable of being dealt with either by surgical or other remedial measures. Should it be impossible, however, to afford relief in this way—as, for example, in cases of cancer of some internal organ—a narcotic must be used; the only drug which can really be trusted to relieve pain sufficiently to promote sleep is opium in its various forms. This is almost the only condition in which it is permissible to employ opium or morphine as a matter of routine, while for the more simple forms of insomnia, independently of any definite structural disease, it is better to resort to some other remedy which is less likely to give rise to the formation of the drug habit.

When sleeplessness depends upon prolonged mental activity or anxiety, potassium bromide or ammonium bromide may be employed with considerable success, and there is comparatively little risk in connection with these drugs, provided that their use is interrupted from time to time and discontinued at the earliest possible moment; in fact, in the treatment of all forms of insomnia, independent of structural disease, the leading principle should be to check the habit of wakefulness and then to discontinue the use of the drug. With potassium bromide it is especially important to check the administration at an early date, since, if used every night, the dose employed must be increased, and, notwithstanding the sleep resulting from its use, the patient is apt to become depressed and morbid.

These dangers are still greater in connection with chloral hydrate,

which is frequently used for the relief of insomnia. When chloral hydrate is given alone and only occasionally employed, its effects will probably be beneficial ; but when the sleeplessness is the result of neurasthenia or of other emotional disturbance the dose of chloral hydrate is likely to be gradually increased and the chloral habit established. Chloral hydrate should not be used for patients suffering from weakness of the heart, nor should it be employed on successive nights. In neurotic patients I have often seen great disadvantage resulting from the injudiciously repeated use of chloral hydrate. The dangers of this drug may, perhaps, be somewhat reduced by its combination with ammonium bromide, the unpleasant taste of the latter diminishing the temptation to the formation of the drug habit.

Reference has already been made to the value of opium and of morphine for inducing sleep when rest is disturbed by the existence of pain. These drugs are also frequently of considerable service for the relief of sleeplessness at the commencement of mild febrile attacks, and for this purpose they possess special value on account of their diaphoretic action. At the commencement of a feverish cold there may be restlessness so long as the skin is hot and dry, while as soon as it becomes moist, as the result of a full dose of powder of ipecacuanha and opium, the patient usually sinks into a quiet sleep. Opiates are obviously only required occasionally for this purpose, and should certainly not be persisted in night after night, even in conditions of feverishness. When repeated use is recommended for any special reason, the after-effects of opium must be kept in mind, and the dose should either be regulated so as to produce as little discomfort as possible, or, if a large dose is required, some corrective must be subsequently used to prevent headache, nausea, or constipation.

For the persistent wakefulness of some forms of insanity morphine is occasionally used hypodermatically, but its disadvantages are so great that many other drugs are generally used in preference ; indeed, many of the newer hypnotics have been employed primarily for the relief of the insomnia of insanity. Foremost among these must be mentioned hyoscine hydrobromate, the early history of which was largely connected with experience in lunatic asylums. This drug, however, has now much extended its sphere of usefulness, being employed under many of the conditions of sleeplessness where opiates, morphine, and chloral hydrate are distinctly contraindicated ; thus, for example, in the sleeplessness due to chronic renal disease, or to other conditions leading to high tension, hyoscine is extremely

serviceable, and although, like many of the hypnotics, it sometimes fails, yet it is often found that even very moderate doses suffice to break the habit of sleeplessness.

This drug is of particular service also in connection with delirium tremens, since in this disease the condition of the heart, and frequently the diseased condition of the kidneys, render the use of opium and of chloral hydrate somewhat dangerous. On account of the delirium which is sometimes excited by the hyoscine, and also on account of the frequent desire to avoid hypodermatic administration, hyoscine is generally only used in these somewhat special forms of insomnia, while for many forms connected with advancing years and requiring the repeated administration of some hypnotic remedy, sulphonal or paraldehyde is more likely to be selected.

The use of sulphonal is attended by sundry difficulties, the chief being its insoluble character, which not only influences the mode of administration, but affects also the rate of absorption, and hence the rapidity of action. Sulphonal may be given with hot bread and milk or hot gruel, or it is frequently stirred up with a little hot broth. The dose should be taken half an hour or more before retiring to rest, since if taken at bedtime it frequently fails to induce sleep, and its slow absorption renders the patient somewhat drowsy during the following day. In addition, sulphonal occasionally, especially in large doses, may produce mild ataxic symptoms and a staggering gait. On account of the relative solubility of this drug in alcohol many prefer taking the small dose of 10 or 20 grains with hot whiskey and water during the course of the evening, and there can be little doubt that under such circumstances the resulting sleep is due in part to sulphonal, in part also to alcohol. Sulphonal is particularly serviceable in the sleeplessness of old people, and the fact that the dose may frequently be gradually reduced until as little as 5 grains at night can be trusted to secure sleep is much in its favor.

The chief disadvantages, perhaps, in connection with this drug is that it may be used as an excuse for the gradual formation of the alcoholic habit, and it is, therefore, frequently necessary to advise its discontinuance from time to time, and perhaps to substitute some other drug if the complaint of sleeplessness has not been overcome.

Paraldehyde can be used in the same class of cases as sulphonal, though it has the disadvantage of causing a persistent odor to remain about the patient for many hours during the elimination of the drug

by the lungs. Further, paraldehyde may also cause some dyspepsia and loss of appetite; hence, it is improbable that this drug will be used without actual necessity. The unpleasant taste of paraldehyde may sometimes be concealed by the administration of the dose in one or more capsules, or by giving it together with some form of syrup. Paraldehyde acts much more promptly than sulphonal, and, apart from its influence upon digestion, which has been already referred to, it does not produce any disagreeable after-effects.

Among the hypnotics of fairly recent introduction, chloralamide, trional, and tetronal have been recommended. Chloralamide is by many preferred to chloral, and it does not appear to be so liable to depress the circulation or to disturb the digestion. The chief objection to its employment lies in the unpleasant taste. On account of their insoluble character, trional and tetronal require to be given under similar conditions to sulphonal; both of these are credited with greater rapidity of action.

Chloroform is frequently of considerable service when sleeplessness is associated with delirium, as, for example, in delirium tremens or in exaggerated forms of hysteria. There is also reason to believe that this drug is somewhat commonly used by nurses after having been on night duty; this use of the drug is distinctly to be deprecated, as the self-administration of chloroform from a handkerchief may be attended with very considerable risks.

In conclusion, I would once more lay stress upon the importance of ascertaining the cause of the insomnia before attempting to deal with the condition by hypnotic drugs. Although frequently dependent upon some physiological error, insomnia is also frequently the result of habit, and perhaps of a firm conviction that wakefulness will persist until some drug has been taken. In many cases of hysterical insomnia, the hypodermatic injection of a few drops of aqua pura, or the use of a solution of sodium chloride at bedtime, may be followed by sound, refreshing sleep. It must be admitted, however, that occasionally insomnia may persist in spite of almost every known drug, even when given in large doses, while it may ultimately yield to a combination of two or three hypnotics in small doses.

Alcoholism and Delirium Tremens. It will perhaps be convenient to consider these conditions together, since they are both the results of over-indulgence in drink. Alcoholism may require treatment in three distinct forms: (1) As the result of acute alcoholism, (2) as chronic alcoholism, and (3) delirium tremens.

1. *Acute Alcoholism.* The treatment of the first condition—of acute alcoholism—must to a large extent depend upon the symptoms. Mere drunkenness may require but little treatment beyond repose, especially if the alcoholic bout has been succeeded by vomiting. Advice may be sought either on account of coma or on account of wild excitement. Both conditions may be treated with hypodermatic injections of apomorphine, though the comatose state is perhaps better dealt with by means of the stomach-pump, or, when the coma is less severe, by the administration of zinc sulphate if consciousness is sufficiently retained to permit of swallowing.

The vomiting produced by apomorphine is commonly succeeded by some degree of depression and by comparative freedom from maniacal excitement. When large quantities of spirits have been taken there may be much collapse, with failure of the heart's action and coldness of the extremities. These symptoms are not infrequently seen in the foolish examples of drinking for a wager, and they call for the utmost care in maintaining the strength of the circulation by subcutaneous injections of ether, and the warmth of the extremities by the use of hot bottles, or hot drinks, or friction.

It is perhaps scarcely necessary here to insert a word of warning against the foolish error of mistaking the coma due to cerebral disease or to uræmia for alcoholism, merely because the breath smells of alcohol.

2. *Chronic Alcoholism.* With regard to chronic alcoholism, the treatment must be mainly symptomatic, since this condition induces disease of various organs; as, for example, catarrh of the stomach or of the intestines, cirrhosis of the liver, alcoholic tremor or neuritis, or, perhaps, granular disease of the kidney. The treatment of most of these various conditions has been dealt with to a certain extent in preceding pages.

The first essential is, naturally, the discontinuance of the habit, and in almost every instance this seems difficult to attain unless the patient is willing to go into one of the homes for inebriates. The best resolutions are apt to fail before temptation; and, as with other forms of indulgence with drugs, such as morphine or cocaine, the patients are apt to become deceitful and untruthful, and to counteract all efforts made to check the habit if by any possibility they can satisfy their craving. In breaking the habit one of the most troublesome symptoms that are apt to arise is that of sleeplessness, and even in homes for inebriates some special hypnotic has usually to be em-

ployed at the commencement of the treatment, as, for example, hyoscine, paraldehyde, or bromide.

Alcoholic neuritis must be treated by rest in bed and by massage, though at the commencement of the treatment the pain in the muscles may be almost too great to permit of more than gentle friction. In addition to massage, the treatment with interrupted currents is often valuable, while appetite has to be maintained by the administration of either quinine or strychnine. Preparations of arsenic are sometimes valuable, but frequently the chronic alcoholism has set up too much gastric irritation to permit of their employment. At one time the use of cocaine, or of the fluid extract of cocoa, was recommended to diminish the craving for alcohol during the early days of treatment. At the present time this remedy is not very much used in these cases, on account of the great risks of the formation of the cocaine habit, the results of which are as disastrous as the results of alcoholism.

It is not necessary to enter into detail here concerning the treatment of gastric or intestinal catarrh, or of cirrhotic changes of the liver, with their sequelæ, or of conditions affecting the kidney, since these various subjects have been fully dealt with already.

3. *Delirium Tremens.* Delirium tremens is ordinarily referred to excesses with alcohol, but its occurrence is not solely to be attributed to the amount of alcohol taken. It involves previous alcoholic habits, with consequent deterioration of brain power and with perhaps rapid diminution in the nutrition. In these cases the habit of intemperance has ordinarily led to considerable gastritis, and the consequent misery and loss of appetite have been, for a time, met by an increase in the amount of stimulant taken. Delirium tremens is, therefore, closely allied to delirium from exhaustion, and this fact must be remembered in the treatment, since one of the first elements of success consists in the administration of nutriment.

That the delirium is not merely the result of excess of alcohol is shown by the rarity with which it occurs among those who are only intermittently intemperate. The dependence of delirium tremens upon faulty nutrition, as well as upon excesses with alcohol, is further demonstrated by the comparative rapidity with which recovery occurs so soon as nutrition can be established.

The risks of delirium tremens are, however, numerous, and they depend to a certain extent upon the organic condition of the individual, upon the development of various complications, or upon the

danger of injury during the stage of delirium. Of these three risks, the last mentioned is the one which may be dealt with first, since in nearly every case of delirium tremens it is possible that the patient may, under the influence of alarm, endeavor to escape, and, with no intention of committing suicide, may jump from a window. The first essential, therefore, is the selection of a room, which should be quiet and not too brilliantly lighted. If this room must of necessity be near the top of the building, great care should be taken that the window of the room fastens, and that the patient is not left alone for a moment on any pretext. In hospitals the room set apart for such cases is ordinarily upon the ground floor, and the window is securely protected either with bars or with wire netting adequately secured. The room should contain the minimum of furniture, and no article should be allowed which might be turned to account as weapons in the excitement of delirium. It is generally advisable, and sometimes imperative, to keep the patient in bed from the earliest stage, and to have an attendant capable of exercising judicious control and restraint rather than one prepared to enter into physical contests. Frequently a nurse with tact and gentleness will succeed in keeping the patient in his bed and in restraining much of the restlessness and excitement; while another who is physically stronger may have considerable difficulty and frequent contests. It is far easier to keep the patient in bed than to persuade him to return after having once allowed him to get up.

When the delirium is extreme it may be necessary to limit the movements, either by a sheet passed across the body and securely fastened under the mattress, or, in rare instances, by the use of the strait waistcoat. The latter measure is to be avoided, if possible, on account of the mental excitement which sometimes ensues owing to the inability of the patient to perform any desired movement; the strait waistcoat, however, may occasionally assist in promoting sleep when other means have failed.

The importance of controlling the movements of a patient suffering from delirium tremens is not limited to the risk of his escape, or of his injuring himself or the attendant in the delirium; but any violent struggles might prove fatal to one who is probably suffering from a weak circulation; hence the need of great care in this respect.

In every case of delirium tremens the nourishment of the patient is of primary importance, and efforts must be made to induce him to take food as soon as possible. The condition of the digestive

organs will usually prevent the use of a solid diet, but with some degree of persuasion small quantities of strong beef-tea may be taken at frequent short intervals, or the beef-tea may be taken alternately with small quantities of milk. Until this liquid food can be digested without trouble no effort should be made to employ solids.

In every case the question of the administration of alcohol will have to be considered. I am convinced that although for their future life it will be advisable for these patients to become total abstainers, yet during the time of the attack there is often considerable advantage in the use of moderate quantities of the accustomed form of stimulant, especially if this stimulant can be used as a bribe to induce the patient to take food. Frequently the prospect of the stimulant will facilitate the administration of food. In patients of advanced years the use of alcohol is imperative, especially when there is much sleeplessness. The whole difficulty consists in tiding over the risks of the first three or four days, and there is no evidence that these risks are increased by the administration of alcohol; while, on the other hand, particularly when the condition is complicated with pneumonia and with sleeplessness, there is considerable evidence to show that alcohol is beneficial. The amount given need not, as a rule, be large, but the quantity must be regulated by the condition of the pulse, by the degree of improvement that occurs after alcohol has been given, and by the severity of other symptoms. When the pulse is weak and fluttering, and the sounds of the heart are indistinct—in fact, when there is reason to believe that the patient is the subject of fatty degeneration of the muscular walls of the heart—stimulants will generally be absolutely necessary, and to withhold them because this affection is assumed to have its origin in the consumption of an excess of alcohol is to misunderstand the true causation of this disease.

The medicinal treatment of this condition is mainly guided by the desire to promote quiet and to produce sleep, and with these objects hypnotics and other remedies may be given. In mild attacks of delirium tremens no medication may be needed beyond, perhaps, the administration of a saline purgative, the need of which is sufficiently indicated by the furred condition of the tongue. When a hypnotic is advisable, considerable caution must be exercised in the selection, since many of the hypnotics more commonly employed under other conditions are distinctly contraindicated by one or other of the diseases which are so frequently associated with delirium

tremens ; thus, for example, the use of opium is often to be avoided on account of the coexistence of renal changes. Should there be any albumin in the urine it will be unwise to use opium or morphine, or any derivatives of these drugs. The albuminuria, it is true, may be only symptomatic of the mild febrile condition which so frequently occurs with delirium tremens, or it may be a mere side phenomenon of pneumonia should this complication be present, but the risks of the existence of chronic kidney disease are very great. Another reason against the use of opium in the solid form lies in the imperfect work which the stomach is capable of performing at the onset of an attack ; hence, if repeated small doses of solid opium are given to procure sleep or allay restlessness, these may remain unabsorbed for some time, and may constitute a source of danger.

Chloral is frequently recommended for administration at night, but the objection to the use of this remedy lies in its depressant influence upon the circulation, which constitutes a real danger when dealing with an old debilitated patient with a weak heart. In judiciously selected cases, however, it may be of some service, but it should be used only in moderate dose, and its influence upon the pulse should be carefully noted.

Hyoscine is less objectionable than either of these. The hydrobromate may be administered in doses of from $\frac{1}{200}$ to $\frac{1}{100}$ of a grain by hypodermatic injection. The influence upon the pulse is, in general, not very marked, and the sleep which ensues after its administration may be disturbed by dreams, but usually there is considerable muscular relaxation and marked diminution in the restless movements and tremor.

Of the other hypnotics, paraldehyde and sulphonal appear to give the best results, and to be free from the objections already urged against the use of chloral or of opium. Potassium bromide or ammonium bromide may be employed with comparative safety in young adults, and may also be used in moderate doses during the day to quiet excitability ; larger doses may be given at night-time to promote sleep. Neither of these drugs should, however, be used for old patients with weak circulation.

Very considerable doses of digitalis have been recommended in the treatment of delirium tremens, and although this drug is not always beneficial in this condition, yet it appears to possess some value when the delirium is associated with low arterial tension. The administration of digitalis should be checked so soon as the

pulse regains normal tension, and the heroic doses recommended by Mr. Jones, of Jersey, do not appear to have been very frequently employed by practitioners in England or in America. When there are indications of cardiac failure, strychnine should be given hypodermatically, and, if necessary, may be followed by the administration of tincture of *nux vomica* in repeated small doses by the mouth.

Weakness of the pulse may also be dealt with by the use of aromatic spirit of ammonia in conjunction with alcohol or with ether.

Apoplexy. Apoplexy is a somewhat broad term which is used to designate the conditions resulting from sudden hemorrhage, or from sudden occlusion by means of an embolus, of one of the cerebral vessels. When a vessel of large size is obstructed by an embolus the chief symptoms agree closely with those which result from hemorrhage from a vessel of corresponding size, and since the treatment is practically the same under both conditions, it is perhaps convenient to consider the subject under the somewhat vague term of apoplexy, instead of attempting to differentiate cerebral hemorrhage from cerebral embolism and to describe the treatment of these conditions separately.

For practical purposes, whenever unconsciousness combined with paralysis occurs suddenly, it will be safe to assume hemorrhage and to treat accordingly. The chief indication is to adopt measures calculated to diminish the risks of further hemorrhagic effusion. These risks will obviously be increased by any movements of the patient involving strain upon the circulatory system, and accordingly it is desirable to avoid all unnecessary movements, and, when the attack occurs in a private house, arrangements should be made for putting the patient to bed in the room in which he has fallen unconscious.

The bed should be arranged so that the head is somewhat high, and the danger of further effusion should be diminished, so far as possible, by diversion of the blood-current to the extremities, more particularly to the feet; this may be effected by warmth applied by means of hot-water bottles carefully protected with blankets, or by the use of hot mustard plasters, or, if it can be conveniently arranged, by allowing the feet to hang over the bed in a warm bath, to which mustard may be added with advantage. Frequently, however, the adoption of such measures will involve an amount of movement that appears undesirable, and the practitioner must be content with seeing that the patient is placed in a position of comfort in bed,

lying on his back, with the head turned toward one side, so as to avoid as far as possible any obstruction to respiration from the paralysis of the tongue, or from accumulations of mucus within the pharynx, and with hot-water bottles at the foot of the bed, as already mentioned.

When the head appears hot, cold applications may be used. Evaporating lotions may be applied upon lint over the forehead, or an ice bag may be found to be more convenient and to require less frequent change. With stout, plethoric individuals venesection is often recommended with the view of reducing the blood-pressure, and thus diminishing the risks of further hemorrhage. To be of any service the amount of blood removed must be from 15 to 20 ounces. It is perfectly useless to apply leeches in the neighborhood of the head and to attempt thus to control cerebral hemorrhage by abstracting blood.

It is necessary from the commencement of treatment to issue warnings against all attempts to rouse the unconscious patient, either with the view of obtaining answers to questions or of his making muscular demonstrations of consciousness, and it is further necessary to give a word of warning against the employment of stimulants throughout the course of this disease. Unfortunately the natural tendency of the uneducated is to treat all forms of unconsciousness as though they depended on fainting, and to employ stimulants in order to promote circulation—a course which would be extremely disastrous in connection with cerebral hemorrhage.

To reduce the blood-pressure still further it is commonly desirable to employ a purgative of rapid action and small dose, which may be used with comparative facility in a condition of unconsciousness. These qualities are to be found in croton oil and also in calomel. The former may be employed in doses of from $\frac{1}{2}$ to 1 minim, and for facility of introducing the smaller dose it should be mixed with a few drops of olive oil or castor oil. The dose may then be placed upon the tongue, and owing to its passage onward during the unconscious movements of tongue and mouth the action is commonly fairly prompt. If more convenient, however, 4 or 5 grains of calomel may similarly be placed upon the tongue, but unless the tongue is previously slightly moistened much of the powder may be lost during the exaggerated movements of respiration.

More active cardiac depressants are sometimes recommended, such as tincture of aconite or the tincture of veratrum viride of the *United*

States Pharmacopœia, which may both be given in repeated doses of from 1 to 2 minims ; the latter, however, occasionally produces such severe symptoms that it has been deleted from the *British Pharmacopœia*. In America it is comparatively rarely that either of these drugs is employed at the onset of an attack of apoplexy. Indeed, the whole treatment of cerebral hemorrhage at this early stage is generally limited to careful nursing, the prevention of any constriction about the neck and the maintenance of perfect quiet. Later, it will be necessary to relieve the dryness of the mouth either by moistening the lips and tongue from time to time with water or with dilute glycerin or by spraying the mouth with liquid paraffin.

So long as the patient remains unconscious it is inadvisable to attempt to feed by the mouth, and it is accordingly necessary to employ nutrient enemata in small quantities from time to time should the period of unconsciousness be prolonged. After the power of swallowing has been regained the diet should be given in liquid form and in small bulk, and even after complete restoration of consciousness, solid food, especially animal food, must still be avoided, since it might lead to constipation, and thus throw a strain upon the cerebral vessels.

With regard to medicinal treatment after consciousness has been sufficiently restored to allow of administration by the mouth, the remedies employed must be selected with the view of quieting the circulation and favoring the absorption of effused blood. With these objects it is customary to administer minim doses of tincture of aconite with potassium bromide or ammonium bromide, together with gradually increasing doses of potassium iodide. These drugs may be given frequently during the day, or the bromide may be reserved for employment at night should sleeplessness form a prominent symptom. Ordinarily, however, the repeated administration of bromide is of great advantage in reducing the mental excitement and emotional conditions which are so often developed during the gradual restoration of the mental powers.

When there is evidence of the existence of syphilis, and the origin of the hemorrhage or embolism has accordingly been referred to syphilitic changes in the cerebral arteries, mercurial ointment may be used until mild symptoms of salivation have been produced ; the solution of the perchloride may also be employed with the same limitation. In these cases, moreover, potassium iodide also appears to be of the greatest service, although its utility in favoring the

absorption of the clot is by no means confined to cases with a history of syphilitic taint.

Some degree of muscular degeneration commonly follows an attack of apoplexy, and appears to indicate the desirability of adopting measures to maintain muscular contractility. No such treatment should, however, be employed so long as the temperature, the complaints of pain, or movements indicative of pain, point to the existence of any cerebral irritation, and indeed it is advisable to defer passive movements, friction of the affected limbs, and massage until some weeks have elapsed after the original hemorrhage. Meanwhile, however, should the fingers on the affected side of the body show a tendency to contraction, passive movements will be of service, and mild electric currents may be used to the extensor muscles. These measures are of greatest service when the muscles show but little sign of wasting, and under their influence the temperature on the affected side may gradually be restored to the normal. A weak, continuous current usually gives better results than are obtainable from faradic stimulation.

The occurrence of one attack of apoplexy always calls for the adoption of precautions calculated to prevent a recurrence. Primarily, all emotional excitement and also violent exertion should be avoided. The diet will require considerable care, so as to be nutritious without being constipating, and all forms of indulgence, both in eating and drinking, should be forbidden. Frequently the occasional use of mild purgatives or laxatives will be beneficial.

When any disease marked by the presence of high tension exists—such as chronic nephritis, cirrhosis of the kidney, or heart disease—the tension may be relieved by the frequent use of small doses either of nitroglycerin or of erythrol tetranitrate. These drugs must, however, be employed with considerable caution, since many observers maintain that the attendant degenerative arterial changes render relaxation of the arterioles a somewhat dangerous proceeding, since although the pressure may be relieved in the arteries it is in all probability somewhat raised within the capillaries, which may favor further hemorrhage.

It has been suggested that when there is evidence of marked arterial degeneration the liability to further hemorrhage might be diminished by the adoption of surgical measures, such as ligature of the common carotid on the affected side, and proposals have frequently been made to trephine and remove blood resulting from effusion

after the initial shock of apoplexy has passed off. Both of these operations, however, involve considerable risks, and cannot be adequately considered in this place.

Meningitis. Acute inflammation of the meninges occurs in connection with several different diseases. It may be secondary to some disease of bone, more particularly to disease of the petrous portion of the temporal bone, or it may ensue in the course of one of the infectious fevers, or in connection with syphilis or ulcerative endocarditis, while a special variety of meningitis has been recognized under the name of "tubercular meningitis"—a name which sufficiently indicates the dependence of the condition upon tubercular changes primarily affecting the vessels and secondarily leading to inflammatory changes and accumulation of fluid within the meninges and within the ventricles.

The treatment of meningitis must to a very great extent depend upon the estimate that is formed of its cause; but there are some features in the treatment that are common to all types of meningitis, and it is, therefore, convenient to deal with these general conditions collectively, leaving the differentiation of the treatment for separate consideration.

In all forms of cerebral meningitis the first essential is to secure rest and quiet. The patient must be kept in bed, with the head slightly raised. It is frequently advisable to cut the hair short in an early stage of the disease in order to facilitate the subsequent application of ice bags or other local forms of treatment. The room should be moderately darkened, since frequently a bright light appears to be sufficient to produce pain. The head of the bed should be arranged so as not to face the window, while the bed, as in other febrile conditions, should be moderately narrow, fairly low, and placed so that the nurse can readily approach either side.

At the commencement of the treatment, even in cases of doubt, purgatives should be employed, since with their administration it is often found that the headache becomes less intense. The selection of a purgative should be guided by the desire to obtain a fairly prompt evacuation without continuous irritation and disturbance. These objects may generally be secured by the employment of some mercurial, such as gray powder, blue pill, or calomel, given at night in dose adapted to the age of the individual, and followed in the morning by a brisk saline purgative, preferably of an effervescent character, which may ordinarily be trusted to secure one thorough evacuation.

The diet in meningitis is, to some extent, regulated by the degree of fever. It should, as a rule, be of light, nutritious character, and frequently it will be found that the tendency to sickness will necessitate the use of iced milk in repeated small quantities.

Pain may sometimes be controlled by the application of cold to the scalp, and for this purpose Leiter's tubes may be employed if available, or an ice bag containing small fragments of pounded ice may be used, or, if ice cannot be obtained, the pain may sometimes be relieved to some extent by evaporating lotions. These cooling applications serve not only to reduce pain, but frequently to diminish excitability and to favor sleep. When the onset is very acute and the pain intense, some relief, particularly in traumatic conditions, occasionally follows the application of leeches in the neighborhood of the painful part.

The further treatment of meningitis must to a large extent be symptomatic, though in every type of the disease it is advisable to commence with comparatively large doses either of potassium iodide or of mercury, and this form of general treatment is perhaps most imperative in dealing with tubercular meningitis.

The chief symptoms demanding treatment are vomiting, constipation, excessive fever and sleeplessness, with other indications of cerebral excitement. These may be dealt with as they arise; vomiting by the employment of iced food, the use of small fragments of ice, and the administration of a gastric sedative, such as diluted hydrocyanic acid.

In general, however, gastric sedatives are of comparatively little service, since the vomiting is the result of central rather than of any form of gastric irritation.

Constipation may sometimes be controlled by enemata, and in general it will be found that an enema of glycerin, or a glycerin suppository, will give more satisfactory results than are obtainable from the use of larger simple enemata. Should the constipation be severe, it may be necessary to employ gray powder or blue pill, in purgative dose, or to administer magnesium sulphate. The last-mentioned drug is, however, generally avoided, since when it fails to act it may give rise to additional trouble by the formation of concretions.

The febrile condition may be reduced by tepid sponging, or in extreme cases by the cold bath; but the antipyretic remedies, such as antipyrine and antifebrine, are better either avoided, since they

may cause considerable depression, or given in very small doses, when they may be of some service in relieving pain.

Sleeplessness may occasionally be controlled by cold applications to the head; but when these fail some form of bromide, preferably the ammonium bromide, may be given, and, if the pulse permits, chloral hydrate may be added. The propriety of employing opium or morphine in these cases must be determined by the age of the patient as well as by the cause of meningitis. In the more common forms of cerebral meningitis which occur in children in connection with bone disease, or with the exanthemata, the administration of morphine and opium must be deprecated, since these drugs are not well tolerated, and they also serve to favor constipation.

If the cerebral excitement is associated with rise of temperature, and perhaps with vomiting, great amelioration may ensue after the use of stimulants, which under such circumstances are further indicated by the rapidity and weakness of the pulse. It is also occasionally found that in these conditions moderate doses of antipyrine or of antifebrine will allay pain and excitement, and for this purpose their employment is justifiable, although the dose should not be large enough to influence the temperature.

With regard to the special treatment of the different forms of meningitis, cerebral meningitis dependent upon diseased bone necessitates the adoption of surgical measures, and these may range from simple incisions over the mastoids to operations as formidable as the opening of the lateral sinuses and the removal possibly of infective coagula. When the meningitis results from injury and there is a suspicion of irritation due to fracture, surgical aid will again be called for, but when the disease arises in connection with the exanthemata, or with other infective processes, little can be done beyond the adoption of symptomatic treatment and the employment of potassium iodide and mercury, as already indicated.

Tubercular Meningitis. Tubercular meningitis is such a serious form of disease that it demands separate mention, even though the treatment offers very little hope. The chief difficulties in connection with tubercular meningitis lie in the diagnosis and in the frequency with which fallacious hopeful indications form a prelude to a sudden increase in the severity of the case. It is by no means uncommon for the course of this disease to present considerable improvement, which may be separated by only a short interval from the fatal termination, and it is, therefore, necessary to be on one's

guard against being misled into giving a cheering prognosis should such signs of improvement arise.

The treatment of tubercular meningitis is very hopeless, and although cases of supposed recovery have been recorded from time to time, and must have occurred within the experience of most practitioners, the recovery has sometimes thrown some doubt upon the original diagnosis, while in other cases it has been but partial. I have on more than one occasion, at the Evelina Hospital, felt confident of the diagnosis, and, with the prolonged use of potassium iodide or of mercury, have found that although death has not resulted, the child has recovered either with loss of sight alone, or with loss of sight together with considerable impairment or total loss of mental power. The complete recoveries that have been occasionally mentioned, and of which I have seen instances, have left much doubt in my own mind as to the original diagnosis, even though paralytic symptoms, squinting, and optic neuritis may have been present.

The treatment of tubercular meningitis must be mainly symptomatic, and the symptoms calling for treatment are the same as those already detailed in connection with cerebral meningitis; but with tubercular meningitis I am in the habit of using large doses of potassium iodide from the commencement of the treatment, even though the explanation of any benefits resulting therefrom may be as uncertain as the benefits themselves. The iodide is used for its power of controlling the growth of small cells, which form the fundamental pathological change in this disease, and not with any reference to the value of the drug as an antisyphilitic, still less with any idea that tubercular meningitis is of syphilitic origin.

Recently attempts have been made to treat this disease by surgical measures, such as the removal of fluid from the ventricles, but the results of this treatment hitherto have not been encouraging.

CHAPTER XVIII.

SPECIFIC INFECTIOUS DISEASES.

General Management of Specific Infectious Diseases—Smallpox (*Variola*)—Chickenpox (*Varicella*)—Scarlet Fever (*Scarlatina*)—Measles (*Morbilli*)—German Measles (*Rötheln* or *Rubeola*)—Mumps (*Epidemic Parotitis*)—Whooping-cough (*Pertussis*).

General Management of Specific Infectious Diseases. Although it will be necessary to point out essential differences in the treatment of the various eruptive fevers, it will save repetition to indicate generally the points of management which hold good for the chief of these diseases—namely, smallpox, scarlet fever, and measles. To some extent the precautions that are necessary when dealing with these diseases have to be followed also in others, such as typhoid, typhus, and whooping-cough, but what is said in the present section applies principally to the first group of diseases above mentioned.

The first consideration is naturally the selection of the room in which the patient is to pass the infective stage of the disease, so as to minimize the risks of the spread of the disease to other inmates of the house and also to favor the well-being of the patient. Whenever possible, the room selected should be at the upper part of the house, and preferably at the top, for although this will necessarily involve some additional trouble of service, it will insure ventilation, and it will favor the exclusion from the sick-room of those who are not actively engaged in connection with the patient. When possible, it is better to select a room on the sunny side of the house, since convalescence is rendered less tedious by the brightness and light, which also serve the additional purpose of favoring cleanliness and ventilation. In severe cases, should the arrangement of the house permit, it will be of great service to isolate adjacent rooms for the use of the nurses.

The amount of light that is to be permitted in the sick-room will to some extent vary with the nature of the disease, though it is very rarely necessary to completely cut off the light, even during the acute stage. Sometimes at the beginning of measles the light appears

to cause some discomfort, especially if the head of the bed faces the window, but by altering the position of the bed, or by using a thin green blind, this complaint may be obviated. Similarly during the early stage of typhoid fever, when the headache is severe, some relief may be obtained by partly obscuring the light; and similar measures may be required in the course of smallpox when there is any ulceration of the cornea, though in this condition it is perhaps better to employ a shade for the eyes than to darken the room.

The temperature of the room should be rendered as even as possible, consistently with efficient ventilation. The temperature should not exceed from 60° to 65° F., unless perhaps in the event of the development of pulmonary complications. To maintain this temperature and to insure sufficient ventilation, it is desirable to have a fire burning brightly in the sick-room, employing screens, if necessary, to prevent the air of the room from becoming unduly heated. Apart from its value for purposes of ventilation, the fire will be extremely useful, not only in warming nourishment for the patient, but also in affording a convenient mode of disposing of scraps of linen or lint that may have been used for the patient, and thereby have been infected, together with any flowers that have faded.

In preparing the room before its occupation by the patient, all unnecessary articles of furniture should be removed, together with all carpets, curtains, and other hangings which might afford a lodgement for infective particles, and thus favor the spread of the disease even after the patient has become convalescent. With this object also pictures should be taken down or at least replaced by unframed pictures of small value, which may be readily burned after the illness is over. The carpet may be replaced, if desired, by floorcloth or linoleum, which can be readily disinfected; but in general it is better that the boards of the floor of the room occupied by a patient suffering from an infectious disease should be left bare.

When possible, the bed should be metal, in preference to wood, and should be provided with a light spring mattress; and it should be somewhat narrow, so as to facilitate the necessary nursing operations. It is often recommended, and when space permits it is of extreme service, to have two beds of similar size and height, so as to permit the patient to be moved from one to the other if the malady is not severe enough to preclude movements; but it is distinctly undesirable that these beds should be in different rooms and that the patient should be moved from one room to the other.

A thin, hard, hair mattress is preferable to a feather bed, since, although the latter may be comfortable when the bed has been newly made, it is apt to become very hot and unpleasant, even when it does not form ridges or lumps, with the restless movements of the patient. The bedclothes should be only moderately warm, since there is no advantage in heaping up bedclothes, particularly during the time when the fever is high.

In every severe case it is essential to secure two nurses, one for day and one for night work, and they should be intrusted with the care of the temperature-chart. They should record accurately periodic observations of temperature, pulse, and other conditions affecting the patient, as, for example, the action of the bowels, the amount of water passed, the quantity of food taken, together with the times at which medicine has been administered. It is essential in every febrile case that the variations of temperature should be carefully charted, since isolated observations of temperature are of comparatively little service, and the course of the disease can be so much better appreciated by inspection of a well-kept chart.

It is perhaps unnecessary to impress upon trained nurses the importance of personal disinfection before leaving the sick-room, but when a relative takes some part in the nursing, precise instructions should be given on the use of disinfectants, and on the adoption of garments which have not been kept in the room, before passing through the house for necessary out-door exercise.

The isolation of the sick-room should be insured, especially when dealing with smallpox or scarlet fever, by suspending a sheet outside the door and moistening this frequently with a solution of formaldehyde or carbolic acid. It is also advisable to have, either within the sick-room or immediately outside, a large vessel containing some strong disinfectant solution, into which all linen garments, towels, and other articles should be immersed before being sent away to be washed.

The doctor should give instructions to have a mackintosh coat hung outside the sick-room for his own use, so as to avoid the risk of spreading the disease after the necessary manipulations of the patient. This coat should from time to time be cleansed by being sponged with a solution of carbolic acid, and it is scarcely necessary to add that the utmost care should be taken in disinfecting the hands.

The comfort of the patient will be largely increased by sponging from time to time with mild disinfectant solutions, and during the

stage of convalescence after scarlet fever or smallpox the surface should be lubricated with a solution of carbolic acid in oil, of the strength of 1 drachm of liquid carbolic acid to 8 ounces of olive oil. These inunctions diminish the risk of infection during the stage of desquamation.

The motions should be received in a bedpan or other receptacle containing a small quantity of disinfectant, and before removal from the sick-room should be completely covered with disinfectant solution. The above indications should be followed in every infectious case, though some slight modifications required by the nature of the disease will be mentioned in dealing with the separate diseases.

After the patient has become so far convalescent as to be able to change his quarters, the greatest care should be taken in disinfecting the room, either by chlorine, formaldehyde, or by sulphur. In using chlorine the vessel containing the mixture of salt and sulphuric acid should be placed on a high shelf, so as to allow the gas to diffuse thoroughly through the room; but when using sulphur the basin or brazier in which the burning sulphur is placed should be in the centre of the room, and the doors and windows should be closed and pasted up before the sulphur is ignited. After allowing some hours to elapse the doors and windows should be thrown wide open and all particles of dust should be carefully collected by means of sponges or cloths which have been dampened in strong antiseptic solutions. These should subsequently be immersed in boiling water or burned, and the doors should be repeatedly washed with carbolic soap.

The following prescriptions for diaphoretic and saline mixtures are often used at the commencement of specific infectious diseases of simple type:

R.—Potassii citratis	3 ss.
Spiritus ætheris nitrosi	3 ss.
Liquoris ammonii acetatis	3 ij.
Aquæ camphoræ q. s. ad	3 j.
R.—Liquoris ammonii acetatis	3 ij.
Potassii nitratis	gr. x.
Spiritus ætheris nitrosi	3 ss.
Aquæ q. s. ad	3 j.
R.—Potassii nitratis	gr. vij.
Spiritus ætheris nitrosi	3 ss.
Liquoris ammonii acetatis	3 ss.
Aquæ q. s. ad	3 j.

R.—Spiritus ammoniæ aromatici	℥ ^{xv} .
Spiritus ætheris nitrosi	℥ ^{ss} .
Liquoris ammonii acetatis	℥ ^{ss} .
Aquæ q. s. ad	℥j.
R.—Magnesii sulphatis	℥j.
Liquoris ammonii acetatis	℥ ^{ss} .
Acidi citrici	gr. ij.
Aquæ destillatæ q. s. ad	℥j.
R.—Sodii bicarbonatis	gr. x.
Sodii tartratis	gr. xx.
Aquæ	℥j.
R.—Potassii acetatis	gr. x.
Potassii bicarbonatis	gr. x.
Potassii nitratis	gr. v.
Aquæ	℥j.
R.—Potassii bicarbonatis	gr. xx.
Acidi citrici	gr. xv.
Aquæ	℥j ^{ss} .
(In effervescence).	
R.—Potassii bicarbonatis	gr. xxij.
Aquæ	℥j.
Acidi citrici	gr. xv.
Aquæ	℥j.
(Dissolve and mix.)	

It will perhaps be convenient to mention here that great strides have been made during the last few years in what has been termed the antitoxin treatment of various specific fevers. This term is, however, too limited, since it includes two distinct classes of remedies, both of bacterial origin, which are being employed in connection with these specific fevers.

One group, which has collectively been termed "vaccines," is used to confer immunity. It has been found that to some extent individuals who have been inoculated with these various vaccines are proof against the subsequent introduction of the bacilli upon which the specific fevers respectively depend. So far as can be estimated at present, the prophylactic action of the vaccines is more persistent than that of the antitoxins. The vaccines that have been employed are for cholera, for typhoid, and for plague, in addition to the ordinary vaccine lymph, which is familiar as a protective against smallpox. The second group, consisting of antitoxins, is mainly used for the treatment of those who are already infected,

though they have also been employed as prophylactics. The chief antitoxins are those employed for diphtheria and tetanus. The observations as to the value of antitoxins are far more numerous and more satisfactory than those relating to the vaccines, since it is obviously more easy to estimate the action obtained in controlling the course of disease than to be certain that the use of the vaccine has been of service in preventing infection.

With the exception of the vaccine for smallpox, it is extremely difficult to estimate the protective action, since it is well known that in times of epidemics some individuals who are constantly exposed to infection escape without the development of a single symptom. It is only when large bodies of men are similarly exposed to infection, and when large sections of these have been treated with the different vaccines, that it is possible to obtain an approximate idea of the protective influence of the vaccines employed. Notwithstanding these difficulties, the evidence in support of the protective value of the vaccines employed for cholera, for typhoid fever, and for plague is accumulating rapidly. These inoculations are now being largely employed in the army, and the similarity of the conditions of life, both of the inoculated and the uninoculated, renders the observations of the different statistics peculiarly valuable.

Professor A. E. Wright, of Netley, in an official document on vaccination against typhoid (enteric) fever, states that the anti-typhoid inoculation is frequently followed by constitutional and by local symptoms, the latter being more severe when the former are slight. The constitutional symptoms generally include a tendency to faintness or perhaps collapse within the first few hours, which may be succeeded by a rise of temperature, which rarely exceeds 101° and commonly passes off within eighteen or twenty-four hours. The local symptoms are marked by tenderness at the site of inoculation, which generally commences within five to six hours, and may be succeeded by redness, either limited to the circumscribed area around the site of inoculation or extending in lines along the course of the lymphatics. The local symptoms, in general, pass away within forty-eight hours. The tendency to collapse or faintness may be kept in check by enforced rest and avoidance of alcohol, while the local symptoms may be relieved by the use of hot-water stupes.

It is sometimes curious to note that experience has shown that the

antityphoid inoculations, while in all probability they will not aggravate, do nothing to check an incipient attack of typhoid fever.

The position of the preventive inoculation against plague rests upon a somewhat more certain basis, and has recently formed the subject of a valuable paper by W. N. Haffkine, C.I.E.,¹ who finds that from very accurate data collected during the time of the late epidemics, the mortality among the inoculated plague cases was some 50 per cent. lower than among the uninoculated, and he believes that the duration of the effect of the plague inoculation lasts at least the length of one epidemic, which on an average extends from over four to six months of the year. In the same paper some valuable remarks are also made concerning anticholera inoculation.

The use of antitoxins in the treatment of diphtheria and of tetanus will be dealt with more fully under the heading of these diseases. These antitoxins are employed after the development of symptoms of the disease, and they produce certain constitutional and local symptoms, details of which will be given more fully hereafter.

It may here be mentioned that other antitoxins are frequently employed for other diseases, such as the pneumococcus antitoxin and streptococcus antitoxin, while Coley's fluid has been used with some degree of success in the treatment of malignant growths, and various forms of Koch's tuberculin have been employed in that of different forms of tuberculosis.

Smallpox (*Variola*). It is not necessary in these pages to discuss the infectious character of this disease, which is well recognized, nor the protective value of vaccination. At the outbreak of an epidemic it is most certainly wise for all those to be revaccinated who are likely to be brought into contact with those suffering from this disease, while those who have already had this misfortune should undergo a period of isolation and quarantine for at least a fortnight.

There is some evidence to show that vaccination is of some service even during the stage of incubation, for although, after exposure to infection, vaccination does not appear to be protective, it reduces the severity of the attack.

The precautions already indicated in the General Management of Specific Infectious Diseases (see p. 419) should be rigidly enforced in connection with smallpox.

It is sometimes necessary to impregnate the atmosphere of the

¹ Lancet, June 24, 1899.

sick-room with some volatile disinfectant, since this disease is frequently accompanied by extremely disagreeable odors. Of the different disinfectants eucalyptus oil is perhaps the most pleasant. Saucers containing sawdust moistened with this oil may be placed in various parts of the sick-room ; turpentine or camphor may sometimes be substituted, while in extreme cases small quantities of chlorine may be evolved from time to time. The last remedy, however, although very efficacious, is extremely unpleasant and irritating if employed in concentrated form.

The treatment of smallpox is mainly determined by the predominance of special symptoms, since, apart from vaccination and from the adoption of measures to diminish the risks of spread of this disease, we are not acquainted with any remedy which, like antitoxin, would antagonize the poison and shorten the duration of the specific fever. During the early stage, before the appearance of the rash, the prominent symptoms are sickness, severe lumbar pain, and rise of temperature, all of these commencing comparatively abruptly. The conjunction of the symptoms, with perhaps the knowledge of an epidemic of this disease, should lead to the immediate isolation of the individual and to the adoption of the disinfectant measures already described.

The medicinal treatment should consist primarily in the administration of a brisk saline purge, and this should be accompanied by a diaphoretic mixture, to which some form of opium should be added to allay the severity of the pain in the loins. Sometimes this pain may be further controlled by the application of fomentations, or if very severe it may necessitate the employment of hypodermatic injections of morphine, or the use of powder of ipecacuanha and opium, the latter being of particular service, since in addition it favors diaphoresis.

The sickness during the initial stage is rarely controllable, but it may be diminished in frequency by sucking small pieces of ice or by repeatedly sipping ice-cold water. Although the febrile stage may cause much discomfort and headache, very little can be done to relieve these symptoms ; the antipyretics, such as antifebrine or antipyrine, being of very little use in this disease, though in moderate doses they may serve to relieve headache. They should be given only in small doses, insufficient to affect the temperature, since their depressant action is by no means devoid of risk. Some slight relief may be obtained from tepid sponging of the surface of the body, or

from the application of ice bags to the body or head ; but, as a rule, it is better to avoid these measures, since, although they may serve to moderate the high temperature, they appear to prolong the initial stage, and it should be remembered that with the appearance of the eruption the febrile condition abates, though the temperature will rise subsequently during the stage of suppuration.

The treatment during the earlier stage must be determined by the predominant symptoms. As a rule, the chief indications are to be found in the condition of the pulse and the appearance of the eruption ; the former, when weak and rapid, calls for the administration of stimulants, and, as the strength is commonly greatly undermined by this disease, there is distinct advantage in the frequent employment of quinine, in doses of 2 to 4 grains three times a day. Larger doses appear to exert but little influence over the temperature, while they may produce much headache and discomfort.

Hebra recommends the use of the continuous warm bath in severe, discrete, and in confluent cases, and this recommendation is approved by Goodall and Washbourn,¹ who have found it of great value in allaying the terrible irritation of the skin and in inducing the patient to sleep. They consider that if suitable arrangements are made for the patient to recline with his head out of the water, and for emptying and refilling the bath, he may be left in it for days together.

When the eruption assumes the hemorrhagic form, chloride of iron should be given with quinine ; in fact, this mixture may be administered from the commencement of the disease, when it is known that other cases in the prevailing epidemic have exhibited hemorrhagic symptoms. The liability to subsequent disfigurement depends upon the severity of the eruption and the depth to which the skin is involved. The disfigurement, accordingly, does not appear to be under the control of any therapeutic measures. It is customary, however, to use inunctions of carbolic oil over the whole surface, partly to diminish the risks of infection and partly to increase the pliability of the skin, since the inflammatory swelling frequently causes considerable discomfort. When the eruption is particularly full on the face, it may be covered with strips of lint soaked in disinfectant solution or in dilute silver nitrate solution.

Goodall and Washbourn advocate the treatment of the eruption

¹ Manual of Infectious Diseases, p. 214.

on antiseptic principles, such as the application of vaseline and iodoform, carbolized oil (1 in 20), oxide of zinc ointment, or linimentum calcis. They recommend that a mask of lint, soaked either in boric acid lotion or in glycerin and water, should be kept on the face. They find that the extreme itching during the stage of healing is best allayed by sponging the skin with a lotion consisting of 1 part of dilute acetic acid to 3 parts of water.

Occasionally it is recommended that the pustules should be pricked with a needle previously rendered aseptic, so as to hasten the formation of scabs, and, after their evacuation, they should be touched with silver nitrate, to promote more healthy action. This procedure, however, does not suffice to prevent disfigurement and does not appear to shorten the suppurative stage. Other local applications which have been employed from time to time are ointments of carbolic acid or of thymol. There is but little evidence, however, that either of these is preferable to the simple application of vaseline.

The use of perchloride of iron has also been recommended, either before suppuration or after the pustules have been pricked. This solution is undoubtedly beneficial as an antiseptic, but it may produce considerable irritation. Prior to the stage of suppuration there may sometimes be great complaint of pain, owing to the extent of inflammatory action. The pain is naturally greatest in those parts of the body where the eruption is most extensive, as, for example, in the face and on the backs of the hands. This pain may be diminished by hot fomentations, which appear to hasten the stage of suppuration.

For the control of bleeding in hemorrhagic smallpox, Goodall and Washbourn recommend the use every three or four hours of a mixture containing from 20 to 25 drops of oil of turpentine and $\frac{1}{2}$ drachm of fluid extract of ergot. Local treatment must frequently be adopted; some writers advocate astringent remedies, but the application of ice to the bleeding parts affords the best chance of success.

The rise of temperature during suppuration ordinarily commences about the eighth day, and may continue, with slight oscillations, until the twelfth day. During this period the employment of stimulants and of tonics is perhaps most imperative, since it is during this stage that the pulse is weakest and that symptoms of heart failure may be present. Should the pulse continue to be unsatisfactory in spite of the administration of brandy, or other form of stimulant, the use of cardiac tonics becomes imperative. Strychnine and digitalis may

be given in suitable doses by the mouth, or, when the symptoms are more urgent, strychnine should be administered subcutaneously, either separately or with ether. During the stage of suppuration the use of carbolic or olive oil should be continued, while comfort may be greatly increased by frequent sponging with a solution of corrosive mercuric chloride, 1 in 2000. The eruption in uncomplicated cases ordinarily subsides from the eleventh to the thirteenth day, the pustules being converted into scabs, which gradually dry and separate, while the inflammatory thickening of the skin diminishes rapidly. This stage practically forms a short prelude to convalescence, and meanwhile, when unaccompanied by complications, the treatment should consist in the continued use of antiseptic lotions and in the employment of tonic remedies, such as quinine, strychnine, and iron, together with a fairly liberal diet.

The complications which may arise during an attack of smallpox are numerous and important. During the course of this disease ulceration of the cornea may occur, and this condition demands prompt action on account of the danger of the formation of a permanent opacity. This ulceration is to be dealt with by the application of silver nitrate, to be followed by cold compresses. Should the pain be very severe, opium should be administered, and when there are indications of inflammatory action in the iris, atropine should be applied locally.

The eruption occasionally affects the mucous membrane of the mouth or the fauces. In the mouth it causes much pain and distaste for food, and necessitates the use of disinfectant solutions, such as potassium permanganate or diluted chlorine water. When the fauces are affected urgent symptoms may arise, owing to the interference with respiration by consecutive œdema. This œdema is comparable to that which occasionally occurs in the course of acute renal dropsy, and the symptoms may often be sufficiently urgent to call for tracheotomy.

To avoid eye complications with smallpox the utmost cleanliness is essential. The lids and conjunctiva should be bathed frequently with lotions of boric acid and potassium permanganate. Goodall and Washbourn recommend the following ointment for suppuration of the Meibomian glands or hair sacs :

R.—Hydrargyri oxidi flavi	gr. xvj.
Acidi borici	gr. xx.
Cocainæ hydrochloratis	gr. x.
Petrolati molle	℥j.

Other complications connected with the eruption are erysipelas, gangrene, or the formation of abscesses. In addition to the treatment adopted for these conditions under ordinary circumstances, these complications should entail the free use of stimulants and of a nutritious form of diet.

Pulmonary complications sometimes arise in the course of small-pox, or they may even make their appearance after convalescence has apparently become established. Of these the most important are pneumonia and empyema. Their treatment in no way differs from that usually adopted for these diseases, but, since the patient is already in an extremely debilitated condition, stimulants and tonic remedies must be freely used.

During the period of convalescence the separation of the scabs may be hastened by the frequent use of warm baths, and the risks of infection may be diminished by inunctions of olive oil or of glycerin, which favor the detachment of epithelial scales in the bath, while they diminish the risks of aërial infection. The warm bath may with advantage be frequently impregnated with disinfectant solutions.

Chicken-pox (*Varicella*). This affection is in general so mild that it does not call for any special treatment. The chief indications are to save the patient from disfigurement and to prevent complications and the spread of the disease. The appearance of the rash may occasionally be accompanied by mild febrile symptoms, which will afford justification for keeping the patient in bed, but frequently these may have escaped notice until the rash claims attention; isolation should then be enforced until all the scabs have become detached.

Care should be taken to prevent the child from picking or scratching the scabs, since the early detachment may favor suppuration and destruction of tissue. The irritation may be allayed by the use of mild alkaline lotions, but with young children it is often necessary to make them wear fingerless gloves or even to tie the hands, to prevent restlessness. If the rash affects the scalp it will be desirable to cut the hair short, to avoid matting and to promote cleanliness. When, in spite of these precautions, thick scabs and sloughs form, they should be removed by poultices, and the raw surface should be dressed with antiseptic applications. The formation of sloughs usually calls for the administration of quinine or nux vomica, together with stimulants.

The limitation of movements involved in isolation ordinarily

leads to the need of an occasional saline purge, and perhaps also to the administration of a mild diaphoretic and diuretic mixture. The possible occurrence of nephritis, and of cutaneous ecchymoses and hemorrhage from mucous membranes, should be borne in mind.

Scarlet Fever (*Scarlatina*). During the initial stage of scarlet fever some uncertainty may be felt as to the nature of the disease, though a provisional diagnosis may be made from the appearance of the throat, from the frequency of sickness, and from the rise of temperature, and additional probability is lent to this diagnosis if the occurrence of other cases of scarlet fever in the neighborhood has already been recognized. This provisional diagnosis should lead to the adoption of the measures already detailed for guidance in dealing with Specific Infectious Diseases (see p. 419), and although in this disease the risks of infection are greatest during the stage of desquamation, there is strong probability that to a lesser extent the disease is infectious from its commencement.

The treatment should commence with the administration of a saline purgative, which will be equally serviceable whether the case ultimately proves to be one of simple tonsillitis or of scarlet fever, and also with the employment of a stimulating diaphoretic mixture containing spirit of nitrous ether and liquor ammonii acetatis. In mild cases very little medicinal treatment is ordinarily required, but it is essential that the patient should be kept in bed for at least a fortnight, and that he should subsequently be kept in a room of even temperature until desquamation has entirely ceased. This involves isolation for a period which varies from four to six weeks after desquamation has commenced.

During the early febrile condition, light liquid nutritious diet must be given, and this is necessitated both by the febrile state and by the soreness of the throat; even after the fall of temperature it is advisable to maintain the use of liquid diet until desquamation is well advanced and until frequent examinations of the urine have shown the constant absence of albuminuria. In addition to these daily examinations of the urine, it is desirable to take the temperature repeatedly, even though the general condition appears to be satisfactory, since a sudden rise of temperature often affords the earliest indication of complications or sequelæ of this disease.

It is sometimes recommended that tincture of aconite should be given during the initial rise of temperature, and it has been asserted that this drug causes reduction of temperature and diminution of

inflammatory action in the fauces. In mild cases, however, tincture of aconite does not appear to be required, while in severe cases its depressant action may be extremely undesirable. Antiseptic gargles may relieve pain in the fauces and may also be of service in controlling local action, but in mild cases they are rarely required, the large majority of patients with scarlet fever needing extremely little treatment other than isolation and protection during the stage of desquamation.

The Medical Officer of Health for Leicester, Dr. Munk¹ (*British Medical Journal*, 1897, vol. ii. p. 1435), has given the treatment with the hot acid bath a trial at the Borough Fever Hospital of that town. The acid bath treatment consists in bathing the scarlatinal patient in water at 102° F. containing $\frac{1}{2}$ an ounce of commercial sulphuric acid to every 10 gallons of water. The patient is kept in this bath and sponged for about twenty minutes, and then enveloped in flannel in bed. Usually he perspires freely, and is then sponged with tepid water every three or four hours as long as the temperature remains above normal. Dr. Munk concludes that the statement made that under this treatment there is no desquamation is not correct, but there is certainly considerable improvement in the mode and rapidity of shedding the dead epithelial scales. There does not appear, however, to be any ground for believing the infectivity of the case is shortened in duration, for 3.6 per cent. of the cases were followed by "return" cases, and there is no convincing evidence that the mortality was lessened in comparison with the mortality of patients of the same age treated in other ways.

It is relatively rare for the pyrexia of scarlet fever to require treatment, and this circumstance is peculiarly fortunate, since most of the measures at our service for reducing temperature are contraindicated in this disease—antipyretic drugs by their depressing influence, and cold baths and cold compresses by the risk of developing complications. When hyperpyrexia arises it must be dealt with by warm sponging instead of cold applications, and the warm sponging must be rapidly performed, so as to cause as little exposure as possible.

With the view of reducing the fever in hyperpyrexia it has been recommended that iced water should be given frequently, that nourishment should be given cold, and that small, cold rectal enemata

¹ Quoted from the Year-Book of Treatment, 1899, p. 155.

should be employed from time to time. The employment of the warm bath is, as a rule, preferable to these measures, since it may favor free diaphoresis; it is not, however, devoid of risk unless extreme care is taken to prevent chill. On removal from the bath the patient should be rapidly dried with warm towels and quickly enveloped in warm flannel garments, which will serve to maintain the diaphoresis initiated by the bath.

The principal complications which occur in connection with scarlet fever are those affecting the kidney, the auditory organs, and the glandular system, and of the three the renal changes are by far the most serious. Even in mild cases of scarlet fever small traces of albumin may frequently be passed during the febrile stage, but these usually disappear as the temperature falls. It has been considered probable that these mild forms of febrile albuminuria may indicate toxic influence upon the renal vessels. This type of albuminuria obviously does not call for treatment other than the continued use of a liquid dietary.

During convalescence acute nephritis may occur, this special form having received the name of scarlatinal nephritis. To some extent this complication appears to result from exposure to cold, but it is largely influenced by atmospheric conditions. The treatment of this condition has already been described under the heading of Scarlatinal Nephritis.

During convalescence inflammation of the middle ear may sometimes arise. This is always associated with severe pain, and may lead to suppuration, which in turn, unless relieved, may cause destruction of the middle ear and perhaps form the foundation for meningeal disease. Hence, when indications of otitis media are found, prompt measures should be adopted for its relief. Pain may be controlled by warm applications over the ear, or, with greater certainty, by the vapor of chloroform, which may conveniently be used by warming a small tumbler or teacup with warm water, and then putting into it a small piece of sponge or a few slips of blotting-paper, upon which 10 to 20 minims of chloroform are dropped. If the glass is then closely applied to the side of the head so as to include the ear, the vapor which arises penetrates the meatus and relieves pain. The membrane should always be examined when there is any complaint of pain. Sometimes it is found that it is already perforated; but if there is any bulging of the membrane a small puncture should be made to allow of the exit of

fluid, and subsequently further relief may be afforded by the use of dilute warm solutions of borax or of zinc sulphate.

Glandular enlargements may occur in connection with otitis media, and they are not limited to the lymphatic glands of the neck. The treatment of these enlargements depends upon indications of suppuration. When associated with fluctuation and with much throbbing pain they should be freely incised, but if they assume a more chronic type they call for tonic treatment, pending perhaps the subsequent adoption of surgical measures for their removal.

Other complications which may arise in more insidious forms are those connected with the heart and with the organs of respiration. Pericarditis may occur during an attack of scarlet fever, while endocarditis may develop more gradually during convalescence. Pleurisy also is frequently of very slow onset during the stage of convalescence, and is of especial importance, since it often assumes the form of empyema. In the treatment of scarlet fever, therefore, frequent examinations of the heart and chest should be made. The cardiac changes are sometimes associated with arthritic pains and with the development of chorea. Hence, the early recognition of these complications should entail additional care and treatment during convalescence.

During the stage of desquamation warm disinfectant baths should be used repeatedly, and inunctions of oil and glycerin should be employed. Thus the risk of infection may be diminished, and much of the itching which so frequently accompanies convalescence may also be relieved. Tonic remedies may also be administered if there is much weakness, and for this purpose the syrup of ferrous phosphate and the syrup of ferrous iodide are very valuable.

Measles (*Morbilli*). The comparatively mild course of uncomplicated measles is generally well recognized, and frequently tempts parents to consider that the disease, as a rule, requires no treatment beyond isolation and nursing. This is certainly true when once the true nature of the disease has been recognized and so far as uncomplicated cases are concerned. During the stage of invasion, however, the catarrhal symptoms frequently call for treatment, and, moreover, during this stage the diagnosis is often very obscure unless the existence of an epidemic is known. The onset, marked by coryza and sneezing, is within a few hours frequently accompanied by troublesome cough.

The chief indication of the specific nature of the disease is often

to be found in photophobia, with some redness of the eyes and eyelids. During the stage of invasion other symptoms may arise, as, for example, vomiting and headache, while occasionally some complaint is made of soreness of the throat. The temperature during the initial stage may range from 103° to 104° F. Should there be any suspicion of measles, the treatment already indicated for Specific Infectious Diseases (see p. 419) must be initiated. To avoid spread of the disease the child must be isolated, but very frequently it will be found that if the prevailing epidemic is of a mild type the parents prefer letting all the children of the family contract the disease together to avoid further trouble, so that although full instructions for isolation may be given, it is not uncommon to find that all the children in the family who have not already had measles are sleeping in the same room.

At the commencement diaphoretic measures are frequently of some service. Certainly, the characteristic eruption often appears to be favored by the use of simple diaphoretics and of warm clothing, and, further, on account of the photophobia, it is desirable to limit the amount of light entering the room during the early days of the fever.

The high temperature indicates the necessity for liquid food, while the catarrhal symptoms and the soreness of the throat render demulcent remedies of service; hence, the treatment ordinarily adopted includes the administration of ammonium acetate, to which ipecacuanha wine may be added to relieve the catarrhal trouble. Simple throat lozenges or preparations of licorice are frequently of use in allaying throat symptoms, and to some extent they may diminish the cough.

When the eruption is well developed and the temperature falls, the diaphoretic remedies may be discontinued, though mild salines may be given with advantage until convalescence is fully established. The risks of infection in the case of measles are greatest during the early catarrhal stage, but even when catarrhal symptoms have greatly abated, the patient may continue to be highly infective during the stage of convalescence and desquamation. Hence, although the child may seem perfectly well when the eruption is fully developed, isolation must still be insisted upon; and, as in scarlet fever, the risks of infection may to some extent be subsequently diminished by the use of warm baths and of inunctions of olive oil to which carbolic acid has been added.

An additional reason for continued care lies in the frequency with which pulmonary complications may arise. If it were not for complications, measles would be a comparatively unimportant disease, but the early catarrhal condition may readily lead to indications of severe bronchitis, or, more commonly, of bronchopneumonia. This complication must be treated upon the principles already laid down, and its dangers depend partly upon the age of the child and partly upon the extent of lung attacked. Of the other complications or sequelæ of measles, the most important is the rapid development of tubercular changes which may involve the bronchial glands or lead to miliary tuberculosis. This complication is, of course, extremely difficult to avoid in those individuals who, by hereditary weakness, are prone to develop any tubercular infective material which may be inhaled or otherwise acquired.

Independently of these more serious complications, cough may often be extremely troublesome from laryngeal or pharyngeal catarrh, and may necessitate the employment of alkaline remedies or of various forms of linctus. Ammonium carbonate or ammonium chloride may be given with ipecacuanha wine, spirit of chloroform, and syrup of tolu, while sometimes in older children the frequency of the cough may be further reduced, either by the continuous employment of a steam kettle near the bed, or by the occasional use of inhalations of compound tincture of benzoin, or of sprays of glycerin and carbolic acid.

When, in spite of these remedies, bronchial symptoms develop, it is well to employ some stimulating application over the thorax and subsequently to use a cotton-wool jacket.

When the temperature is very high before the full development of the rash, the body may be sponged with tepid water, or a warm bath may be given. These measures are particularly serviceable when the eruption appears late, or when, perhaps in consequence of chill, a brilliant eruption suddenly fades prematurely. These conditions are ordinarily associated with severe headache, or possibly with convulsions, and they call for diaphoretic remedies and for warm baths to favor the reappearance of the rash.

Inflammation of the middle ear may arise and lead to suppuration and to perforation of the membrana tympani, but these complications are somewhat less frequent than with scarlet fever.

During convalescence the utmost care should be taken to avoid exposure to cold, and, in addition to the use of warm clothing, an

even temperature should be maintained in the room. Convalescence may be hastened by the use of tonic remedies, such as quinine and iron, in doses adapted to the age of the patient.

German Measles (*Rötheln* or *Rubeola*). The treatment of this disease should be the same as that adapted to mild forms of measles, though the general course frequently renders special treatment, beyond isolation, comparatively needless. The temperature very rarely rises much above 100° F., and the rash is, as a rule, unaccompanied by any severe complications. In some rare epidemics pneumonic symptoms have been present, while albuminuria may also be met with. In general, however, in spite of the development of the rash, the child feels so well that it is difficult to insure isolation or even to keep him in bed.

During convalescence mild tonic remedies may be administered if the appetite shows any signs of failing.

Mumps (*Epidemic Parotitis*). This infectious disease is in the main to be treated with the view of diminishing the risks of its extension or of the development of complications after exposure to infection. The first symptoms may not make their appearance until some two or three weeks have elapsed from the time of infection. The initial stage is then marked by a rise of temperature and by some complaint of pain in the region of the parotid gland. The febrile condition indicates the need for purgatives and diaphoretics, and of these two classes of remedies the former is the more serviceable. The latter may not be needed, since the temperature rarely rises much above 101°.

The pain in the region of the parotid gland can be relieved by warm applications. These are sometimes avoided, owing to the supposed risk of favoring suppurative changes, and consequently attempts are frequently made to relieve pain by placing two or three leeches over the swollen gland. Suppuration is, however, practically unknown as a complication, and, on the other hand, the relief afforded by hot fomentations and by stimulating liniments is beyond dispute. The addition of a few drops of laudanum or of belladonna and glycerin will often serve further to diminish the pain. The swelling and pain of mumps are also said to be rapidly relieved by inunctions with the following ointment :

R.—Ichthyol,
Lanolin, ãã partes æquales.—M.

From the commencement of the disease the inability to open the mouth to any extent will necessitate the employment of liquid nourishment. This may consist of milk and of beef-tea, or, when there is much weakness, the more concentrated forms of meat essences may be used, either as a liquid or in the form of a jelly.

Orchitis is the principle complication which may either arise in the course of this disease or may occur subsequently. The resulting pain may be relieved both by fomentations and by poultices, though in some instances the application of ice bags appears to be more serviceable. The occurrence of this complication during convalescence is an indication for absolute rest in bed, and it may be mentioned that this trouble arises comparatively rarely when the patient has been kept in bed so long as there is any enlargement or tenderness of the parotid glands. Although the disease frequently affects both parotids, the one becoming enlarged and painful as improvement occurs in the other, the course of treatment is in no way to be modified on this account.

Whooping-cough (*Pertussis*). It is perhaps scarcely necessary to enter into much detail regarding the prominent symptoms of whooping-cough, since the cough itself is so characteristic, with its succession of spasmodic expiratory efforts, followed by long-drawn, noisy inspiration, that, when once heard, it is never likely to be forgotten. It occurs most commonly in children, but cases may be met with at almost any age. Frequently it may commence as an apparently simple cough, and it is distinctly contagious before the characteristic whoop occurs. The child may exhibit symptoms of a catarrhal nature for a week or so, and during this time, if no epidemic exists in the neighborhood, their true nature may be overlooked. The cough, however, steadily increases in severity, and by degrees assumes a paroxysmal character, until finally the characteristic whoop is heard.

The disease is associated with numerous and important complications, which differ, however, to some extent with the time of year, bronchitic troubles being most frequent during the late autumn and early spring, while during the summer months the chief trouble is generally to be found in the frequency with which vomiting follows the cough, and tends to produce considerable inanition.

Whooping-cough long shared with diphtheria the undesirable character of affording scope for continuous therapeutic activity; at one time endless lists of specifics were recommended for these two

diseases, and certainly, so far as whooping-cough is concerned, the latest specific is generally the one which gives the greatest satisfaction for a time, but with increased opportunities of observation its beneficial action seems less certain, and ultimately nearly every specific that has been recommended is gradually relegated to oblivion. No practitioner who has had extensive experience in the treatment of children's diseases will probably care to dissent from this somewhat gloomy estimate of the power of drugs in this disease, and it can only be hoped that inasmuch as whooping-cough is in all probability due to the presence of a bacillus, this bacillus will eventually be recognized, and that we may be provided with some new method of treatment which will be as certain in its operation as antitoxin is in the treatment of diphtheria.

Meanwhile, although the treatment is unsatisfactory, it is necessary to offer some indications of the course of action which perhaps gives the best results, and it is still more necessary for the practitioner to impress upon the parents the gravity of this malady and the dangers which may arise unless appropriate precautions are taken, since there is a great tendency to consider that the disease is *only* whooping-cough, and, therefore, of no importance, since, like other infectious fevers, it must run its natural course.

During the early stage, when catarrhal symptoms are present, there may be a slight rise of temperature, and this alone should indicate the importance of employing some mild saline mixture and also of keeping the child in the house, and perhaps in bed, if the temperature is at all above 100° F. Although in the summer months whooping-cough may be comparatively mild, the tendency to the occurrence of lung changes has always to be counted upon, and these may include bronchitis, pneumonia, or even pulmonary collapse.

When the disease is fairly established various antispasmodics may be employed, and of these the most favored are belladonna, potassium bromide, and chloral. Of the three, belladonna gives the best results in checking the violence and the frequency of the cough. To be of any service it should be given in comparatively large doses, and it is worth remembering that children relatively bear belladonna much better than adults. In using the tincture of belladonna it is well to commence with small doses, such as $\frac{1}{2}$ to 2 minims, and to increase the amount administered as toleration becomes established, until as much as 5 minims may be given in a single dose. The ex-

tract has often been recommended in preference to the tincture. It has the inconvenience of being necessarily administered in pill form, which may present disadvantages to small children; if the extract is used, it should be given in doses of $\frac{1}{10}$ of a grain three times a day; this dose often requires to be repeated until physiological symptoms are produced.

To some extent belladonna is of indirect service when administered in combination with sodium bicarbonate, since it then serves not only to allay the cough, but also to diminish the tendency to vomiting. The belladonna treatment of whooping-cough is not always satisfactory, and the development of undue physiological symptoms may call for a diminution of the dose, even though the continuance of the cough might indicate the need for an increase.

Both potassium bromide and chloral hydrate are useful in diminishing the frequency of cough, especially when it appears to follow as a reflex act after slight irritation, such as might be produced during the time that food is being taken. These drugs are, however, very often of great service when administered at night, since their hypnotic action lessens the tendency to cough, and by encouraging sleep diminishes the exhausting character of the disease. None of these three can be regarded as in any sense curative. They merely serve to tide over the duration of the disease with somewhat less discomfort and somewhat less interference with the general health, and they are only to be used alone when the physical signs indicate the comparative absence of bronchitic or of pulmonary changes.

In a considerable number of cases it will be found that the bronchitic or pneumonic complications—the latter being generally of a catarrhal form—necessitate the use of remedies which will favor the removal of expectoration; in other words, it is often essential to treat children as though the disease consisted solely of bronchitis or pneumonia.

Violent fits of coughing may produce vomiting, hemorrhage, or other complications, which will then call for special treatment.

I have tried most of the various specifics that have been recommended in the treatment of whooping-cough, and those which appear to me to offer the most hope are those possessing antiseptic powers, such as carbolic acid, used preferably as a spray, rather than by impregnating the atmosphere of the room with the vapor of the acid. It has been rather quaintly claimed in favor of vaporizing carbolic acid in the sick-room, that it makes the atmosphere sufficiently

unpleasant to secure the absence of those who are not wanted there.

The same benefit may be obtained from a method which has been strongly recommended—namely, the similar impregnation of the atmosphere with fumes from burning sulphur. This process is ordinarily reserved for the disinfection of the room after the convalescence of the patient, but I have seen this treatment adopted for long periods, even during the early stages of the disease, when the amount of sulphur dioxide in the atmosphere was sufficient to insure coughing whenever the room was entered. The sulphur fumes, so far as my experience goes, are of very little service, and the same may be said of the use of fumes of carbolic acid, though the carbolic acid in the form of spray may be more useful. In this last-named, however, it is possible that some of the benefit results from the local sedative action of the drug, and from the soothing influence of the vapor which enters the respiratory organs with the carbolic acid.

Both carbolic acid and sulphur have been applied locally over the pharynx and fauces, but these applications are extremely likely to be followed by coughing, and indeed any irritation of the fauces will frequently serve to provoke the paroxysms.

Of late years bromoform has been strongly recommended, and it has been credited with being able not only to diminish the number, duration, and severity of the attacks, but also to allay vomiting. Bromoform is administered in doses of from $\frac{1}{2}$ to 2 minims, according to the age of the child, and it may be given in capsules containing the above dose dissolved in oil, or it may be mixed with syrup and with mucilage, and taken as a mixture three or four times a day. When bromoform is pure it possesses an agreeable odor and a somewhat sweet taste, but under the influence of direct sunlight it is very rapidly decomposed, and then these characters are changed, and the greatest difficulty will be experienced in attempting its administration. I have employed this drug somewhat largely, and have found that it does not materially shorten the course of the disease, and I have also been unable to convince myself that it possesses any marked power of diminishing the severity of the various paroxysms.

Pertussine, a proprietary preparation which is said to contain 1 part of thymol and 7 of syrup, at first appeared to diminish the frequency of cough, and I found that the number of whoops in the twenty-four hours increased whenever the administration of pertus-

sine was discontinued. After further experience, however, of the action of pertussine, I have become convinced that it cannot claim the position of a specific for this disease.

Heroin is another remedy of recent introduction. This is a modification of morphine, which has been introduced as a substitute for the latter drug, and is said to be devoid of the power of producing narcosis when employed in comparatively small doses. My experience with this drug, however, is so recent that I am unable to speak with any certainty as to the results.

When bronchitic symptoms are present there is some advantage in the employment of inhalations or sprays of various volatile substances, such as turpentine, terebene, eucalyptus oil, or peroxide of hydrogen. Some of these may be given internally, as well as used as a spray or inhalation, as, for example, the oil of turpentine or oil of eucalyptus. Although it has been claimed for these that they possess antiseptic powers, they appear rather to relieve the bronchitic element of trouble than to influence the course of the disease.

There can be no doubt that the course of this disease is often greatly prolonged by association with other sufferers, and also by the establishment of a curious reflex excitability closely allied to habit. Both these causes, which may induce an abnormal duration of the disease, can readily be controlled, the former by a change of air and surroundings as soon as the catarrhal symptoms have disappeared, the latter by the employment of one or more of the sedative remedies previously enumerated. In addition to sedatives, convalescence may often be hastened by the use of tonic remedies. I have frequently witnessed much benefit from the employment of a mixture containing tincture of ferric chloride, potassium chlorate, and very small doses of tincture of opium, and this mixture appears most serviceable when the conditions permit of free ventilation of the rooms occupied by the child, and of exercise in a garden or in fields, where there are no risks of spreading the disease. In weakly children cod-liver oil is also of great value during convalescence; it assists nutrition, and it favors greater regularity of the intestinal functions. As in other diseases, however, its laxative properties call for caution, since they may induce troublesome and exhaustive diarrhoea, which would directly defeat the chief object of its employment.

With regard to the different complications of this disease, reference has already been made to the frequency of bronchitis and other pulmonary conditions, which demand special treatment. Various

forms of hemorrhage may arise from overstrain of the smaller vessels during the violent expiratory efforts; these hemorrhages, although they alarm the friends, are generally of comparatively little importance, and rarely call for separate treatment. The most common forms are epistaxis, hemorrhage from the gums and the mouth, and subconjunctival hemorrhage. In addition, albuminuria and more rarely hæmaturia may be met with; they are both due to overstrain of vessels, and neither cause other symptoms nor lay the foundation for chronic forms of renal mischief; in fact, they serve merely as additional indications of the severity of the attack of whooping-cough; but they do not add to its risks nor entail modifications of treatment.

The frequent recurrence of vomiting is much more important, since this so seriously threatens nutrition. Some children vomit during every fit of coughing, the sickness resulting in part from the reflex irritation of the pharynx and in part from the violent spasmodic movements of the abdominal muscles. Sickness is most likely to occur when the attack of coughing commences during the time that food is being taken, and this result is favored when the food is of an unsuitable character. The diet in these cases should be of a fluid nature, and it should be as nutritious as possible. When, however, the stomach has been emptied during the paroxysm of cough, it is advisable to give nourishment so soon as the attack is over, so as to favor its retention and absorption; but if digestion appears much impaired, and if the cough is very frequent, it is desirable to promote absorption by giving the food in a peptonized form, and perhaps to favor digestion and to counteract depression by the addition of a few drops of brandy.

CHAPTER XIX.

SPECIFIC INFECTIOUS DISEASES—*Continued.*

Typhoid Fever (*Enteric Fever, Typhus Abdominalis*)—Treatment of Associated Symptoms: Hyperpyrexia, Diarrhœa, Nervous Symptoms, Hemorrhage, Perforation, Convalescence—Typhus Fever (*Typhus Exanthematicus*)—Relapsing Fever (*Febris* vs. *Typhus Recurrens*)—Epidemic Influenza (*La Grippe*).

Typhoid Fever (*Enteric Fever, Typhus Abdominalis*). The treatment of typhoid fever has been very largely influenced by the increased knowledge of the pathology of this disease; the recognition of its dependence upon the introduction of Eberth's bacillus renders the rational treatment of the disease more satisfactory, even when the symptoms may be so mild as scarcely to call for special treatment. The pathological changes due to infection with this bacillus, the lesions in the lower part of the small intestine, the enlargement of the spleen, and the characteristic course of the temperature, are the features which are ordinarily present in every case, and are so well known as to need no detailed description here. The association of such symptoms as headache, nausea, epistaxis, and occasionally much sense of fatigue may mark individual cases.

Among other symptoms which may be present or absent, either in the individual case or occasionally in the course of epidemics, may be mentioned the characteristic typhoid rash of rose-colored spots scattered over the abdomen and over the lower part of the chest, the occurrence of diarrhœa, which is ordinarily associated with some tympanitic distention, and the development of marked indications of weakness, constituting the so-called typhoid state.

Any of the above symptoms may perhaps call for modifications of the general plan of treatment which is indicated by the presence of the bacillus; and, further, the treatment must be radically changed whenever marked complications occur, such as severe and protracted diarrhœa, intestinal hemorrhage, perforation, hyperpyrexia, secondary congestions—as, for example, of the lung—or progressive cardiac weakness, or rather symptoms which may interrupt the progress of the disease or occur even during the stage of convalescence. The treatment, therefore, of typhoid fever must naturally be divided into

the hygienic, dietetic, and medicinal treatment of simple uncomplicated cases, and the special forms of treatment demanded by the various associated symptoms, complications, or sequelæ.

Prior to the recognition of the dependence of this disease upon bacillary growth, it was well-known that numerous cases of typhoid fever ran through a perfectly simple course, independently of any treatment other than the modification of hygienic and dietetic conditions; and, in fact, in children or young adults, provided that reliance can be placed upon the nurses, there is frequently no call for the use of medicines until the stage of convalescence has been reached. On the other hand, however, in some instances medicinal treatment undoubtedly appears to modify the severity of the attack and even to shorten its duration.

The hygienic measures mainly concern those brought into contact with the patient, since the possible spread of the disease is largely under their control. The selection of the sick-room, its temperature, light, and ventilation, the arrangement of the bed, and the necessary disinfectant measures have already been dealt with in the section on the General Management of Specific Infectious Diseases (p. 419).

The judicious control of a patient with typhoid fever is so important that the care should never be left in the hands of friends. One, two, or more nurses should be engaged, according to the severity of the case. The employment of nurses is the more important, since in this disease abrupt changes of symptoms may indicate the need for prompt alteration of treatment; and, moreover, even in mild cases, a nurse is, as a rule, more to be trusted to withstand the patient's entreaties for food during convalescence.

Since the spread of this disease is effected by the excreta, great care must be taken to disinfect the motions and to insure cleanliness. Under judicious management there is but little fear of the spread of the disease, either to those who are engaged in nursing or to others with whom the attendants may come in contact. But since the body and the clothes may become soiled by excreta, it is always desirable to have near the bedside some disinfectant solution, as, for example, a solution of carbolic acid or of corrosive mercuric chloride, with which the hands may be cleansed after handling the patient.

Even when the case is not marked by high temperature, comfort may be increased and risks of spread of the disease may be dimin-

ished by daily sponging with a moderately warm disinfectant solution.

It is also necessary to have a mackintosh sheet at hand in case measures for the reduction of temperature have to be undertaken. Further, inasmuch as headache frequently forms a prominent feature during the early days, it is well to have the hair cut short, so as to facilitate the application of cold to the head if necessary. In female patients this measure may perhaps be delayed, except in severe cases, though there is but little advantage in the delay, since ordinarily the hair falls out during the course of the fever or during protracted convalescence.

During the fever the diet requires constant care, and the chief indications are the avoidance of solids and also of highly concentrated forms of diet. There is no doubt that the protest against the employment of strong meat essences is well founded, and that although the fever necessarily reduces the strength, a large element in the altered appearance of the patient is due to the rapid loss of liquid which ensues, either as the result of high temperature and increased evaporation from the skin and from the lung, or still further as the result of profuse diarrhœa. This liquid must be replaced, if possible, and this affords an indication for an increased amount of water in the dietary rather than for the use of a highly concentrated diet. On the other hand, the lesion in the intestine is a sufficient argument against the use of solid forms of diet which leave indigestible waste material to act as an irritant, and so promote diarrhœa. The best form of diet, therefore, in typhoid fever is one which includes milk and beef-tea, both being given in tolerably dilute condition, so as to promote the introduction of the necessary quantity of liquid. During the height of the fever the milk and beef-tea should be given alternately every two hours in mild cases, every hour in severe cases, and the bulk should amount to about 4 pints in the twenty-four hours. Of this quantity from 2 to 3 pints should consist of milk, and the remaining supply of liquid may consist either of water with which the milk or beef-tea is diluted, or of barley water, which may be used for the same purpose.

The proportion of milk as well as that of beef-tea must be regulated to some extent by the digestive powers of the individual. It is sometimes found that the milk is scarcely digested, and gives rise to white, curdy motions. Under these circumstances it may be desirable, or even necessary, to discontinue the employment of milk,

more particularly if the curd in the motion is found in connection with diarrhœa. For a time this symptom may be avoided by giving chicken broth well diluted, or beef-tea, or attempts may be made to use whey instead of milk ; but in cases of severe diarrhœa, still better results may be obtained from the white of egg mixture, which may be rendered more beneficial by the addition of small quantities of brandy. In the ordinary course the amount of liquid taken every hour should be from 3 to 4 ounces, whether this consists of milk diluted with barley water or of similarly diluted beef-tea or chicken broth ; if the other symptoms indicate the need for stimulants, these are best given with the ordinary nourishment in small doses distributed over the twenty-four hours.

During the height of the fever it is undesirable to employ any other diet than that above indicated. Certainly, it is somewhat perilous to administer any solids during the time that ulceration is proceeding in the small intestine, and the peril is still greater during the third and fourth weeks of the fever, when the sloughs are separating, and risks of perforation and of hemorrhage are thereby increased.

As the patient progresses and the fever indicates the well-known oscillations characteristic of the termination of the acute stage of the attack, complaint will probably be made of considerable hunger and of the insufficient diet, but all entreaties for more food should be resisted until the temperature has for ten days or a fortnight been at the normal point or subnormal. From time to time it has been recommended that with the fall of temperature a more liberal diet should at once be commenced, and successful cases have been reported in support of this mode of treatment. It has also been stated that it is essential to feed up the patient as soon as convalescence commences ; of course, the value of this statement depends upon the date at which convalescence is to be considered as initiated, since obviously it is impossible to consider that in all cases solid food may be taken without risk when the temperature first reaches the normal. Doubtless some cases may do well even with this early resort to solid food, but the fall of temperature is not necessarily an indication that the ulcerative process in the intestine has ceased, still less that the surface has healed.

Reference has already been made to the administration of alcohol in typhoid fever and to the advisability of distributing the doses evenly over the twenty-four hours. In many cases, and espe-

cially in young adults, no stimulant is required; but during the stage of convalescence, digestion and appetite appear to be promoted by small amounts of alcohol. The indications for the administration of stimulants during the fever are to be found chiefly in the character of the pulse. When the pulse becomes weak, irregular, and rapid, out of all proportion to the temperature, stimulants will probably be of service, and especially in those cases in which these alterations in the pulse are associated with weakness of the nervous system, indicated by delirium or by sleeplessness.

The character of the tongue is sometimes mentioned as calling for the use of stimulants, the dryness and tremor, with much brown fur, being considered special indications. This is occasionally true. I have often seen the appearance of the tongue improve greatly after the moderate employment of stimulants; but, on the other hand, there has sometimes been strong reason for believing that the above-mentioned characters of the tongue were perhaps attributable to the employment of alcohol in overdoses. It is better, therefore, to look to the pulse and to the mental condition of the patient than to the tongue for indications for prescribing stimulants.

During the height of the fever the amount administered may require to be from 4 to 8 ounces, and, as in other diseases necessitating the employment of whiskey or brandy, it is desirable to reduce the amount given at the earliest possible moment. There is one symptom, however, which is frequently very amenable to the use of stimulants—namely, sleeplessness, which in an exaggerated form has been described under the name of *coma vigil*. The patient lies flat on his back, with the eyes partly open, perhaps with some slight muttering delirium, but otherwise without any complaint, and this condition of sleeplessness may be continued for many hours or even days, unless interrupted by the use of some stimulant such as whiskey or brandy. In such cases, instead of distributing the alcohol evenly over the twenty-four hours, small doses may be given during the day and a larger dose administered at night-time, but even then the amount given in the single dose should not exceed from 1 to 2 ounces.

The form of stimulant demands a passing reference. During the fever the greatest amount of benefit appears to result from the use of good brandy or good whiskey, which may be taken without any inconvenience if a sufficiently small dose is well diluted. During convalescence, on the other hand, the alcohol should preferably be administered at the time of taking solid food, and since the stimu-

lants already mentioned might at this time cause some distaste for food, or even provoke nausea, it is better to give champagne or port wine, either of which may be more readily taken.

Mention has already been made of the comparative unimportance of medicinal treatment in many simple, uncomplicated, mild forms of typhoid fever; but, having regard to the pathology of this disease, there can be no doubt of the advisability of employing measures calculated to reduce the activity of the typhoid bacillus, and this forms the *rationale* of the antiseptic treatment of typhoid fever. Apart from these measures, however, when the onset of the disease is marked by constipation, the amount of headache may to some extent be reduced by the cautious employment of a saline purge, and this may be followed by the administration of a simple diaphoretic and diuretic mixture, containing, for example, spirit of nitrous ether and solution of ammonium acetate. There is no advantage, however, in employing large doses of these remedies, since it is improbable that they serve to reduce the temperature or to curtail the course of the disease. The utmost advantage that can follow their employment lies in the removal of nitrogenous waste, and in the substitution of a moderate degree of perspiration for the dry, harsh heat of the fever. If diaphoretic remedies are given lavishly, they may serve to produce considerable perspiration of an exhausting character.

One form of antiseptic treatment consists in the administration of a dilute solution of free chlorine water, to which other remedies may be added, such as quinine. My colleague, Dr. Burney Yeo,¹ who has employed this mixture largely, gives the following directions for the preparation of this solution:

“Into a 12-ounce bottle put 30 grains of powdered potassium chlorate, and pour on it 60 minims of strong hydrochloric acid. Chlorine gas is at once liberated. Fit a cork into the mouth of the bottle and keep it closed until it has become filled with the greenish-yellow gas. To hasten this you must keep shaking the mixture of acid and chlorate. Then pour water into a bottle, little by little, closing the bottle, and well shaking at each addition until the bottle is filled. You will then have a solution of free chlorine together with some undecomposed chlorate of potash and hydrochloric acid, and probably one or two by-products.

¹ Medical Treatment, p. 635.

"If the bottle is filled too rapidly with water, the chlorine will be driven out of the bottle by the water instead of being dissolved in it.

"To 12 ounces of this solution, for an adult, we add 24 to 36 grains of quinine and an ounce of syrup of orange-peel, and we give an ounce every two, three, or four hours, according to the severity of the case—that will be from 12 to 36 grains of quinine in twenty-four hours."

In the cases in which I have employed this solution I can confirm Dr. Yeo's experience that the tongue ordinarily becomes rapidly clean, and that the offensive character of the evacuations frequently disappears. It will be seen that in this solution the amount of quinine which is given is comparatively small, and, further, that it is distributed over the twenty-four hours. Quinine has, however, often been employed in larger single doses, with the view of reducing temperature. I have known 20 grains to be given with this object, in two doses within an hour of each other, but the quinine was then administered with milk instead of being dissolved with an acid, and from numerous observations made in this and other diseases I have little doubt that the activity of quinine is considerably diminished by this mode of administration, so that, although a large dose was given, the patient did not experience the full physiological effect which would ordinarily be produced by this dose.

Of other antiseptics which have been recommended the following, which are referred to in the *Year-Book of Treatment* for 1899, pp. 153 and 154, may be mentioned:

Asaprol is a naphthol monosulphate of calcium. It is highly recommended by Dr. Clement Ferreira.¹ He gives 30 to 45 grains daily. It cleans the tongue and lessens tympanites and diarrhoea. The substance is an antiseptic, but Dr. Ferreira recommends its use not only on this account, but also because it exercises an agglutinating action on the bacilli of cultures, and, therefore, possibly exercises a beneficial influence on the malady.

Dr. J. C. Potter² recommends 5 minims of compound tincture of benzoin every two hours in typhoid fever; after twenty-four hours the diarrhoea decreases and the temperature falls. If the diarrhoea is not controlled the dose should be doubled.

Dr. Bramwell³ advocates the use of salol in the powdered form,

¹ Bulletin Général de Thérap., October 23, 1898.

² British Medical Journal, November 27, 1897.

³ Ibid., 1897, vol. ii. p. 1214.

not in tabloids, in doses of 5 to 10 grains (according to age) every four hours until the urine is tinged, when the dose is diminished, giving only sufficient to maintain the faint coloration of the urine. Dr. Bramwell believes that in several mild cases the disease has been aborted by salol, and cases of greater severity have passed through a mild and uncomplicated course under salol treatment. In addition to this treatment, however, in severe cases he employs cold packs and sponging during the first few days. Dr. Bramwell bases his statements on ten years' use of the drug.

Brigade Surgeon Lieut.-Colonel Quill¹ recommends the internal administration of the following mixture :

R.—Acidi carbolicæ liquefacti	℥xxxvj.
Tincturæ chloroformi compositæ (B. P.)	℥ij.
Tincturæ cardamomi compositæ	℥ij.
Syrupi aurantii	℥j.
Aquæ chloroformi q. s. ad	℥xij.

One ounce, with an equal quantity of iced water, to be taken every second or third hour, immediately after food. "In mild cases of enteric fever five or six doses of the above mixture are given in the twenty-four hours, while in severe cases ten doses are given. It is advisable to continue its use in from three to five doses daily for at least a week after the temperature has fallen to normal." Compound tincture of chloroform in the above prescription is very similar to the liquid known in England and the United States as "chlorodyne."

It should be added that when relapses occur during convalescence the ordinary diet and treatment of an acute attack must be resumed ; the pyrexia and diarrhœa may, however, require the special treatment described in the next section. The risks of hemorrhage and perforation are greatly increased during a relapse, and, even in the absence of such complications, convalescence is always greatly retarded.

Treatment of Associated Symptoms. The commonest symptoms which call for special treatment are hyperpyrexia and diarrhœa, and these may occur with but little warning as mere exaggerations of milder symptoms which have attracted but little notice. So long as the temperature in the early days remains between 103° and 104° F., and only reaches the latter point occasionally, there is no special need for attempting to modify this temperature ; but if the temperature rises to 105° F. or higher, and does not at once fall, it will be advisable to employ some measures for reducing the height

¹ British Medical Journal, May, 1898.

of the fever. The reduction of temperature formed the subject of discussion at one of the recent meetings of the British Medical Association, and all who took part in this discussion were agreed on the undesirability of employing any of the newer depressant antipyretics; and, while fully recognizing the importance of reducing the high temperature, it was felt that this could be effected with a greater degree of safety and of comfort by the application of cold than by the administration of drugs.

The temperature may be lowered in various ways, either by the use of the cold bath or by sponging the patient freely with tepid or cold water, or even by friction with cloths soaked in ice-cold water, or with cloths containing lumps of ice of convenient shape. Of these various methods the bath is undoubtedly the quickest in action, but it involves many inconveniences. Foremost among these is the disturbance of the patient in his removal from the bed to the bath. It is, perhaps, scarcely necessary to indicate that it is essential that the patient should be lifted into the bath with the minimum amount of movement or of muscular exertion on his part. The temperature of the bath may conveniently be at 100°, 102°, or 103° F. when the patient is first immersed, and the temperature may subsequently be gradually lowered by the addition of cold water, or, if more rapid diminution of temperature is desirable, by dissolving lumps of ice in the bath.

In employing the bath it is necessary to take the patient's temperature from time to time, and to remove him to his bed again so soon as the temperature, taken in the rectum, indicates a fall of from two to three degrees. It is also essential that the patient should be removed from the bath and stimulants should be administered if any indications of collapse occur, as shown by failure of the pulse or by blueness of the surface. The cold-bath treatment of typhoid fever is undoubtedly very severe, and is only applicable to patients who have been previously of a robust type. In delicate individuals, especially in females, the cold bath is apt to be followed by very great depression.

Under favorable conditions the initial fall of temperature may be continued for a few hours after the patient has been removed from the bath; the temperature then commonly rises again, though it does not attain the previous height.

Sponging the whole surface of the body with tepid or cold water is frequently almost as beneficial as immersion in a cold bath, and it

has the advantage of involving no disturbance of the patient, and if performed by two nurses it can be carried out almost as rapidly as the bath. The temperature of the water used under these circumstances must be dependent upon the severity of the fever. Tepid sponging will often reduce the temperature sufficiently in mild cases of hyperpyrexia, but in severe cases the temperature of the water may be lowered almost to freezing-point, so as to obtain a more rapid lowering of the fever.

Even during this process, however, some degree of collapse may result, and may call for the administration of stimulants, which should always be at hand when dealing with hyperpyrexia.

A moderate degree of diarrhœa frequently occurs in the course of every case of typhoid fever, and it was at one time held that this symptom was to be regarded as a conservative process by which the poison of the disease might be eliminated, and on this hypothesis it was recommended that no steps should be taken to check the diarrhœa. It is at present believed, however, that although a moderate amount of diarrhœa may do no harm, the chief indication for adopting measures for its arrest is to be found in the presence of undigested curd or milk in the motions, and this undigested food will commonly make its appearance when the diarrhœa is excessive and when the patient appears to be exhausted by this symptom. The measures to be adopted will accordingly have two distinct objects in view, one the modification of the dietary, so as to facilitate the due absorption of food, and thus to prevent it acting as an irritant in the course of the intestine, the other to promote greater regularity of peristaltic action by the use of various sedatives, which for this purpose are to be employed by the rectum.

The modifications of diet may consist merely in the greater dilution and in the peptonizing of milk previously to its employment, or, if diarrhœa is severe, it may be advisable to check the administration of milk and to substitute either weak beef-tea or a mixture of egg albumin.

The medicinal treatment which gives the best results consists in the employment of enemata containing opium, either as laudanum, or as the compound ipecacuanha powder. These may conveniently be given with mucilage of starch, and if greater action is required small quantities of tannic acid may be added. The most convenient time, perhaps, for administering the enema is after each liquid motion. These measures, as a rule, suffice to check the severity of

the diarrhœa, so that it is rarely necessary to give astringents by the mouth. Should the diarrhœa, however, continue in spite of these remedies, it is advisable to increase the amount of stimulant that is being administered, and sometimes also to use a mixture either of bismuth subnitrate or carbonate, or the chalk mixture, adding to either of these small quantities of laudanum.

The treatment of the nervous symptoms which may occur in the course of typhoid fever has already been incidentally mentioned. The prominent symptoms consist of intense headache, sleeplessness, and delirium, and to these should perhaps be added deafness, which may occasionally be very great. This last symptom, however, does not call for treatment, and in many respects it appears to be somewhat advantageous, since sleep is less likely to be disturbed by noise. Most of the nervous symptoms above mentioned call for the increased administration of stimulants, and when there is much sleeplessness, in spite of stimulants, it is sometimes necessary to employ some mild hypnotic, such as chloral hydrate, potassium bromide, sulphonal, or paraldehyde.

Foremost among the complications must be mentioned intestinal hemorrhage, which may occur at any stage in the course of the disease, although perhaps it is most frequent during the third week, especially if there is much diarrhœa. The occurrence of hemorrhage is indicated, prior to alteration in the appearance of the stools, by symptoms of collapse, and frequently by a fall of temperature and by an increased rapidity of the pulse, which becomes weak and thready. This complication entails the adoption of measures already indicated in the treatment of diarrhœa, and in addition it may be mentioned that it is essential that the patient be kept absolutely at rest.

Applications of ice-bags over the abdomen are sometimes recommended; they are, however, contraindicated by the amount of depression and by the extent to which they impair the vitality of subjacent viscera. Short of the administration of strong astringents, the best treatment lies in insuring rest for the intestine by refraining from the administration of food by the mouth and also by the use of enemata containing opium. Nutrient enemata are sometimes employed in this condition, but the common association with diarrhœa renders them of very little service, and accordingly it becomes essential that the strength should be maintained by employing nutriment which leaves but the slightest residue; and this is the condi-

tion, indeed, that forms the chief indication for the use of any of the concentrated meat juices, small quantities of which may be given from time to time with iced water.

The astringents which have proved to be of service under these circumstances are turpentine, which is conveniently given in capsules containing two or three minims, and copper sulphate, which may be used as a pill, in doses of from $\frac{1}{4}$ to 1 grain. Tincture of hamamelis is also sometimes very efficacious. Other astringents are often recommended, as, for example, tannic acid or gallic acid, but whichever may be selected it should be employed well diluted, so as to interfere as little as possible with the digestive functions of the stomach.

Perforation is a still more serious complication which is, happily, not of very frequent occurrence. The indications are sudden, severe abdominal pain, collapse, weakness of the pulse, and fall of temperature, the symptoms differing from those of severe hemorrhage chiefly in the amount of abdominal pain and in the subsequent development of peritonitis. Signs of collapse always call for the immediate employment of opium or morphine in full dose. Some practitioners are of the opinion that this remedy affords the only chance of recovery, but a more suitable method of treatment is to attempt by surgical measures to find the site of perforation, to close the opening in the intestine, and to wash out of the peritoneal cavity any of the intestinal contents which might have escaped. This involves the performance of a serious operation, but the risks incurred are far less than the risks of inactivity.

The results are not always as successful as one would desire, even when the surgeon has been fortunate enough to find the site of perforation comparatively readily; thus, for example, I may mention that Mr. Watson Cheyne recently operated upon a patient of mine, and although he was able to do so within a little over an hour after perforation had occurred, and although the perforation was found immediately below the abdominal wound, yet, in spite of the utmost care, the patient died within three days with symptoms of collapse. The immediate result of the operation in this case was to cause considerable relief, and during the second day there was so much improvement in the appearance and in the character of the pulse that we were somewhat hopeful of the ultimate issue. It was found subsequently, however, that the ulcerated patches in the intestine were very deep, so that even had he recovered from the first opera-

tion, in all probability one or more of the other ulcers would subsequently have given way.

In considering the surgical treatment of perforation it should be remembered that the chances of success depend greatly upon the possibility of early operation, since if from any cause surgical measures are postponed, there will be greater difficulty of finding the perforation, owing to the extensive peritonitis which speedily develops.

When the course of the fever has been particularly severe, either with high temperature or with frequent diarrhœa, indications of cardiac failure may present themselves, the chief being the rapidity and irregularity of the pulse, and perhaps also tendency to faint after any slight exertion or movement. This condition is to be dealt with partly by the administration of brandy or whiskey and partly by the employment of other cardiac stimulants, such as strychnine and digitalis, which may be given subcutaneously, or by the use of caffeine, either in mixture with digitalis or as strong coffee, which frequently serves to increase the force of the heart's action.

Treatment during convalescence is chiefly to be dictated by the desire to avoid doing harm through the too early administration of solid food or through allowing the patient to incur risks of perforation by resorting too soon to muscular movements, even in sitting up in bed. I have occasionally had cause to regret attempting to resume solid food even when the condition appeared to indicate that all danger had passed; and, moreover, I have witnessed several cases of severe relapse which have apparently been the direct result of injudicious use of solids, given by the friends without the permission of the doctor in attendance. I am convinced that it is better to defer the administration of solids too long than to employ them at all too soon. In the one case the convalescence may perhaps be a little retarded, in the other severe risks may be incurred.

During the early days of convalescence it is unnecessary to employ tonic remedies, such as quinine and iron, since these will serve to promote appetite, and will, therefore, increase the difficulty of withholding solid food; but after solids have been taken for some few days with no ill effect upon the temperature, some mild tonic prescription of quinine and iron may be given, and will favor the return of strength and vigor. Convalescence after typhoid fever is also hastened by change of air, the improvement noted during the first few days of change being frequently very striking.

Typhus Fever (*Typhus Exanthematicus*). The onset of typhus fever is commonly so sudden and so severe that the patient is of necessity obliged to keep in bed from the commencement. The general management of this highly infectious fever does not materially differ from that already indicated in detail for other infectious fevers (see p. 419); but as the nature of the contagion is somewhat obscure, and is not wholly to be controlled by the use of antiseptics or disinfectants, greater precautions should, perhaps, be taken for insuring thorough ventilation of the room, and it is generally desirable to place the bed between the window and the fireplace, so that there shall be a free current of air passing over the patient.

In the selection of the room, it is especially important for this fever to effect perfect isolation by placing the patient at the top of the house.

The treatment does not differ from that already recommended for uncomplicated cases of typhoid fever; in other words, it is largely influenced by the endeavor to keep the febrile symptoms within reasonable limits and to maintain the strength during the short course of the fever. For these objects it may be necessary to use antipyretic measures, such as cold sponging or the cold bath; the wet pack may also be used if there is much delirium. Since the pulse often shows signs of extreme weakness, stimulants are needed from time to time.

In addition to the administration of brandy or of ether, camphor or ammonia may be used to increase the force of the pulse, and with the same object strychnine may be given hypodermatically, or it may be administered by the mouth in conjunction with the tincture or infusion of digitalis.

Typhus fever is now rarely seen, owing to the great improvements in the sanitary conditions of the dwellings of the poorer classes, but since it appears to develop most frequently with conditions of overcrowding and defective nutrition, it is almost essential that the patient should be removed to a hospital or nursing home, to diminish the risk of the spread of the disease and to insure greater cleanliness and comfort.

It is impossible to influence the duration of the febrile condition, the temperature falling by crisis at the end of fourteen days, and this fall is always to be anticipated unless there have been signs of undue weakness of the pulse or of excessively high temperature. These symptoms form the chief indications of danger in every case of

typhus fever, but, in addition, various complications are sometimes associated with this disease and will call for appropriate treatment. Pneumonia must be considered as the chief of these complications, and the onset is frequently apt to be overlooked unless the lung is examined daily.

Of the other complications affecting the respiratory organs laryngitis and pleurisy deserve mention. Although perhaps most common during the febrile stage, these respiratory troubles may arise after the crisis.

A form of albuminuria is fairly common during the height of the fever, but the association with definite structural changes is not very frequent. When this condition occurs it rarely calls for treatment, though it may be necessary to adopt antipyretic measures for the relief of high temperature, and thus indirectly to benefit the renal engorgement.

During the early stage of the disease headache may be very severe and may call for the use of cooling applications. To some extent the headache appears to be linked with sleeplessness, and unless there are marked indications of renal changes, small doses of opium may be administered. When there is very much headache, however, it is advisable to examine the condition of the bladder from time to time and to pass a catheter periodically.

When there is much coma or delirium, it will also be advisable to prevent undue dryness of the mouth and lips by moistening these frequently with water or with diluted glycerin. The parched cracking of the lips also may be controlled to some extent by spraying the mouth with liquid paraffin.

During the febrile condition food must be given in the liquid form at frequent intervals, as indicated in the treatment of typhoid fever, but there are not the same reasons for rigidly avoiding the use of all solids during the early stage of convalescence. With the fall of temperature convalescence is ordinarily fairly established, unless some complication arises. Hence after one or two days of normal temperature it will be advisable to commence the administration of tonics and the use of a more liberal dietary.

Relapsing Fever (*Febris vs. Typhus Recurrens*). Relapsing fever, which is an infectious disease marked by an acute febrile attack lasting about a week, and followed, after an interval of six or seven days, by a second similar but perhaps milder attack, is, like typhus fever, to be treated by isolation and by symptomatic treatment. We

are not so far acquainted with any specific form of treatment for this disease, and the utmost that can be done is to maintain nourishment, to relieve constipation, or perhaps to promote intestinal action by the use of gentle aperients.

In this disease stimulants may be administered somewhat freely, especially when there are any indications of failure of the heart's action. To combat the weakness which always attends this fever, iron sulphate and quinine may be given internally, while if the fever is very high a diaphoretic mixture may be prescribed—for example, solution of ammonium acetate, together with potassium acetate, and perhaps with tincture of digitalis, the last being of considerable service in promoting the strength of the pulse and in favoring diuresis.

When pains in the muscles and joints are prominent symptoms, they may be dealt with by the internal administration of quinine and opium, and by the local application of preparations containing opium. These pains are most frequent during the stage of remission and after a relapse, but they are also often present during the febrile attacks.

When the spleen remains large during the stage of convalescence, quinine is generally of considerable service, especially when, in addition, mild attacks of fever of a remittent type occur from time to time. During the attack headache and delirium are best dealt with by cold applications. Opium is usually recommended in this condition, but, since suppression of urine and uræmic symptoms are not uncommon, opium must be employed with considerable discretion.

During the height of the fever there may be frequent complaint of pain over the hepatic and lumbar regions. This may, to some extent, be relieved by the use of warm fomentations.

Diarrhœa is a common sequel or complication of relapsing fever, and it often occurs when the feeding during the stage of convalescence is somewhat deficient.

The tendency to ophthalmia is best averted by the early use of nourishing food. Should ophthalmia develop, however, atropine should be dropped into the eyes, and repeated small doses of calomel and opium should be given. For the relief of pain leeches may be applied to the temples.

Dysenteric and pulmonary complications are also of fairly frequent occurrence, and the former calls for the use of vegetable astringents, or of ipecacuanha and opium, while both conditions indicate the free employment of quinine and of stimulants.

Epidemic Influenza (*La Grippe*). This troublesome epidemic is in general marked by sufficiently definite symptoms, though the type varies in different epidemics. The commonest symptoms are those of a mild pyrexia, with headache, with pain in the back rather like lumbago, and pains in the limbs, which may resemble those of a mild rheumatic attack. These symptoms are often so mild that during the earlier epidemics they were not considered of sufficient importance to necessitate any alteration of the daily routine. The danger of the complications and sequelæ of influenza has now perhaps led to an exaggerated dread of this disease, though clearly there is greater wisdom in warding off dangers than in incurring unnecessary risks. The main complications differ in a remarkable way.

With some epidemics pulmonary troubles arise, others assume a gastro-intestinal form, others again are marked by severe cerebral symptoms. Occasionally two or more of these different types of complications may coexist. The tardy convalescence is extremely typical, and may sometimes lead to a diagnosis when the actual attack has been almost disregarded. During convalescence there is usually great mental depression, and often irregularity of the heart, with palpitation on slight exertion. The liability to pulmonary troubles is greatly increased during convalescence, and severe bronchitis, pneumonia, and even the rapid development of phthisis are frequently attributed to lack of care during the initial attack or to undue exposure before health has been restored.

The treatment of influenza must depend upon the prevalent type and upon the symptoms presented during the early course. There can be no doubt that even though the attack may be mild, it is desirable to keep the patient in bed from the onset, and in the house for some days after convalescence is well advanced. The febrile condition, the loss of appetite and of the sense of taste indicate the need of a liquid diet, which should largely consist of milk, though beef-tea, chicken broth, or jelly should be given occasionally. During convalescence a much more liberal diet should be adopted, strong, nutritious soups, such as ox-tail or turtle, may be given, and as digestive powers return the appetite should be tempted with fish, poultry, game, and meat. Alcohol is not often required during the attack, and its indiscriminate use is to be deprecated, as it appears to increase headache and the exhausting night-sweats which often occur.

During convalescence, however, alcohol is frequently of considerable service when the pulse is weak and irregular, and when attacks of palpitation and shortness of breath follow slight exercise. It is also indicated when pulmonary complications or sequelæ arise, more particularly pneumonia, which may assume an adynamic type and threaten life from cardiac failure.

The medicinal treatment must be based upon the chief symptoms. A purgative is generally needed, except in the gastro-intestinal form, where vomiting and purging may call for appropriate remedies. The pyrexia is now rarely sufficiently severe to call for the adoption of antipyretic measures, but in some of the earlier epidemics the temperature occasionally rose to 105° or 106° and necessitated the use of wet packs or of tepid sponging. Possibly the greater care now taken during the initial stages reduces the liability to these high temperatures. Sodium salicylate is frequently given to relieve milder febrile attacks, and it is of some service in reducing the severity of the pains in the loins and the limbs. Quinine is often employed with the same object, but should only be used in moderate doses, since large doses are likely to increase headache. This tendency may, however, be diminished by giving half-drachm doses of diluted hydrobromic acid with each dose of quinine. With mild cases, however, it is perhaps better to reserve quinine for the stage of convalescence, and only to employ simple diaphoretic and diuretic mixtures containing liquor ammonii acetatis and spiritus ætheris nitrosi. Troublesome, irritating cough, with very scanty expectoration, often necessitates the use of sedative expectorants. The official lozenge of ipecacuanha, or that of ipecacuanha and morphine, will often serve to allay irritation. When, however, bronchitic or pulmonary troubles arise, stimulating expectorants must be used, and, as already mentioned, the condition of the pulse may indicate the importance of employing stimulants.

Gastro-intestinal troubles are to be dealt with on general principles; occasionally benefit follows the employment of a brisk purgative, more often sedative and astringent remedies must be used.

For the persistent headache, phenazone in 5-grain doses will often be of service, but this remedy must not be given indiscriminately, on account of its powerfully depressant influence upon the pulse. Sleeplessness may call for the use of morphine, sulphonal, or paraldehyde, but the best cure for this symptom lies in change of air so soon as convalescence is established.

Influenza in childhood has been studied by Furst.¹ He describes a period of depression, with some nasal catarrh and slight, dry cough, preceding the onset of the fever. This period, which he speaks of as the period of incubation, may last, he says, eight or ten days, although it may be observed that the incubation, in the adult at least, is generally much shorter. The onset of the pyrexia is marked by shivering, the voice becomes hoarse, deglutition is sometimes painful, the nasal catarrh increases, and there is some dyspnoea; constipation is the rule, and in many cases there is severe headache, though in infants the latter symptom may be replaced by convulsions. He believes that treatment may have a very material influence in cutting short the disease, and of all internal drugs he prefers salipyrin, which he looks upon as almost a specific. At ages of from five to ten years he gives $4\frac{1}{2}$ grains thrice a day; from ten to fourteen years 15 grains thrice a day. After a couple of days it will usually be sufficient to give two doses a day only. Monsengeil, some years ago, said that he found salipyrin most useful in influenza, especially in influenza with little or no elevation of temperature, as it did not produce the depression which antipyrine is apt to cause. Furst treats the pharyngitis and rhinitis, which are often the most troublesome symptoms of influenza in childhood, by pulverizations; for this purpose he prefers a 2 per cent. alcoholic solution of rectified turpentine, although he employs also a mixture of menthol, eucalyptus, and cocaine in a suitable menstruum.

Reference has already been made to the risks of the development of pulmonary sequelæ during convalescence; it is, therefore, only necessary to add that great care should be taken to avoid any sudden alteration of temperature and any exposure to wind or draughts, and to insist upon the need of warm clothing and the use of additional wraps on changes from town to country.

¹ Rev. Mens. des Mal. de l'Enf., January, 1898; Year-Book of Treatment, 1899, p. 171.

CHAPTER XX.

SPECIFIC INFECTIOUS DISEASES—*Continued.*

Diphtheria—Erysipelas—Hydrophobia (*Rabies*)—Lockjaw (*Tetanus*)—Malarial Fevers (*Intermittent, Remittent, Pernicious*)—Cholera Asiatica.

Diphtheria. The treatment of diphtheria must necessarily depend greatly upon the site affected, upon the severity of the symptoms, and upon the degree of prostration. Of late years the treatment has become much more hopeful since the introduction of antitoxin, which has resulted indirectly from the discovery of the part played in this disease by the Klebs-Loeffler bacillus. Previous to the use of antitoxin, a very large number of specifics for diphtheria had been recommended at various times, but these specifics gave rise to much disappointment, and many observers maintained that no remedies were of much value.

The general lines of treatment to be adopted for this disease may be conveniently grouped under the following headings: (1) Hygienic treatment; (2) constitutional treatment; (3) local treatment; (4) symptomatic treatment; and in addition must be mentioned the use of antitoxin, to which the recent reduction in the mortality of this disease is undoubtedly to be attributed. The following account of the hygienic and constitutional treatment will hold good for all forms of diphtheria, while the special treatment demanded by the site attacked will receive consideration with the local and symptomatic treatment.

The first essential connected with hygienic treatment is isolation, and the selection of a room for the patient should, if possible, be guided by the desire to secure light, free ventilation, and an even temperature. The depressing nature of the disease and the possible need of surgical interference render light a necessity, while the risks of the spread of the disease are largely influenced by the freedom of ventilation. The temperature of the room should be maintained at from 65° to 70° F., but the advantages of this temperature should not be purchased at the expense of ventilation, which is more important than the actual degree of warmth. In laryngeal cases, and

especially when tracheotomy has been performed, it will be well to use a steam kettle and sometimes also to surround the bed with a tent, but the kettle should be placed near the foot of the bed, and for the convenience of nursing the tent should be freely open on one side.

It is desirable, especially with children, to adopt measures to restrain movements, since there is some danger of cardiac failure if, during the course of the disease, the patient suddenly sits up in bed. Further, on account of the risks of the spread of the disease, as well as on account of the sudden changes which may supervene, it is desirable, whenever possible, to employ trained nurses both night and day; the sudden changes which may arise demand watchful care and accurate observation.

The constitutional treatment must be influenced by the depressing nature of the disease, which calls for the administration of nourishing food in a liquid form, and also for the employment of alcohol. According to the age of the patient, food and medicine may be given either with a feeding cup or with a spoon, so as to avoid risks of disturbance of the circulation from sudden changes of position. No rule can be laid down as to the amount of stimulant to be employed, since this must be determined by the degree of prostration, as indicated by the pulse or by the aspect. In severe cases, when the pulse shows signs of failure, digitalis, strophanthus, or strychnine may be required, the two former being administered by the mouth, the last, which is ordinarily reserved for emergencies, being given hypodermatically. Tincture of ferric chloride, with diluted phosphoric acid and glycerin, is occasionally of service in mild cases, but it must be given in comparatively small doses, on account of the readiness with which it disturbs digestion.

With regard to the local treatment of diphtheria, potassium chlorate has been often used as a mouth wash, but this is inconvenient with young children, and in infants it may induce toxic renal symptoms, if given internally without due caution. In laryngeal cases relief is sometimes afforded by sucking small lumps of ice, since the numbing influence of the cold may favor the introduction of food.

Apart from local sedative measures the primary idea has hitherto been the destruction of the germs causing the disease, this destruction being effected either by escharotics or by antiseptics, while some substances have had transient favor as solvents of the membranes.

To a very great extent the local treatment of diphtheria has been rendered unnecessary since the introduction of antitoxin, but inasmuch as antitoxin is not always available when most required, it will be desirable to discuss various measures which may be used pending its arrival.

The treatment with escharotics—as, for example, the application of silver nitrate or of various strong acids—has long been discontinued, since it has been found that the separation of the membrane and the subsequent caustic action involve so much damage that the membrane rapidly re-forms. Still, whatever form of local treatment be adopted, there can be no doubt that it is most efficacious when the membrane has been previously gently detached, so that the antiseptic agent may be brought as far as possible into intimate contact with the affected surface. The detachment may sometimes be effected by gentle streams of water, but in general the false membrane is more satisfactorily removed by the use of small swabs of cotton-wool or of soft lint mounted upon vulcanite rods.

Similar swabs may also be employed to apply the antiseptic agent after the removal of the membrane. The local application which is commonly used is the official lactic acid, which represents 75 per cent. of anhydrous hydrogen lactate. When it is difficult to reach the affected area with the swab, this solution may be used as a spray, but for this purpose it is generally advisable to dilute the lactic acid with three times its bulk of water. Some prefer the employment of corrosive mercuric chloride, or a mixture consisting of 1 part of corrosive sublimate and 5 parts of tartaric acid in 1000 parts of water. This solution is employed, like the last, after the removal of the diphtheritic patch.

Others prefer a saturated solution of borax with soda, or of boric acid in glycerin, while for its antiseptic action quinine is sometimes used of the strength of 10 grains to the ounce, dissolved in a little hydrochloric acid and mixed with equal parts of glycerin and water. Potassium permanganate is also occasionally employed in the strength of 20 grains to the ounce, while the biniodide of mercury solution has been much praised. This consists of the following :

R.—Hydrargyri chloridi corrosivi	.	.	.	.	gr. $\frac{1}{2}$.
Potassii iodidi	.	.	.	.	gr. x.
Ferri et ammonii citratis	.	.	.	.	gr. xx.
Syrupi	.	.	.	.	℥ iv.
Aquæ	.	.	.	q. s. ad	℥ ij.

Prior to the introduction of antitoxin I obtained some satisfaction from the use of sulphur insufflation, but the treatment with paraffin, in which the ordinary paraffin used in lamps is applied with a camel's-hair brush to the raw surface every hour, did not in my hands give very good results. Of other local remedies it may be sufficient to mention a mixture of sulphurous acid and glycerin, liquor sodæ chlorinatæ and chlorine water, while peroxide of hydrogen has found some adherents, the chief objection to its use being the unstable character of the solution. The principal solvents that have been recommended, apart from antiseptics, are alkaline solutions, pepsin, papain, and resorcin. These solvents, however, are very slow in their action, if, indeed, they possess any solvent power.

In employing any of the above for the purpose of irrigation, it is advisable that the solution should be moderately warm, since to some extent the heat favors not only the action of the drug, but also the detachment of the membrane. Although solutions may be used for irrigation in cases of pharyngeal diphtheria, they occasionally cause much discomfort if employed in nasal and post-nasal diphtheria, although, without a doubt, the affected surface is more readily reached by irrigation than by any other plan of treatment. In nasal and post-nasal diphtheria the solutions are sometimes employed in the form of spray; but however soothing this may be, the spray does not exert the same cleansing effect, and whenever possible it is better to use gentle irrigation or to syringe the nasal chambers gently with diluted solutions of potassium chlorate and glycerin, or of borax and glycerin.

Since it is so difficult to apply local treatment in nasal and post-nasal diphtheria, this form is the most dangerous, because the toxins are both produced and absorbed more rapidly, and the constitutional symptoms become more urgent and produce severe asthenia, which demands the frequent and liberal employment of stimulants.

In connection with any form of diphtheria the cervical and sub-maxillary glands may become much inflamed. When there is evidence of the formation of pus, this should be evacuated early, and warm local applications will be essential; but if the glands are merely painful and hard, relief may sometimes be afforded by the continuous use of ice bags or Leiter's tubes. In the treatment of aural diphtheria, should mastoid tenderness develop, it may be necessary to make an incision over the mastoid process down to the periosteum.

Though it is still necessary to study the above forms of treatment, it has now been shown that antitoxin gives the greatest reduction of mortality; and, further, it has been found that the benefits are largely dependent upon the date at which this remedy is used. It cannot be too strongly urged that the good results to be derived from antitoxin depend largely upon its early employment; and yet it may, nevertheless, be of value even when the patients appear to be moribund when first seen. The advantages from this treatment are, primarily, the early separation of the exudation and the improvement in the general condition and aspect of the patient. After the use of antitoxin it is comparatively rare for the membrane to extend, and in cases of nasal diphtheria there is frequently considerable diminution in the amount of offensive and irritating discharge from the nose.

Although the introduction of antitoxin does not obviate the necessity for operative measures, yet, if it has been found advisable to perform tracheotomy or intubation, the tube may usually be removed at a much earlier date than was formerly possible, probably indeed within twenty-four or forty-eight hours from the time of operation.

Perhaps some few words may be desirable with regard to the mode of administering antitoxin. When first introduced the dose was from 10 c.c. to 20 c.c., and this dose had perhaps to be repeated within twelve or twenty-four hours. At the present time, however, it is not customary to measure the amount, since it has been found possible to concentrate the antitoxin and to affix measures of its power of producing immunity. It is now customary to give a dose of 1000 immunization units every twelve hours for the first twenty-four, thirty-six, or forty-eight hours, according to the gravity of the case. Much larger doses, however, have frequently been employed. In America, for example, it is customary in severe cases to use from 1500 to 2000 units for the first injection, and some observers recommend that as much as 4000 units should form the appropriate dose for a child of four to six years of age.

These injections may be made in any part where the subcutaneous tissue is loose, as, for example, in the flank or over the thigh. The syringe employed is one which may be readily taken to pieces, so as to be disinfected by boiling. The apparatus should be sterilized previous to employment, and the skin over the site of the intended injection should be first washed thoroughly with soap and water, and afterward with a solution of carbolic acid. Injection should

be effected slowly, since otherwise considerable pain may follow the introduction of this comparatively large bulk of liquid. After the removal of the needle, firm pressure should be made over the site of injection, to prevent any loss of serum. It is frequently customary to apply a small pad of sublimate wool over the site of the puncture and to fix this in position with collodion. The need for repetition is to be measured by the general course of symptoms. When the temperature falls and the membrane becomes detached, and does not reappear, there is, as a rule, no need for the repetition of antitoxin.

This mode of treatment has been credited with causing many complications, as, for example, the development of a rash and interference with the renal functions. The rash of antitoxin does not possess any clinical importance. Frequently it resembles urticaria, but sometimes it may simulate the eruption of measles or of scarlet fever, and since it may be associated with a slight rise of temperature, it is necessary to be on one's guard against mistaking the antitoxin rash for one of the specific fevers.

With regard to albuminuria after the use of antitoxin, this symptom is certainly somewhat more frequent, but it also does not possess any clinical importance, since usually the albuminuria speedily subsides and does not lead to any permanent renal affection. In somewhat rare cases the use of antitoxin appears to be followed by the production of pains in the joints comparable to those of acute rheumatism. This symptom, however, like other complications, does not give rise to any permanent anxiety.

Laryngeal diphtheria calls for special watchfulness, since even after the use of antitoxin, symptoms of laryngeal obstruction may develop. It is well always to have instruments at hand ready for intubation or tracheotomy, and, in addition, it is advisable to use a steam kettle somewhat more freely than in other forms of diphtheria. The vapor may with advantage be medicated; thus at the Evelina Hospital we are in the habit of employing a mixture of creosote and carbolic acid; 1 ounce of creosote and 2 drachms of powdered acacia are rubbed together and added to 2 ounces of solution of carbolic acid (1 in 20), the mixture being then put into a bronchitis kettle with a pint of water. Although the vapor thus formed, or the vapor of turpentine, of oil of eucalyptus, or of terebene, is frequently used, it is extremely doubtful whether they exert any distinct disinfectant power, since it is impossible to use the solution in a form strong enough to destroy germ growth.

In laryngeal diphtheria emetics have been sometimes recommended, with the view of favoring the removal of the membrane, the emetic most commonly employed being drachm doses of ipecacuanha wine, given repeatedly at short intervals until vomiting results.

The indications for operation are those which show that respiration is being markedly interfered with. These are chiefly the following: suppression of voice, depression of the suprasternal and supraclavicular spaces, sucking in of the lower part of the chest, restlessness, and sleeplessness.

The choice of operation depends partly upon the instruments available and partly upon the manual dexterity of the operator. Of the two I am certainly in favor of intubation whenever practicable, since tracheotomy is often followed by the appearance of sloughy patches on the wound, although this complication is less frequent since the introduction of antitoxin.

If tracheotomy is to be done, it is desirable that the operation should be performed before there is much lividity, and after the operation the tube should be entirely removed as early as possible. If the removal of the tube is deferred much difficulty may be experienced, especially if the tube has been allowed to remain in place for over three or four days, since under these circumstances the child often becomes accustomed to the presence of the tube and is nervous and excitable as soon as it is removed. In some cases, however, the difficulty of respiration may result from paralysis of the muscles of the larynx, so that the glottis becomes closed during efforts of inspiration.

After either tracheotomy or intubation it will be necessary to feed with liquids, and in young children the feeding for the first few days is most conveniently effected by means of the nasal tube. This can be passed comparatively easily into the pharynx, but after its introduction it is always desirable to wait for a few seconds to see that breathing is being satisfactorily performed before introducing milk, beef-tea, or any other form of liquid nourishment through the funnel.

The complications which may arise in connection with tracheotomy I have fully dealt with elsewhere.¹ It may suffice, therefore, to say here that notwithstanding the possible development of diphtheritic patches upon the wound after tracheotomy, I am distinctly in favor of early operation, and, whenever it is possible, of the simultaneous

¹ Diphtheria and Antitoxin, p. 112 (Longmans).

employment of antitoxin, since instances where complications have arisen are, in my own experience, those in which antitoxin has not been used or in which the operation has been deferred too late.

Passing next to the special symptoms, complications, and sequelæ of diphtheria, it must be noted that some of the complications arise during the course of the disease, while others are to be regarded as sequelæ which are separated from the original attack, and may make their first appearance some weeks after convalescence. The more important complications are those connected with the digestive system. In very severe cases uncontrollable vomiting and diarrhœa may occur, especially toward the fatal termination. Although under such circumstances it is necessary to employ measures to counteract these symptoms, the greatest care must be taken to avoid the risk of cardiac collapse, since after violent attacks of vomiting the pulse frequently becomes weak, rapid, and irregular. In such circumstances, therefore, stimulants must be used somewhat freely, and all violent movements must be controlled.

Pulmonary symptoms may also develop during the attack, especially when the case is one of laryngeal diphtheria and the membrane appears to extend along the ramifications of the bronchi. Notwithstanding the danger of pulmonary symptoms, these cases appear more commonly to terminate with symptoms of cardiac failure. Occasionally the lung complication takes the form of engorgement, but sometimes it is of the true pneumonic type, and is then to be recognized chiefly by the alteration in the percussion note over the thorax, since the laryngeal stridor masks the ordinary physical signs of pneumonia. Should these complications develop, the usual treatment for pneumonia must be followed, preference being given to the stimulant rather than the depressant expectorants.

Epistaxis is another complication that may arise more commonly with nasal than with any other form of diphtheria, but this rarely calls for special treatment. In malignant cases hemorrhage may also occur from other mucous membranes, as from the alimentary canal, from the bladder, or occasionally from the lung. But the treatment of these must be entirely symptomatic.

Of the multiplex forms of paralysis which occur subsequent to diphtheria, the nasal type affects the soft palate, the laryngeal muscles, and the muscles of deglutition. These ordinarily require no special treatment, although the difficulty of deglutition may necessitate the frequent use of the nasal tube; and, moreover, resto-

ration of the tone of the muscles may to some extent be favored by the frequent employment of small doses of strychnine or the tincture of *nux vomica*. Paralysis of the diaphragm is comparatively frequent, and may favor the occurrence of pulmonary trouble, the latter symptom adding very largely to the danger, owing to the difficulty of clearing the lung of any inflammatory exudation. Paralysis of the diaphragm calls for complete rest in the recumbent posture and for the greatest care in the avoidance of chills. The course of this complication is ordinarily somewhat prolonged, and although some improvement may follow the use of strychnine or of *nux vomica*, mild electrical currents may further favor the restoration of muscular tone. With paralysis of the intercostal muscles, which is less frequent, I have been able to hasten recovery by the application of strong galvanic currents.

Subsequent to diphtheria, independently of cardiac failure, the pulse frequently shows great variation in rate and often becomes extremely irregular. I have learned to dread sudden wide variations of the pulse rate, since I have on more than one occasion found that this symptom preceded sudden cardiac failure. Accordingly, whenever these marked alterations occur, the patient should be kept in bed and moderate doses of tincture of digitalis or of tincture of *strophanthus* should be given.

In view of these possible dangers during convalescence, it is desirable to administer tonics as early as possible after the laryngeal and pharyngeal symptoms have subsided. The tincture of ferric chloride and quinine should be employed in doses appropriate to the age of the patient, and, when possible, convalescence should be hastened by change of air, preferably to the seaside. It must be admitted, however, that even in the duration of the convalescence of diphtheria the earlier employment of antitoxin appears to play an important part, since the degree of depression which ordinarily follows the disease is diminished by the curtailment of the period of special severity.

Erysipelas. It is perhaps doubtful whether this condition, which so commonly results from infection following upon some injury, should be considered as a medical or a surgical condition; but since cases of erysipelas are liable to occur in the practice of every medical man, and since, moreover, in hospital practice it is customary to transfer cases of erysipelas from the surgical to the medical wards, there is some reason for dealing with this disease in this book.

Erysipelas is due to inflammatory action provoked by the presence of the streptococcus erysipelatosus, and although an idiopathic form of erysipelas is frequently described, there is every probability that this form is only idiopathic in the sense of the site of injury or of the introduction of the streptococcus being not immediately apparent.

The treatment will to some extent be determined by the site affected and by the degree of the inflammation. There is in general considerable pyrexia at the commencement of the disease, the temperature rising to 104° or 105° F. This pyrexia may call for treatment when it persists. The most important element, however, in the treatment lies in the separation of the patient from others with open wounds, in the adoption of antiseptic surgical dressings when the disease is distinctly of traumatic origin, and in the use of other local measures for limiting the extension of the disease. It will also be necessary to treat complications as they arise, and to give internal remedies calculated to counteract the more immediate dangers.

During the height of the fever the diet should be nourishing, and should be administered at frequent intervals in liquid form. The furred condition of the tongue, the height of the temperature, and the headache will frequently call for the use of a brisk purgative, such as calomel, which, should the febrile condition persist, it may be necessary to repeat from time to time. The administration of stimulants must be determined by the condition of the pulse. It is impossible to lay down any general rule with regard to the amount that should be given in the twenty-four hours, but the huge doses which were at one time recommended in this country do not in general appear to be required, and, as in other febrile states, the quantity should be increased or diminished as the pulse shows signs of failure or as it regains normal strength.

Numerous local applications have been employed to diminish the inflammatory action, to relieve pain, or to check the advance of the disease. The affected surface is sometimes simply dusted with a powder consisting of equal parts of starch and zinc oxide. More frequently, however, the glycerite of lead subacetate is applied with a soft brush, or the ointment of zinc oxide is mixed with an equal part of liquid paraffin, so as to facilitate its application. These measures are merely palliatives, and they do not limit the spread of the disease. The latter object is sometimes effected by painting the skin beyond the line of advance with silver nitrate; the extension

has also sometimes been arrested by painting a broad band of collodion around the limb above the line of redness, and occasionally more direct measures are used, such as the subcutaneous injection of a 2 per cent. solution of carbolic acid in the vicinity of the affected area.

A 2 per cent. solution of corrosive mercuric chloride has also been used subcutaneously, but the greatest advance in the local treatment is afforded by the employment of the antistreptococcic serum or streptococcic antitoxin. The dose of this is from 10 c.c. to 20 c.c. every six, twelve, or twenty-four hours, but much larger doses have frequently been administered. The activity of this antitoxin depends to some extent upon its age, the strength rapidly diminishing if the antitoxin is kept; this fact may, in some measure, explain the occasional failure of its action. Those who have experimented with fresh specimens speak in general favorably of this form of treatment.

The complications which may arise in connection with erysipelas are of some importance, and some of them demand surgical measures for their relief. Thus subcutaneous abscesses may form, and the affected skin may slough. Occasionally, also, considerable inflammatory action may occur in the region of the larynx, and the swelling may be sufficient to obstruct respiration and to call for tracheotomy. Although delirium is occasionally present in erysipelas of the head, and occurs in individuals of alcoholic habits, it must be regarded as a symptom rather than as a complication, and it rarely indicates the existence of active meningitis. The delirium frequently improves during the administration of alcohol and of tonic remedies. Pulmonary complications, such as pleurisy or pneumonia, may occasionally occur, and should be dealt with on ordinary principles.

Erysipelas causes the greatest anxiety when it occurs in old people of deficient vitality and in those whose constitutions have previously been weakened, either by the existence of chronic kidney disease or by frequent alcoholic excesses. Under these three conditions the pulse frequently shows signs of failure, and alcoholic stimulants will be constantly needed.

Hydrophobia (*Rabies*). Rabies, or hydrophobia, has been defined as an acute disease of animals dependent upon a specific virus, and communicated by inoculation to man. The symptoms of this disease are marked by a premonitory stage of irritability, discomfort, and depression. Occasionally also, during this stage, which is of

variable duration, the voice may be somewhat altered, and the temperature slightly raised. Much more severe symptoms follow, in which spasm of the muscles of the larynx and of the œsophagus has given rise to the common term of hydrophobia, since these spasms may be excited by any attempt to swallow.

In this stage, which usually lasts but one, two, or three days, there may be violent maniacal symptoms during the spasmodic attacks, though during the intervals consciousness is retained. The concluding stage of paralytic symptoms is marked by gradual loss of consciousness and by progressive weakness of the circulation, and death finally occurs with syncope.

The disease depends upon the introduction of the virus from an infected animal, which in this country is chiefly the dog, though cats are also subject to the disease, and wolves are frequently rabid. Only a small proportion of those bitten by rabid dogs develop symptoms of hydrophobia, the proportion, according to Horsley, not exceeding 15 per cent.

Until the introduction of the Pasteur treatment a large proportion of those definitely affected with this disease died. Much, however, can undoubtedly be done to prevent the occurrence of symptoms by the prompt treatment of the site of injury, and this treatment should always be carried out without delay after the bite of a dog, presumably rabid, pending the establishment of the rabid character. The most effective measures are the use of the actual cautery, or of silver nitrate, which should be employed freely. Even when these are not available, benefit appears to result from excision of the damaged tissues and from promoting free bleeding.

When the premonitory symptoms have occurred, the treatment is almost confined either to the use of palliative measures or to the adoption of the Pasteur treatment. The palliative measures consist in the use of remedies by which the frequency of the spasmodic attacks may be reduced. The patient should be kept at rest in a darkened room, and all forms of excitement, such as might be occasioned by startling noises or bright lights, or even by the presence of many people in the room, should be avoided.

At one time it was customary to treat the symptoms of the premonitory stage with full doses of chloral hydrate or of potassium bromide, but these drugs are of very little service in this disease, and they do not suffice to calm anxiety or to ward off the onset of the paroxysmal stage; accordingly they are now rarely employed,

and, failing facilities for the adoption of the Pasteur treatment, greater reliance should be placed upon the hypodermatic injection of full doses of morphine.

It is sometimes recommended that with the onset of the spasms, chloroform should be administered to check their severity. This is, however, a somewhat hazardous proceeding, owing to the violent character of the convulsions.

With the onset of the paroxysmal stage tracheotomy has occasionally been advocated, but although this operation to some extent relieves the symptoms of urgent dyspnoea, it does not control the spasmodic contractions of the muscles. In this stage it is better to avoid the use of any form of nourishment by the mouth, since all attempts to feed the patient are likely to be followed by spasm; hence efforts to maintain strength should be limited to the use of nutrient enemata. Spraying the pharynx with cocaine has sometimes been advocated in the hope of facilitating the introduction of nourishment, but this spray may itself excite spasm, or, if used too vigorously, it may produce dangerous cardiac depression.

Although it has been stated that life may possibly be prolonged if the severity of the attack can be controlled until the poison is eliminated, any treatment other than that of Pasteur is rarely followed by favorable results when marked symptoms of this disease have occurred, although in the condition known as spurious hydrophobia, or pseudorabies—a condition which is neurotic rather than toxic—favorable results may be obtained from almost any form of treatment.

The Pasteur treatment depends upon successive inoculations of rabbits with virus obtained from the brain of a mad dog, the virus appearing to accumulate in the spinal cord of these rabbits. The amount of virus retained within the cord diminishes gradually when the cords are preserved in dry air. Pasteur commences treatment by injecting an emulsion from a spinal cord fourteen days old,¹ and on each subsequent day an emulsion from a cord dried one day less than that used on the previous day, until the virus is reached only two or three days removed from the strength of ordinary "street" rabies.

The statistics of the Pasteur Institute show an extraordinarily low death-rate as the result of the treatment, although it is stated that the great majority of those treated at the Paris Pasteur Insti-

¹ Foster. *Practical Therapeutics*, vol. i. p. 82.

tute have undoubtedly been bitten by dogs which, on examination, have been declared to be rabid. This treatment has also been carried out at the Pasteur Institute in New York, and in 104 persons thus treated no deaths are recorded, although in 47 of these persons the bite had been inflicted by animals whose rabies was either declared by experimentation or by the deaths of other persons or animals who had been bitten by them, while 42 had been wounded by animals whose condition was recognized only by clinical or veterinary examination.

Notwithstanding these brilliant results, it must be remembered that the effect of treatment appears to be largely dependent upon its employment soon after the injury has been inflicted, and it must also be remembered that some observers maintain that it is possible to communicate hydrophobia by these inoculations.

More recently Tizzoni has recommended the use of an extract obtained from the central nervous system of rabid animals, and claims that this possesses the advantage over the Pasteur treatment of not producing any harmful action, local or general, and of not communicating hydrophobia. To be of any material service, this treatment should be commenced not later than the fourth day after infection.

In view of the great mortality of those actually affected by rabies, these inoculations demand respectful consideration, but in estimating the results of treatment it is well to bear in mind the comparatively small percentage of those who, having been bitten by rabid animals, subsequently develop symptoms of hydrophobia.

Lockjaw (*Tetanus*). Tetanus depends upon the introduction of a bacillus, or of poison developed by a bacillus, which may be found in earth or in putrefying fluids or in manure. The introduction of this bacillus is in general effected through an open wound. The disease appears to be peculiarly rife in certain districts.

The convulsions form the leading features of this disease; these may affect either the whole body or only the muscles of the face and neck. It is unnecessary here to describe the typical symptoms, which I have given elsewhere in detail.¹ Death may occur during the convulsions, owing to heart failure or owing to arrested respiration. In the case above mentioned, the fixation of the muscles of respiration caused the greatest anxiety. Death may, however, occur

¹ Lancet, November 2, 1895.

in the intervals, as the result of exhaustion in part due to the frequency of the convulsions, in part to the difficulty of maintaining nourishment.

The treatment of tetanus of traumatic origin demands careful examination of the wound, the removal of any sources of irritation which may be detected, and antiseptic treatment to prevent any further infection. Apart from these, the treatment involves measures calculated to diminish reflex excitability, and of late years the disease has been dealt with by means of antitoxin, with considerable, but not invariable, success. To reduce the frequency of the spasms the patient must be kept in bed in a dark, quiet room, and only those engaged in the actual nursing or treatment should be admitted.

The utmost care is required to maintain nourishment without provoking tetanic spasms. Owing to the contraction of the muscles of the jaws, the feeding is frequently rendered extremely difficult. Occasionally it is possible to induce the patient to take small quantities of liquid nourishment at frequent intervals, but very often the fixation of the mouth renders this almost impossible, and it may even be advisable either to feed by means of a nasal tube, or to employ chloroform previous to the administration of food by the tube, or to resort to the use of nutrient enemata.

The remedies that have been recommended are those calculated to diminish reflex excitability. Morphine has been used hypodermatically, and chloral hydrate and potassium bromide have been given in full doses by the mouth; but since the disease is fairly frequent in children it is often undesirable to use either opium or morphine, and, failing antitoxin, reliance must be placed upon the use of comparatively large doses of potassium bromide and chloral hydrate. It must be noted, however, that with fractious children much struggling is sometimes excited by the attempt to administer any drug by the mouth, and the effort must not be too persistently made if convulsive spasms are excited.

Numerous other remedies—such as Calabar bean, *cannabis indica*, belladonna, quinine, strychnine, and cocaine—have been recommended at various times. Those which can be administered hypodermatically may be tried, though there is little likelihood that strychnine can exert any beneficial influence in this complaint other than the stimulation of the heart if the circulation is depressed, either as the result of the disease or in consequence of the administration of large doses of chloral hydrate.

The tetanus antitoxin already mentioned is used in doses of from 10 c.c. to 20 c.c. injected subcutaneously every six or twelve hours. The frequency of administration and the amount of the dose are regulated by the frequency and also by the severity of the convulsions. In the single case in which I employed this remedy the effect was to reduce both the frequency and the severity of the convulsions, and although prior to the employment of the antitoxin the case appeared to be hopeless, yet success followed this treatment. It is well, however, to remember the Hippocratic aphorism quoted by Osler, that such persons as are seized with tetanus die within four days, or, if they survive this period, they recover.

The success of the treatment to some extent appears to depend upon its early employment. In the *Year-Book of Treatment* for 1899, p. 87, there are references to the use of this remedy, and the general conclusion is that tetanus antitoxin has a distinct value, especially in those cases which have not had a very short incubation period, and where it has been given in the early stage soon after the symptoms have commenced. It may be mentioned that although in general the antitoxin is injected subcutaneously, Roux and Borrel suggest that it should be introduced into the substance of the brain. Reference is made in the *Year-Book of Treatment* for 1899, p. 191, to some few cases in which this method has been adopted, but further observations must be made in this direction before it is possible to speak definitely of the results.

Malarial Fevers (*Intermittent, Remittent, Pernicious*). It is not within the scope of this book to discuss the recent advances in connection with the etiology and pathology of the various forms of malarial fevers. It will be sufficient to indicate the growing belief that these conditions depend upon the presence in the blood of an organism, the plasmodium malariae, which is found in various forms in different types of intermittent or remittent fevers.

So far as treatment is concerned, there is also comparatively little advantage in making distinctions between intermittent fever, remittent fevers, and the pernicious form. In all three the essential treatment must be somewhat different, according to the period at which advice has been sought. Thus it will be necessary to consider, first, treatment during the intervals between the separate attacks during the acute stage; second, treatment during the attack; and, third, treatment of the sequelae of different forms of malarial fever.

With regard to intermittent fever, quinine must certainly be administered during the intervals between separate attacks, and the mode of administration to some extent depends upon the severity of the case and upon the local practice.

In America, where malaria is common, large doses of quinine are given in the intervals between the separate paroxysms, and the greatest benefit is claimed for the administration of quinine in single large doses some two to three hours before the paroxysm is expected to occur. It is maintained that the results are far better than when a similar large dose is given almost immediately before the onset of the paroxysm, since the former practice allows of the absorption of quinine and of its action at the time that the specific organism of this disease is in full development.

It is also claimed that the action of quinine is increased when the intestine is acting freely, and that there is considerable advantage, therefore, in giving calomel or some other purgative some four or five hours before the quinine is employed. When, however, large doses are used, they are extremely apt to produce vomiting if given by the mouth, and it will accordingly be desirable to allay reflex excitability by the simultaneous use of potassium bromide or of diluted hydrobromic acid; the latter to a great extent checks the undesirable symptoms of cinchonism or quinism, at the same time that it reduces vomiting. If, in spite of these, vomiting still results after the administration of 10 to 20 grains of quinine, it may be necessary to introduce the drug into the system by other channels, as, for example, by the hypodermatic injection of the solution or by the use of quinine as a suppository.

Of the official forms of quinine the sulphate has perhaps the greatest reputation, but this is extremely insoluble, and, whether used by the mouth or by hypodermatic injection, requires the presence of a mineral acid. Quinine hydrochlorate and acid quinine hydrochlorate are more soluble, the latter, which has recently been introduced into the *British Pharmacopœia*, dissolving in rather less than its own weight of water and yielding a slightly acid solution. It is probable that these forms of quinine will almost entirely supersede the older form, since they can be so much more easily dispensed, and the solution of the acid hydrochlorate is so much less irritating than the solutions of quinine sulphate made with free mineral acid.

With the onset of a severe attack of malarial fever, it is perhaps

more customary to employ the single large dose of quinine in the manner above mentioned. In England, where the type is less severe, small doses are perhaps more usually given during the intervals between different paroxysms, particularly in quotidian ague, as the form most commonly seen, tertian and quartan being comparatively rare. The treatment does not require modification on account of the particular form of ague. I have seen a complete cure of a severe attack of quartan ague follow the administration of 5 grains of quinine sulphate in an acid solution three times a day.

Numerous other remedies have been advocated as substitutes for quinine, and their recommendation has, perhaps, been partly due to the former high price of this drug. This objection to the use of quinine has of late been removed, owing largely to improved methods of production; and although some remedies, such as arsenic, appear to act as prophylactics and to diminish the risks of exposure to malarial influences, they do not exert the same curative effect. When, however, the supply of quinine is limited, it is well to remember that arsenious acid may be beneficial, if pushed judiciously during the intervals between the paroxysms, while Warburg's tincture has been strongly recommended, on account of its powerful diaphoretic and antiperiodic properties.

Two remedies which have been employed in malarial fever deserve mention—namely, euchinine, which was introduced as a substitute for quinine, and methylene-blue, for which special advantages have been claimed.

St. George Gray¹ gives his experience of euchinine in malarial fevers, and maintains that it is superior to quinine in being tasteless and in requiring a smaller dose to reduce the temperature. He considers that 10 or 15 grains of euchinine are as efficacious as 20 to 30 grains of quinine sulphate, but he finds that it nearly always causes buzzing in the ears, if not other symptoms of cinchonism. He lays stress upon the smaller dose and upon the tasteless character, considering the latter the chief advantage over quinine.

Methylene-blue² has been recommended in cases of malaria where quinine had proved useless or where there was intolerance of quinine. Cardamatis has used it in a very large number of cases, apparently with success. In some of his cases he has found it advisable to use

¹ British Medical Journal, February 26, 1898.

² Year-Book of Treatment, 1899, p. 441.

both methylene-blue and quinine, but in the large majority he employed methylene-blue alone. According to his account, the drawbacks include staining of the tongue and lips, and sometimes a slight amount of cystitis. He considers that patients are not only cured of existing malaria, but that they are also rendered immune, so that they may continue to reside in malarial districts with but little danger of subsequent attacks. The daily dose is from 10 to 12 grains for adults, and the drug is to be administered in intermittent fever some ten hours before the beginning of the paroxysm.

With the development of ague it is desirable to remove the patient from the malarial district at the earliest opportunity, unless the disease yields quickly to treatment with quinine.

With regard to the treatment during the paroxysm, this must to a great extent depend upon the stage. The ordinary succession of events is as follows: a cold stage of short duration, lasting usually about fifteen minutes, forms the commencement of the attack, and during this time there will be much headache and perhaps nausea and vomiting. The symptoms resemble those of a rigor, with great depression and shivering, while the temperature rises rapidly to 104° or 105° F. or more. During the cold stage very little can be done to promote comfort. The patient should be kept in bed and covered with blankets, and warm drinks may perhaps be given. When a full meal has recently been taken, vomiting should be induced, either by the use of an emetic or by copious draughts of warm water. It is quite useless, when the attack has commenced, to attempt to administer quinine, since absorption at this time is partially or wholly arrested.

The cold stage gradually gives place to a hot stage, and indeed in some forms of malaria the cold stage is either entirely absent or of extremely short duration. During the hot stage, which lasts three or four hours, the temperature continues high and the pulse increases in force and rapidity, while there may be considerable headache. The headache may to some extent be relieved by the use of cold compresses, and the general discomfort may occasionally be reduced by sponging the body with cold or tepid water and by the use of cooling drinks.

It is very rarely necessary to adopt more active measures for the reduction of temperature. The antiperiodics are of no service for the relief of headache or fever in this stage of the attack, while the relatively short duration of the fever renders the use of the wet

pack or of the vapor bath unnecessary as a means of reducing the temperature or of promoting diaphoresis.

The hot stage is succeeded by the stage of sweating, during which the severity of the symptoms moderates, the temperature falls rapidly, and the relief of headache may be followed by sleep. The free perspiration may continue for nine or ten hours, or even more, and although it is usually followed by considerable weakness, the contrast from the discomfort both of the cold and of the hot stage is such that the patient feels practically well.

During the sweating stage comfort may be increased by the use of copious draughts of water, and should there be much exhaustion and weakness, small amounts of stimulants may be taken, and the routine treatment with quinine may be commenced.

In remittent fever the chief difference from the intermittent form is that the temperature continues above normal in the intervals between the febrile attacks, but in some forms of remittent fever the second stage may be absent and the cold stage may be of short duration. In remittent fever vomiting is somewhat more common, and jaundice may also arise.

The treatment of remittent fever does not materially differ from that of intermittent fever, though the continuance of the febrile state indicates that the patient should be kept in bed in the intervals between the hot stages, instead of being allowed to get up and dress. The special symptoms of vomiting and jaundice may call for treatment on general principles, while the febrile condition may be dealt with by the administration of ammonium acetate in addition to quinine.

In the pernicious form of malaria hæmaturia may arise, or blood-coloring matter may be separated from the corpuscles. This form is frequently rapidly fatal, the symptoms resembling those of acute uræmia, including suppression of urine, vomiting, and perhaps either coma or delirium. These symptoms are often followed by indications of asthenia. The treatment of this condition involves the free use of quinine from the commencement, together with stimulant remedies, such as hypodermatic injections of strychnine and the employment of nutrient enemata, to which some form of alcohol may be added with advantage.

When, in spite of these measures, there is much depression of the circulation, spirit of camphor or ether may be injected hypodermatically. Very little can be done for the relief of the hæmaturia or

the hæmoglobinuria, both of which so profoundly weaken the patient. So soon as convalescence appears to be established, however, astringent remedies may be administered, such as alum in 5-grain doses, or ferric chloride, or the iron arsenate. Unhappily, however, in the majority of cases of pernicious malaria there is no opportunity for the use of these remedies.

With regard to the treatment of the cachexia which results from malarial fever, this should be dealt with partly by change of air and partly by the frequent exhibition of iron, quinine, or arsenic. The compound syrup of hypophosphites is often of service in restoring strength and vigor after an attack of malaria. The anæmia, however, may be extreme and persistent, and will call for the prolonged use of various forms of iron. The tendency to relapses must also be remembered, and this liability may to some extent be counteracted partly by tonic measures and partly by the adoption of warm clothing, since it is generally found that slight changes of temperature, or even cold draughts playing upon some exposed portion of the body, may be sufficient to determine the occurrence of malarial discomforts, or even to provoke a distinct attack of ague.

Asiatic Cholera. The dependence of this disease upon the development of the cholera bacillus of Koch has only been recognized of late years, but this dependence has already furnished the basis for great advances in the prophylactic treatment. The chief symptoms of the disease is profuse diarrhœa, speedily followed by collapse, which, in favorable cases, gives place in turn to symptoms of reaction.

The treatment, therefore, must be adapted to these several conditions, but more interesting than the treatment of the disease is that which is intended to check the liability of those likely to be infected. This prophylactic treatment was first performed in Spain by the injection of attenuated cholera poison, and gave rise to much discussion. Since 1893, however, Haffkine has been making protective inoculations in India on a very large scale, and his observations have been confirmed by experiments made in Paris, and also by use of the anticholera serum in Japan.

The preliminary symptoms of cholera are abdominal pains, with diarrhœa and depression, and these symptoms may last for one or two days before the onset or occurrence of the stage of collapse. There was at one time much discussion concerning the propriety of checking choleraic diarrhœa, and the late Sir George Johnson was

strongly in favor of encouraging this symptom by giving castor oil, on the hypothesis that the diarrhoea served to eliminate the poison.

Others have attempted to treat this disease on the principles of intestinal antiseptics, as, for example, by the administration of calomel in place of castor oil with the first onset of the diarrhoea, or of salol, or of bismuth salicylate, while thymol and betanaphthol have also been recommended.

The present tendency is, however, to endeavor to control the diarrhoea as early as possible by the employment of astringents and of opium, and it is urged that opium is of considerable service not only in diminishing the frequency of the motions, but also in relieving the cramp-like pains which accompany the diarrhoea, and are most marked in the stage of collapse.

Opium is sometimes given alone in the form of the tincture, or, if the pains are very severe, it is injected hypodermatically. It may, however, be made into a mixture with astringents. In 1892 the College of Physicians of London recommended the employment of the following two mixtures with the earliest indications of choleraic diarrhoea :¹

I.

R.—Salicylate of bismuth and cerium	gr. v.
Compound powder of cinnamon (B. P.)	gr. vijss.
Camphorated tincture of opium	℥xxx.
Compound tincture of chloroform (B. P.) and aromatic spirit of ammonia	āā ℥xx.
Essence of peppermint	℥x.
Chalk mixture q. s. ad	℥j.

Dose.—One ounce every three or four hours.

Should it disagree, or in twenty-four hours fail to give relief, the following mixture should be substituted :

II.

R.—Aromatic sulphuric acid	℥xv.
Camphorated tincture of opium	℥xxx.
Compound tincture of chloroform (B. P.) and tincture of coto	āā ℥xx.
Syrup of orange flower	℥j.
Peppermint water q. s. ad	℥j.

Dose.—One ounce every three or four hours.

A somewhat similar prescription was recommended by the Board of Health, but in this only a small proportion of tincture of opium

¹ Martindale. *Extra Pharmacopœia*, 1898, p. 96.

is employed, and the value of the mixture is mainly dependent upon the astringents it contains :¹

R.—Aromatic confection (B. P.)	gr. ix.
Aromatic spirit of ammonia	℥ ix.
Tincture of catechu	℥ xxx.
Compound tincture of cardamoms	℥ xviii.
Tincture of opium	℥ iij.
Chalk mixture	q. s. ad ʒj.

(Equals one dose.)

These prescriptions are all perhaps almost too elaborate for employment on occasions of emergency, when it will be necessary to trust to remedies of a more simple and available character, as, for example, the administration of 10 drops of aromatic sulphuric acid with 20 drops of laudanum, to be repeated every two hours until the patient is fully under the influence of opium or until the symptoms show signs of improvement. To this mixture 5 to 10 drops of spirit of camphor may be added.

During the stage of collapse, severe diarrhœa and vomiting are generally present; the latter symptom precludes the employment of any remedy by the mouth. It will then be necessary to use morphine hypodermatically to relieve pain and to check diarrhœa. In addition, hypodermatic injections of ether will often be found to improve the quality of the pulse and to diminish discomfort. The duration of collapse may sometimes be shortened by the use of hot applications to the hands and feet, or by warm fomentations applied over the abdomen. If vomiting is not severe, thirst is commonly present and may be relieved by copious draughts of water, which may sometimes be retained with greater facility if ice has previously been employed. When vomiting has been a severe symptom, small doses of cocaine, given by the mouth, will sometimes be of service; it is, however, necessary to be very sparing in the use of this remedy, since it may produce considerable weakness of the circulation. When the draughts of water and the ice fail to satisfy the thirst, fluid may be slowly injected into the rectum, or a simple saline solution, slightly warmed, may be slowly injected subcutaneously or directly into a vein. This form of treatment has long been employed for the relief of the collapse of cholera, which to a great extent appears to depend upon the profuse drain of liquid from the bloodvessels.

Cantani's method is to inject into the rectum 3 or 4 pints of liquid

¹ Martindale. *Extra Pharmacopœia*, 1898, p. 96.

containing a very small proportion of tannin, and he facilitates the introduction of this liquid by raising the pelvis, believing that the fluid will then find its way into the small intestine. These injections are to be given after each motion, and are employed mainly with the view of cleansing the intestine. A very large proportion of the fluid thus introduced is undoubtedly returned, and for the relief of symptoms of collapse the subcutaneous or intravenous injections of warm saline solutions are of greater service.

During the stage of collapse, when there is but little vomiting, relief may sometimes be afforded by small quantities of stimulants, which may be given with hot coffee or hot tea. It is generally found, however, that these stimulants must be freely diluted, since if given in concentrated form they favor vomiting and headache.

During the stage of reaction the amount of liquid taken by the mouth may be increased, and saline aperients are often useful. In this stage there may be complaint of lumbar pain, and albumin or blood may be found in the urine. These afford indications for the use of hot fomentations over the lumbar region, and also for the administration of saline aperients in greater quantity. The stage of reaction is also sometimes marked by indications of pulmonary engorgement, which may necessitate the use of fomentations or poultices over the thorax and the administration of expectorant remedies.

There is little that need be said of the treatment during convalescence. The ordinary tonics, such as iron, quinine, and hydrochloric acid, will often be of service.

CHAPTER XXI.

TUBERCULOSIS.

Curability—Climate and Health Resorts—Open-air Treatment—Exercise—Clothing—Diet—Nordrach Treatment—General Medicinal Treatment—Antiseptic Inhalations.

Tuberculosis. Under the heading of tuberculosis it will be convenient in this volume to consider first the forms of tuberculosis which most commonly come under the care of the physician, namely, those affecting the lungs; second, apart from the general treatment of this condition, to consider the special treatment to be adopted in view of special symptoms, complications, or sequelæ which result from tuberculosis of the lungs.

To some extent this will involve the consideration of tuberculosis as affecting other viscera, but in these chapters the symptoms will be considered only as complications of what is ordinarily called pulmonary phthisis.

The distinction between pulmonary tuberculosis and tuberculosis affecting other viscera is to some extent artificial, and conditions which are for the sake of convenience regarded as sequelæ may, under some circumstances, constitute the primary disease; for example, tuberculosis may primarily and mainly affect the mesenteric glands and the intestine, while the affection of the lung, if any, is of minor importance. Or, again, the tubercular process may affect the vessels of the brain, constituting tubercular meningitis where the tubercular taint is undoubted, but where its extension to the lungs or to other organs forms no necessary part of the disease. Then, again, independently of these conditions—which may be regarded as the medical forms of tuberculosis, and accordingly fall within the scope of this book—there are other conditions which come more particularly under the notice of the surgeon, where the tubercular affection acts mainly upon the joints, the bones, or the skin. To some extent these have in recent years been found amenable to some of the methods of treatment recently advocated for pulmonary tuberculosis, and in so far as they are to be dealt with by general or by

constitutional treatment they will find mention in this work, while considerations of any surgical measures which may be necessary will, of course, be excluded.

With regard to pulmonary tuberculosis the question of curability has of late years come into extreme prominence since the discovery of the bacillary origin of the disease. So long as it was thought that the disease was hereditary, treatment seemed of little avail, and was perhaps too purely concerned with the treatment of special symptoms; but the discovery of the dependence of the disease upon the growth, and consequent irritation, of bacilli has led to innumerable experiments and to many new modes of treatment, all with the object of checking the growth of the bacilli and many intended to cause their death, and by so doing to arrest the tubercular process. There can be no doubt, however, that the discovery of the bacillus has not completely elucidated the whole question of tuberculosis, and that although the disease is due to infection, and is, therefore, communicable, yet the dangers to the individual are to some extent subject to hereditary predisposition. All who have had careful, well-authenticated details of the family history of consumptives brought before them must have realized the importance of hereditary predisposition; for instance, there can be no reason to doubt that in hospital out-patient rooms, and in other places where people suffering from consumption are crowded together, the students, the doctors, and nurses must be frequently inhaling the tubercle bacilli, and the comparative immunity of the majority seems to depend, not upon the non-absorption of these bacilli, but upon some process by which the vitality of the bacilli is arrested, unless the individual is from heredity predisposed to the disease.

Further, with regard to the germicidal treatment of tuberculosis, in reading the following pages it must be remembered that although numerous drugs have the power of destroying the bacilli, when the question is regarded purely from the experimental or laboratory side, their efficacy is more open to doubt when the bacilli have to be reached in the interior of the lung, and it becomes somewhat problematical how far it is desirable to adopt, or to continue to employ, remedies of undoubted germicidal power if these also possess the power of exciting further irritation. If it were possible to confine the action of certain of these germicides to the small area affected, the germicidal treatment of tuberculosis could be undertaken more hopefully; but the problem we have to face is how to kill the

bacilli without at the same time irritating the lungs or the air passages by the strength of the remedies we employ.

In recent times the treatment of tuberculosis has received a fresh impetus in the enthusiastic recommendation of the open-air treatment. It has long been known that some cases of tuberculosis would improve if removed from their ordinary conditions of life into circumstances where a large part of the day could be spent in the open air, more particularly if the open air was fairly free from damp, dust, fog, or other impurity; and on this account patients have been sent on long sea voyages, or to high altitudes, or to southern health resorts, where, though the conditions have varied very greatly, yet improvement has been claimed in each case, the whole secret appearing to lie not so much in expatriation as in alteration of the surroundings and mode of life of the individual. One of the primary factors in this treatment lies in the establishment of a hopeful spirit, which will convince the patient of the desirability of breaking through his former habit of living in heated rooms with closed windows, and of dreading draughts and fresh air generally.

With these preliminary remarks it will be necessary now to turn to the details of treatment of cases of pulmonary tuberculosis. The first essential is to consider how far in the individual case it is possible to influence the tuberculous process beneficially by change of residence. To some extent the alteration in the surroundings must be determined by the patient's means, since notwithstanding the charms of southern health resorts, with their brightness of color and sunshine, it is frequently impossible for the patient to meet the expenses involved in the journey and living; but even when expense does not affect the question, some cases of tuberculosis are wholly unfit to face the risks and discomforts of a long journey, more particularly should this journey have to be performed alone. From the physical side, the conditions which preclude such journeys are great fluctuations of temperature or a persistence of high temperature, the existence of much evidence of pneumonic consolidation, the extent to which the individual suffers from night-sweats, or the degree to which his vitality has been already undermined by prolonged hectic fever and profuse expectoration. When the end appears almost in view, it is little short of cruelty to send such patients to die away from home and friends. Another consideration which will influence change of locality is the recent occurrence of profuse hæmoptysis or the presence of albuminuria.

Sir Andrew Clarke¹ spoke strongly against sending patients with consumption to winter in Alpine altitudes, if they were at the same time suffering from albuminuria. He maintained that under such circumstances they seldom improved, and that those who, while dwelling in Alpine altitudes, become albuminuric always do badly; and he accordingly laid down two important rules for the avoidance of danger: (1) That no phthisical patient with albuminous urine should be recommended to winter at any Alpine height; (2) that everyone developing albuminous urine while dwelling there should immediately be sent away. Similarly, high altitudes are contraindicated for patients with weak circulation as well as for those with large, well-marked cavities in the lungs.

From what has been already said it will be evident, however, that although under these circumstances it is advisable for patients to remain at home or near home, it is unnecessary for them to ignore the importance of the open-air treatment of tuberculosis, since experience is showing that when patients are kept out of doors in the fresh air for a large part of the day all their symptoms may improve very materially, and in many parts of this country establishments are springing up where the open-air treatment of consumption is raised almost to the level of a fine art. Mild or incipient cases of tuberculosis may do well to winter at southern resorts, while severe cases may improve very materially by judicious open-air treatment at home.

The three factors in the climatic treatment of tuberculosis have been admirably summed by Osler:

1. A pure atmosphere.
2. An equable temperature.
3. A maximum amount of sunshine.

Wherever these three requirements can be satisfied the place is suitable for a health resort. With regard to purity, it has been well pointed out that the purity of the atmosphere is greatest in parts remote from large centres of industry, and on this account patients have frequently been sent into the mountains or into parts surrounded by forests.

In the Alpine health resorts these conditions are joined with the advantage of stillness of the atmosphere and a low barometric pressure, and in spite of the snow the atmosphere is dry, and, as a

¹ *Lancet*, January 5, 1889, vol. i.

rule, free from fog and cloud. The stillness of the air renders the cold less perceptible to those who are sufficiently strong to take exercise, and for them in most of the Alpine health resorts abundant opportunities for out-door exercise are provided in skating, tobogganning, and in excursions. The chief Alpine stations that are at present open during the winter are the following: Davos Platz, Maloja, Andermatt, Leysen, L'Aigle, Samaden, St. Moritz, Campfer, Wiesen, Arosa. From personal acquaintance with the majority of these health resorts I can speak in high terms of the treatment carried on at Arosa, near Davos, which as yet has the advantage of being less crowded than the latter place. The altitudes of the above range between 4700 feet in the case of Leysin and 6032 feet at St. Moritz. The class of cases suitable for these altitudes includes those in which the disease is commencing, or is comparatively stationary and not too far advanced, and, as a rule, limited to one lung. When there is reason to believe that slight hemorrhage occurring during the summer months while the patient is at low altitudes is dependent upon tubercular changes, an Alpine climate may be of great service. When there is greater tendency to hemorrhage, this tendency is likely to be increased, and thus may lead to the rapid extension of the disease, with possibly a fatal issue.

When the physical signs indicate that the disease is far advanced or that it is rapidly developing, especially if there is much pyrexia and loss of weight, the case is not suitable for these high altitudes. Sir Anthony Clark's opinion of the dangers of albuminuria has already been mentioned, and another danger lies in the weakness which may follow the inability to sleep at these elevations. Many persons know from experience during previous visits to Switzerland that both their power of sleep and their appetite fail at great altitudes. Under such circumstances other health resorts should be sought, and indeed the selection in every case must be dependent upon due consideration of numerous conditions; for example, not only must the stage of the disease be considered, but it is necessary to take into account the existence of special symptoms or complications, and even if these permit resort to an Alpine climate, the position in life and the tastes of the individual should also be consulted. The age of the individual must likewise be considered; young adults will do well as compared with those who are older and weaker. The latter, however, will often gain more permanent benefit from a winter or two spent in Australia or in South Africa; but the conditions in

both of these countries have to be carefully chosen, to avoid the wet season in the neighborhood of Cape Town and to permit a maximum of benefit with a minimum of discomfort. Those who travel up country from Cape Town must be prepared for a somewhat rough life and for a comparatively limited dietary. This climate is naturally suitable for those with incipient phthisis, with but few physical signs and little deterioration of general health. The same limitations apply to the advantages sometimes sought on a sea voyage. A long sea voyage on a well-provisioned ship will often be most beneficial to those in comparatively good health, while its discomforts may often prove disastrous to those who are already showing signs of much affection of the lung, and who suffer with much hectic fever or with profuse perspiration. Notwithstanding the undoubted advantages so often derived from Alpine resorts, the depressing influence of association with a number of sick people and the frequent discussion of symptoms serve to render the Alpine health resort somewhat depressing, especially to those who have much expectoration or who are much weakened by the disease. On this account efforts are constantly being made to discover new centres with desirable conditions, and incipient cases are sometimes sent to the Rocky Mountains, to Denver, or to Colorado Springs, or other Colorado resorts, where opportunities for occupation are perhaps greater than in the Alpine health resorts. For the above reasons, also, efforts have been made recently to develop some other places in Switzerland as winter stations, and many people now go to St. Beatenberg, to Les Avants near Montreux, to Grindelwald, and to Chamonix during the winter months. The last-named are now favorite resorts, not so much for those with phthisical tendencies as for others who may be suffering from overwork, and who desire a short winter holiday where much exercise can be taken. At Grindelwald the Bar Hotel is open during the winter, and there is an excellent skating rink, which is largely patronized. Grindelwald, however, is now becoming almost too popular and too busy to be a satisfactory winter station for invalids.

For more advanced cases of phthisis, residence in one of the southern health resorts is often preferable to mountain air. When the lungs are much affected, when there is much hæmoptysis, expectoration, or recurrent fever—conditions which render the Alpine climate unsuitable—the selection will lie between Cannes, Hyeres, Arcachon, and other resorts on the French and Italian Riviera, and

places further afield, such as Tangier, Algiers, or Egypt. A trip in Egypt is, however, somewhat costly, more particularly if the patient desires to go up the Nile in a dahabeeah. It is inexpedient for phthisical patients to attempt to winter in Cairo, on account of the dust, the noise, and the overcrowding. Those of limited means are sometimes tempted to make the trip up the Nile in the ordinary tourist steamers; but the expeditions often undertaken by tourists are frequently of a fatiguing and exciting nature, and should not be risked by any invalid with a tendency to hemorrhage. The life on a Nile steamer is otherwise well calculated to cheer and improve the condition of phthisical patients, though a good deal necessarily depends upon the companions and upon the boat. So far as the climate is concerned, from November to early in March it is well adapted for cases of phthisis, provided, however, that precautions are taken to avoid chill soon after sundown, when the temperature falls very rapidly.

From personal experience I can speak in favorable terms of the hotels at Luxor, where there is very much to interest, without undue fatigue. Similar establishments are to be found at Assouan, at Assiout, and at Mena, close to the great pyramids. At Helouan, which is sometimes recommended, the climate, conditions, and the baths are more suitable for the treatment of chronic rheumatic and gouty affections than for the reception of phthisical patients. Those with archæological tastes and with comparative affluence will, however, find that life on a dahabeeah is preferable to life on any of the steamers or in any of the hotels; but it must be remembered that, though the journey is undertaken for health, considerations of time and expense cannot always be lightly put aside.

It was at one time the fashion for patients to go to Madeira; but, in spite of its beauty, the climate is apt to be somewhat depressing, owing to the damp and wet. When there is much bronchial catarrh, however, the moist atmosphere may be beneficial. Teneriffe among the Canaries, and in particular Orotava, present similar beauty of scenery, the climate is more dry, and the daily range of temperature is less at Orotava than at Funchal in Madeira. There are many residences at varying altitudes above sea level, so that all tastes can probably be suited. During some part of the year, however, there is a strong north wind in Orotava, which is extremely trying to those who are old and weak or who have a feeble circulation. Without a doubt, the popularity of Orotava would be largely in-

creased, as a health resort, by the erection of shelters similar to those now so commonly employed for the open-air treatment of phthisis.

The value of the health resorts of America should not be overlooked, such as San Diego, Los Angeles, Thomasville, and Lakewood, when low altitudes are required, or Colorado, Adirondacks, and Asheville, when high altitudes are desirable.

Whatever climate is selected, strong injunctions must be given against remaining in-doors, and against leading a life of inactivity, so long as the temperature is fairly stationary. Whenever the temperature is raised, or even when there is much daily oscillation, advantage is still to be derived from the open air rather than from closed windows and heated rooms. The recognition of these considerations induced Dr. Burton Fanning to endeavor to reproduce in England some of the advantages ordinarily attributed to foreign health resorts. He indicated his view that, although the weight of opinion generally was in favor of elevated sanatoria, equally favorable results have been produced by the most diverse climates, and he concluded that the only essential requisites for the climate of phthisis are: that its air be pure and bracing, and that it allow the patient to spend the greater part of the day out of doors. In the valuable series of papers in the *Lancet* (March 5, 12, 26, 1898) he considers the open-air treatment in England. From an examination of the practice pursued at foreign health resorts he shows that while exercise is recommended at some stations, and graduated walks and ascents are made use of, yet that at Falkenstein the inmates are kept perpetually at rest, and that the long adoption of the recumbent position is thought to be almost as important as the open air. He thinks that the essential point in the conduct of the various sanatoria lies in the discipline and medical supervision that are exercised, and that the results achieved have but little to do with the localities so long as the open-air treatment is carried out.

In the article referred to a description is given of a sanatorium at Cromer, where a veranda and a summer house were conveniently situated, and where a shelter was erected in the grounds, with two movable sides, consisting of panels of wood and glass. These were arranged in position daily, after the direction of the wind had been observed. Patients are placed in these shelters in the early morning, and remain there until sunset, while in dry weather they may stay out of doors until much later. They are warmly clad, and, if

necessary, hot-water bottles are employed to keep the feet warm. Dr. Burton Fanning prefers absolute rest whenever there is any perceptible weakness of the pulse, and he does not think that an evening rise of temperature, so long as it is below 102° F., is any contraindication to following the treatment in its entirety. He has found, so far, that a week or a fortnight is sufficient to produce acclimatization, and that the time of greatest anxiety is during the first week or two.

One of the most notable features resulting from the open-air treatment is the gradual fall of temperature to more nearly the normal range. It was found that those patients whose temperatures did not fall below about 99.6° F. in the morning were not suited to strict open-air treatment. It was also noted that more improvement in the temperature was effected in the cooler months than in the summer. Another great improvement was the diminution in the night-sweats which often preceded the fall of the evening temperature. An increasing appetite was constantly noted within the first few days of commencing the out-door life ; but, on the other hand, during the first few weeks there was often some increase of cough and increased difficulty with expectoration.

During the early days of the employment of the open-air treatment no routine use of drugs was made, though the special symptoms and intercurrent ailments were treated immediately. An ordinary linctus was given to relieve cough and to help sleep, and simple purgatives and digestives were occasionally employed. Only two points of routine were carried out, which indeed are essentials wherever phthisis is treated, the first being the collection and disposal of the sputum, and the second a somewhat generous though simple dietary.

The results recorded in the papers on this subject are in strict accordance with experience of cases of phthisis treated in hospitals in large cities. Every physician must have noted the improvement which so often occurs after a patient who appeared to be desperately ill has been admitted to the hospital, where the conditions of ventilation, of warmth, and of comfort, as well as the absence of overcrowding, have almost invariably served to prolong life and to diminish the urgency of the symptoms. It is not claimed for the open-air treatment that it is an infallible cure, or that it will serve to prevent the extension of tubercle to other organs, but it is asserted, and apparently with justice, that in a large percentage of patients

improvement will follow the adoption of this system ; and there seems to be but little reason why establishments for the open-air treatment of phthisis should not become part of the health arrangements of every town.

During the early stages of tuberculosis, when the evening temperature is nearly normal and when there have been no indications of hæmoptysis, abundant exercise should be encouraged, and the particular form of exercise should necessitate free movement in the open air. Although, in general terms, exercise is beneficial in promoting appetite and in increasing the breathing power, it is very desirable to avoid any form of athleticism which entails any sudden severe strain. The object of encouraging the patient to take an increasing amount of exercise is to throw into activity the healthy parts of the lungs, which are scarcely perhaps utilized during the time that a sedentary life is indulged in. It has even been recommended that by forced efforts at respiration, as, for example, by bugle blowing, the healthy portions of the lungs should be rendered emphysematous ; but although the size of the thorax will in this way be increased, there can be little advantage in producing emphysema intentionally, since when this disease is present the breathing power is impaired, notwithstanding the increased size of the thorax.

For mild cases skating and tobogganing are sometimes beneficial, and can be indulged in when the patient is in mountain air in the winter ; they encourage circulation and respiration, besides affording occupation of a cheerful nature. It cannot be too often impressed upon the patient and his friends that a sedentary, brooding life is one which is most likely to hasten the tubercular process. Even when on a long sea voyage, the rule of an abundance of daily exercise should be observed unless there is reason to fear hæmoptysis. It is generally better to distribute the exercise over the whole day instead of crowding it all into a limited period.

Even for patients who are too severely ill to be sent to a health resort, the appetite and the general nutrition are improved after being out in a sailing boat, in a carriage, or even in a bath chair. The influence of change of surroundings and fresh air combine under these circumstances to work for good.

The clothing of the consumptive deserves attention, since, misled by the frequency of cough and expectoration, many consumptives are in the habit of overclothing themselves. The clothing should

be warm and light, and, although flannel should be worn next the skin, it should be frequently changed, a proceeding which involves no risk, provided that the fresh garment is properly aired. It is, of course, essential that warm woollen gloves should be worn in cold climates, and that the feet should be kept warm with woollen socks and with thick boots, since risk of bronchitis or of hemorrhage appears to be somewhat greater when the extremities are allowed to get cold. When pursuing the open-air treatment in this country, care should be taken that the patients when lying on their couches are warmly clad and covered with warm, light rugs to prevent the rapid cooling of the body with any alteration of temperature; but, on the other hand, overclothing which promotes free perspiration is only too likely to favor risks of chill. Those who are able to take exercise should have at hand some additional light, warm, woollen wrap to put on when resting.

The diet of phthisical patients presents many difficulties, the chief being the distaste for many important articles of food. With regard to quantity, it is difficult to lay down any rule; as much nourishing food should be taken as can be digested, the amount and the nature of the food being varied in accordance with any dyspepsia that may arise. So long as the temperature is normal, or nearly normal, all kinds of diet may be employed, but it is generally considered advisable that fats should be taken in abundance to counteract the wasting process incidental to the disease. When the patient is unable to take much meat, fats may be taken in the form of milk or butter. When the temperature is much above the normal, the diet must be somewhat modified, and should consist more purely of liquids; but even then milk, eggs, and butter should form the staple article of food, and in extreme cases patients may even live, like those with acute nephritis, on an exclusive milk diet. If restricted to a milk diet, it should be given in repeated small quantities. When milk disagrees, koumyss or buttermilk may be substituted. Whittall recommends the following recipe as the simplest and best of all plans for the production of artificial koumyss.

“In the absence of yeast, a palatable and highly nutritious beverage may be prepared by mixing one part of fresh, rich buttermilk and one part of water with eight parts of cow’s milk, adding a very little loaf sugar, putting the mixture into a loosely corked gallon jar, leaving it in a warm, but not hot, place beside the fire, where it may be frequently and briskly shaken, and in thirty-six to forty-

eight hours it is ready for use as a pleasant, sharp-tasted, thick liquid, which slightly effervesces. Some little skill and experience are required in producing a uniform result, and the patient should not give it up if the first and second results are unsatisfactory. After the first batch of this artificial koumyss has been successfully prepared, the use of buttermilk may be entirely dispensed with, as an equal bulk of the koumyss liquid can be used instead in the preparation of each subsequent quantity. Some patients succeed best by leaving out the sugar entirely, and by shaking the mixture very seldom during the first twenty-four hours. It may be taken *ad lib.* The buttermilk referred to above is that obtained in the process where the cream and milk have been both churned together in the manufacture of butter."¹ Koumyss may, however, now be procured from most of the large dairy companies.

When cow's milk disagrees, it is sometimes found that the milk from other animals, notably the ass, the mare, or the goat, may be taken, but it is well never to force patients to struggle with these against a strong disinclination. As in infant feeding, milk may sometimes be peptonized before its administration, and numerous peptonizing powders are supplied by chemists for this purpose.

It has been found that when the administration of food promotes coughing, nourishment may be given through a soft œsophageal tube, and by this means Débove introduced the system of overfeeding, or "sur alimentation," for which excellent results have been claimed. Food administered in this way must necessarily be in the liquid form, and it may consist mainly of milk, to which dry, powdered meat has been added.

Occasionally, when the digestive system rebels against the administration of milk or of meat, nourishment may be maintained by giving oysters, fish, or game, on alternate days.

The employment of alcohol in tuberculosis has led to much discussion. In the early stages it is undoubtedly not required, while in the later stages it may promote coughing.

When wasting is progressing rapidly, alcohol is sometimes beneficial if given with meals. When patients complain of sleeplessness, or when they are frequently disturbed by coughing during the night, a small amount of stimulant taken at bedtime with some form of nourishment, such as milk, arrow-root, or beef-tea, may serve to

¹ Pharmacy, Materia Medica, and Therapeutics, p. 566.

insure a quiet night. It has been recommended that in advanced stages of consumption stimulants should be given in abundance, and it has been claimed for this treatment that the frequency of diarrhœa is diminished, sleep is induced, and waste retarded. There are, however, grave objections to the lavish employment of stimulants, and it is better to reserve them for occasional use on emergencies.

While speaking of the dietary of phthisical subjects, it will be perhaps convenient to mention the inadvisability of employing sweet syrups in the medicines, since these may promote much dyspepsia, and thus interfere with digestion. A similar result may follow occasionally from the administration of cod-liver oil, of guaiacol, creosote, and hypophosphites, and when employing these remedies the digestion must always be carefully watched, since it is obvious that remedies which interfere with digestion will, by diminishing the nutrition of the individual, outweigh any advantages with which they otherwise might be credited.

Many of the foregoing principles connected with exercise, open air, and diet have been combined in varying degrees in different localities. Much has recently been written concerning the Nordrach treatment of consumption, of which an important element consists in the endeavor to increase the weight and well-being of the patient by a somewhat liberal form of diet. Thus, for example, it is recommended that as much *as possible* of the following or such-like foods should be eaten :

Breakfast, 8 A.M. Tea or coffee, cold tongue, ham, fowl, or sausage, bread and butter (with plenty of the latter), and one pint of milk.

Dinner at 1 P.M. First course : fish, fowl, or meat. Second course : fowl or meat. With both courses a liberal supply of potatoes, vegetables, and gravy or sauce, with butter as the main ingredient. Third course : fruit, with biscuits, nuts, etc.—say, three times weekly, the other days pastry, milk puddings, ices, etc.—coffee and one pint of milk.

Supper at 7 P.M. One hot course, as at dinner, potatoes and vegetables included, and one cold course, as at breakfast, with bread, butter, and tea, and one pint of milk.

To enable the digestive functions to be properly performed, it is recommended, first, that as much as possible should be eaten at meals, and that nothing should be taken between whiles. Secondly, that there should be a long interval of rest between the meals, to

allow complete assimilation. Thirdly, that before dinner and supper the patient should spend an hour reclining upon a sofa or in a hammock, on the theory that a meal is more likely to be digested if the body is not fatigued. At Nordrach the amount of exercise taken is regulated by the temperature of the body, the temperature being taken on waking in the morning, then after the morning walk (at 11.30), again after the afternoon walk (at 5.30), and at night ten minutes before retiring to bed (at 9 or 9.30). Should the temperature for a week be regularly below 98.6° F. in the morning and below 100.4° F. in the evening after rest, gentle walking exercise may be taken; but when the temperature exceeds these limits absolute rest in bed is recommended, and even talking is forbidden. When immediately after exercise the temperature is above 100.4° F., it is assumed that the walk has been too long, and rest for the remainder of the day is enjoined. Even when at rest with fever, it is recommended that the same quantity of food is to be taken by the patient as when he is about, and it is asserted that the more food is taken the sooner the fever will subside.

With regard to the value of fresh air, the Nordrach treatment coincides with that already mentioned. The windows are to be opened to their fullest extent both day and night, an abundance of clothing is recommended when the patient is at rest, but during exercise it is advised that he should have as little clothing as possible, since the less weight he has to carry the better.

It is admitted that there is no need for a sanatorium of any special construction, provided that the locality where the treatment is pursued is in the country, where pure air is to be had, well away from smoke, dust, traffic, and excitement, where a quiet, unconventional life may be led. But, apart from these factors, it is recommended that each patient's room should be about 14 feet by 14 feet by 12 feet, with the front almost entirely occupied with window space, and that the floors should be covered with linoleum, the walls and ceilings sheeted with well-varnished wood, all of which can be washed as often as necessary. Some stress is laid upon the use of steam coils or hot-water pipes, and of electric light, so as to avoid the vitiation of the atmosphere by fire or by gas, while in sanatoria intended for the reception of numerous patients the dining-hall should be a large room with many windows. Common sitting-rooms or meeting-rooms are to be avoided, since they are considered conducive to loitering, talking, and excitement.

Turning next to the use of medicinal remedies, one of the most time-honored drugs employed in the treatment of consumption merits the first place, even though it is somewhat questionable whether it acts as a drug or as a food. The administration of cod-liver oil is almost a matter of routine in cases of phthisis ; and although at first it may cause some discomfort, yet a little management will often enable increasing quantities to be taken. It is best, when giving cod-liver oil, to commence with the small dose of a teaspoonful, and this will perhaps produce least discomfort if given about two hours after meals or shortly before going to bed. It is only during the first weeks of its administration that it is likely to cause much nausea, and it is perhaps questionable whether the nausea is not sometimes prompted by a preconceived distaste for the remedy rather than by the actual eructation which it causes. It is certainly, as a rule, more easily absorbed than any other form of oil or fat, and its physical properties, although at first repellant, can, as a rule, with care and discretion be soon tolerated. Very often cod-liver oil is less objectionable if the mouth is first thoroughly wetted with water or weak coffee, and if a small quantity of the same liquid is swallowed subsequently. Occasionally, especially with children, a little salt taken with the oil, or a piece of bread eaten afterward, will tend to remove the taste and to cleanse the mouth. When once the distaste has been overcome, the amount given can be speedily increased until it amounts to half an ounce or more after each meal.

Numerous substitutes for cod-liver oil have been introduced, and many emulsions and similar compounds have been devised to overcome the difficulty of its administration ; but I am convinced that in the large majority of cases the simple form of oil is more easily tolerated than any of these preparations. When the digestion is weak and cod-liver oil creates some slight nausea, it may be given in combination with extract of malt, which also to a large extent acts as a food and serves to mask the taste of the oil. In cases of extreme wasting among young children, especially if associated with much diarrhœa, the oil may be employed by inunction, and I have seen numerous cases in which this device has been followed by great improvement in weight and in strength. This treatment is, however, somewhat difficult for adults.

There are certain conditions in which it is inexpedient to persist in the employment of cod-liver oil ; foremost among these should be mentioned any tendency to diarrhœa. In the treatment of chil-

dren with tuberculosis, an increase in diarrhoea is often found to be arrested when the administration of cod-liver oil is checked, and indeed there seems some probability that this symptom may even be induced by the use of the oil in overdoses. Independently of diarrhoea, the employment of cod-liver oil is generally contraindicated by a high temperature, especially when the morning temperature is above the normal level, since, under these circumstances, the oil is very prone to promote dyspeptic symptoms.

Occupying a position comparable to that of cod-liver oil—that is to say, as acting almost as foods rather than as medicines—may be classed the various proprietary preparations of malt which are often given alone, and coming into close range with these stand the forms of pancreatic emulsions which are intended to facilitate the absorption of milk or other food when the digestion is weak. A remedy that has obtained a great reputation in the treatment of the early stages of phthisis is the compound syrup of the hypophosphites. There is a proprietary preparation of this sold under the name of Fellows' Syrup, while a formula for a similar preparation has been devised containing 20 grains of quinine, 1 grain of strychnine, 2 drachms of hypophosphorous acid, 3 ounces of iron hypophosphite, together with hypophosphites of calcium, magnesium, and potassium, made up to 1 pint with syrup. There is an abundance of evidence that during the administration of hypophosphites phthisical patients improve greatly, but it is to some extent doubtful how far this improvement is one of an increasing general nutrition, or whether it is due to any specific action of phosphorus upon the tubercular process. It has often been urged that during the administration of phosphorus degenerative changes occur with greater rapidity, and it has been thought possible, therefore, that phosphorus or hypophosphites might favor first degeneration and subsequent calcification of tubercular masses.

Calcium and sodium hypophosphites have also been strongly recommended in phthisis. In overdoses they are said to produce weakness, sleepiness, headache, giddiness, noises in the ears, loss of appetite, colic, and diarrhoea, and they are even credited with favoring hemorrhage from the nose and lungs. If given in doses of from 1 to 5 grains three times a day, in syrup or pill, they may lead to great improvement in the earlier stages of phthisis; the cough and expectoration are reduced, while the appetite and digestion are also favorably affected.

Of the forms of specific treatment of consumption apart from the treatment by Koch's tuberculin, which will be considered later, the most hopeful results have been obtained with creosote and with guaiacol. Both of these remedies have been employed on a large scale, though perhaps of recent years the preference has been given to guaiacol and its preparations. Creosote has been administered in a variety of ways, and it is usual to commence with moderate doses of 1 to 5 minims and to increase the amount, watching the effect on the digestive system. It has been found possible to administer as much as 30 to 60 minims daily without any ill effects. Creosote may be given either in capsule or emulsion, or it may be mixed with some fixed oil, as, for example, cod-liver oil, almond oil, or olive oil. An emulsion of creosote may be prepared as follows:

R.—Creosoti	.	.	.	.	.	.	.	℥v.
Tincturæ gentianæ compositæ	.	.	.	.	.	.	.	℥xv.
Alcohol	.	.	.	.	.	.	.	℥xv.
Extracti glycyrrhizæ fluidi	.	.	.	.	.	.	.	℥xxx.
Aquæ	.	.	.	.	.	.	q. s. ad	℥j.

Of this emulsion an ounce may be given three times daily after food. The British pharmacopœial mixture consists of:

R.—Creosoti	.	.	.	.	.	.	.	℥xvj.
Spiritus juniperi	.	.	.	.	.	.	.	℥xvj.
Syrupi	.	.	.	.	.	.	.	℥℥j.
Aquæ destillatæ	.	.	.	.	.	.	q. s. ad	℥℥xvj.

The dose of this is from $\frac{1}{2}$ ounce to 1 ounce. Creosote has also been given in a pill containing 1 part of creosote and 1 of curd soap in powder.

Creosote is also now frequently administered enclosed in soft gelatinous capsules containing a variable amount of the remedy—for example, from $\frac{1}{2}$ minim to 3 minims. It is often recommended that the creosote employed should be obtained from beechwood—a distinction, however, which is not made directly in either the *United States* or the *British Pharmacopœias*, although the official form of creosote is obtained from the distillation of wood tar instead of coal tar, and the test with perchloride of iron serves to indicate when coal tar has been used in the preparation of this drug.

During the administration of creosote it is well to remember that if large doses are given they may lead to much gastric discomfort, indicated by pyrosis and sometimes by nausea and vomiting. These

obvious disadvantages have led to the substitution of creosote carbonate (creosotal) and of guaiacol carbonate, which are less irritant, and can accordingly be given in larger dose; but even these sometimes provoke vomiting, and must then be discontinued. When they can be tolerated they frequently materially reduce the amount of expectoration and render it less offensive.

For the present it will be convenient to defer all consideration of the employment of creosote by inhalation, since the treatment of phthisis by inhalations being a particularly important subject, it will be more convenient to group together all remedies employed in this way.

The activity of creosote is believed to be largely due to the guaiacol, which in good wood creosote is present in the proportion of 20 per cent., while, according to Yeo, beech creosote contains from 60 to 90 per cent. Guaiacol can, however, be prepared synthetically from pyrocatechin. It may be obtained either in the form of a liquid or in crystals, and while its odor resembles that of creosote, it is somewhat more agreeable. The liquid form is that most commonly employed, and it can be administered in doses of from 1 to 5 minims. When given in solution it is ordinarily dissolved in alcohol in the following proportions:

Guaiacol	1 part.
Water	180 parts.
Alcohol (90 per cent.)	20 "

Of this solution from 1 to 4 drachms can be given in water twice or thrice daily. It has also been recommended that it should be given in cod-liver oil, or in a mixture consisting of

Guaiacol	13.5 parts.
Tincture of gentian	30 "
Alcohol (90 per cent.)	250 "
Sherry	1000 "

Of this mixture two teaspoonfuls may be given twice or thrice daily in water.

Although guaiacol is less irritating than creosote, some patients find difficulty in taking it, and this difficulty extends even to the employment of this remedy in pills or capsules; it has, accordingly, been recommended that in such cases it should be administered hypodermatically in a solution consisting of 5 per cent. of guaiacol and 1 per cent. of iodoform in sterilized olive oil, a cubic centimetre

being the dose of this solution. Although this method of administration has been credited with the power of lessening cough and expectoration, diminishing the number of bacilli in the sputum, and favoring cicatrization of cavities, it has none the less the objection of occasionally causing much pain, and the hypodermatic injection appears to me to present no advantage over the internal administration. There is reason to believe that the dyspeptic symptoms, which have been so often observed with guaiacol, result from its administration in overdoses, and that these symptoms may be avoided by commencing with a small dose and by gradually and cautiously increasing the dose employed. It has been stated, moreover, that large doses present no advantages over small doses, and that the results depend upon the length of time this remedy is given rather than upon the amount of the individual dose. It has also been recommended that guaiacol should be administered in capsules containing 1 to 3 minims, with $\frac{1}{4}$ grain of iodoform in each.

As already stated, guaiacol carbonate is not irritating to the digestive system. It occurs in minute white crystals which are insoluble in water, and it is, therefore, conveniently administered in cachets, the dose being from 3 to 8 grains. Other compounds of guaiacol which have been recommended are the benzoate, 4 to 14 grains in cachet; the valerianate, 3 minims in capsule; guaiacetin, 8 grains; and the piperidin guaiacolate, which may be employed in doses of from 5 to 30 grains. The last can be given in solution with chloroform water, and during its administration the appetite and general strength have been said to improve, while no unpleasant effects have been observed.

The external employment of guaiacol also possesses some interest, doses of from 30 to 60 minims being applied to the skin and covered with an impermeable covering. Its absorption is evidenced by a fall of temperature with profuse perspiration, but these symptoms are speedily followed by return of fever, and accompanied by so much depression that this mode of administration has been almost entirely discarded. So strong has been the belief in the efficacy of guaiacol that it has been employed in almost every possible way. It has been given in enemata, it has been used as an inunction, being rubbed into the skin of the chest and abdomen, and it has even been injected into the lungs directly with a hypodermatic syringe, and, like creosote, it has been employed in inhalation. The benefits which can be derived from either creosote or guaiacol are to

a great extent limited by the stage of the disease. Both of these remedies may cause some improvement if used in the early stages, as well as after the formation of cavities, and guaiacol has even been credited with being of very great service in the later stages of phthisis. As a rule, however, these remedies are used with the greatest chance of success before symptomatic treatment is urgently needed. At later stages, although they may still be employed, they have frequently to be associated with drugs necessitated by the prominence of some special symptom, such as cough, diarrhoea, or fever.

At one time arsenic was largely prescribed in the treatment of tuberculosis, and even now it is still much employed by French physicians. Its action is in all probability similar to that of phosphorus—that is, it promotes fatty degeneration of the results of inflammation—but, apart from this, the tonic value of arsenic cannot be overlooked. During its use the rapidity of respiration is often diminished and the breathing becomes more easy; but these good results are commonly seen independently of the existence of tuberculosis. I have used arsenic fairly largely in phthisis, but I have not been convinced that the drug is capable of controlling, still less of arresting, the disease. The improvement, so far as my experience goes, is often limited to the general improvement of the patient's condition. The appetite may increase and the patient may put on weight for a time, but the condition of the lungs, so far as I have observed, has not shown any marked benefit. It is noteworthy, however, that arsenic has been credited with controlling the night-sweats in the later stages of phthisis. On somewhat theoretical grounds it has been asserted that arsenic, even when it does not affect portions of the lung already involved, will prevent the extension of the disease and will diminish the risks of catarrhal conditions.

Sulphur has been largely employed, and it has been used in numerous curious ways. Whitla speaks of the onion (which contains much sulphur) as one of the best known expectorants; sulphur has also been given internally in the crude form or in combination with hydrogen or various metals, as in the sulphuretted waters. A few years ago strong opinions were expressed upon the value of sulphuretted hydrogen when given by rectal injection. This extremely uncomfortable method of treatment has now been almost entirely abandoned, although shortly after its introduction it was highly vaunted, and numerous cases were mentioned in which it was credited with having effected considerable improvement.

Notwithstanding the undoubted elimination of sulphur from the vessels of the lungs, there is no evidence that it is given off by these vessels in sufficiently concentrated form to influence the growth or the development of bacilli, and it was solely on these purely theoretical considerations that this mode of treatment was ever advocated.

Different forms of mercury have been given with a similar antiseptic object—for example, small doses of the corrosive mercuric chloride, or repeated doses of calomel or of biniodide of mercury. It is, however, extremely doubtful whether these affect the tubercular process, although during their administration patients may improve somewhat from relief of diarrhoea and the reduction of temperature.

Iron is another remedy for which much has been claimed in the treatment of tuberculosis, and in selected cases some benefit will often be found to result from its use, more particularly among those who suffer from much anæmia. In chronic forms of phthisis, in particular, great apparent improvement may be noted; but it will generally be found that there is no alteration in the physical signs, although there may be an increase of appetite and a gain of weight during the use of iron compounds. Ferric chloride is perhaps the preparation which is best taken by phthisical patients, although to children or young adults the syrup of ferrous iodide is often given. There appears to be a general feeling that iron compounds are contraindicated by recent hæmoptysis, and also that they should not be given when the expectoration is at all blood-tinged. I am not aware that there is any direct evidence of the danger of employing iron under these conditions, and indeed the astringent preparations of iron are frequently beneficial during convalescence from hæmoptysis.

The keynote of much of the foregoing general treatment of consumption is the desire to employ remedies to counteract the activity of the bacilli. In most cases it is recommended that these remedies should be employed internally; but it is obvious that the antiseptics so used must be very considerably diluted before being conveyed from the bloodvessels of the stomach to those of the lungs, and it is only during their circulation in the vessels of the lung or during their elimination, that the antiseptic action can be operative. Most of these antiseptics are of a volatile nature, and, therefore, they can be used in the form of inhalations or sprays, and it is often thought that in this form more active material could

be brought to bear upon the affected site. Accordingly patients with consumption have been advised to wear inhalers fitted with sponge, or tow, upon which a volatile antiseptic remedy could be poured. For a long time there was much doubt as to the efficacy of these remedies. Dr. Latham, in his Harveian Oration, says that he fears the discovery of the tubercle bacillus has not proved in all respects to be an unmixed benefit, and that the result of treating patients in various ways by antiseptic remedies has been that the patient, and not the bacillus, has succumbed. It is at least certain that some of the antiseptics, if used as a spray or inhalation, must be given in very dilute form, since they would otherwise prove so irritating as to be almost irrespirable. This is seen when it has been attempted to employ chlorine or iodine as inhalations, and to a less extent, perhaps, it is obvious with sulphuretted hydrogen or fumes from sulphur.

The substances that have been used for inhalation with the most sanguine hope of success are creosote, guaiacol, eucalyptus, thymol, menthol, terebene, turpentine, iodoform, carbolic acid, camphor, ethyl iodide, etc. These are sometimes given alone, or occasionally two or more are employed simultaneously, as, for example, iodine and carbolic acid. The greatest favor, perhaps, has been extended to the inhalations of creosote and of guaiacol. Coghill recommended a mixture of a drachm each of eucalyptol and chloroform, with 2 drachms each of creosote and phenol. Some of these volatile antiseptics, instead of being used directly upon an inhaler, are diffused through the room occupied by the patient, this being conveniently effected by the distribution in different parts of the room of saucers filled with sawdust upon which the volatile antiseptic can be poured. Occasionally the substances are inhaled more readily when given in the form of a spray. The respirator, even in its simplest form, is an unsightly object, and is apt to be inconvenient when patients have to cough and expectorate; accordingly, it is often found more agreeable to inhale a spray for a certain length of time daily than to persist with the troublesome presence of a respirator.

It must not be forgotten that this mode of employing these antiseptics should not interfere with the administration of other remedies internally; in fact, there is no reason why antiseptics should not be simultaneously given by the mouth, by inhalation, and even by inunction. Those who attach importance to the use of guaiacol often recommend that it should be employed in all of these ways.

Several attempts have been made of late to apply antiseptic remedies to the air passages in more concentrated form by introducing solutions in olive oil into the larynx by a curved vulcanite tube passed below the vocal cords. This treatment has been recently advocated by Dr. Thompson, of Cincinnati.¹ He recommends that the introduction into the trachea should be made while the patient takes a slow, deep inspiration, and that during the commencement of the treatment the patient should be anæsthetized locally with cocaine. For tracheal injections he considers that menthol and camphor take the front rank in bronchitic affections, and he maintains that they control cough more efficiently than morphine. A strong argument which he advances in favor of this treatment is that medicines given in this way do not impair nutrition. Thus in cases of commencing tuberculosis where cough is excessive he finds that an injection of menthol and guaiacol in the evening will generally enable the patient to eat a good dinner and to get an hour's sleep before the paroxysm of cough returns, and he further states that even in long-standing cases of tuberculosis with secondary supuration, the septic fever and the night-sweats yield more readily to tracheal medication than to remedies administered by the stomach. Although Dr. Thompson does not claim that tuberculosis of the lung can be arrested by tracheal injections, he maintains that many of the symptoms induced by the tubercular infiltration can be controlled by this method, without interfering with the nutrition of the patient, in a manner wholly unknown to those who use only the œsophageal route for the introduction of remedies.

¹ Therapeutic Gazette, October 15, 1898.

CHAPTER XXII.

TUBERCULOSIS—*Continued.*

Treatment of Special Symptoms of Phthisis—Cough—Reflex or Mechanical Vomiting—Night-sweats—Pyrexia—Diarrhœa—Gastric Symptoms.

Cough. The cough of phthisis has frequently to be treated by special measures, but the treatment must be based upon the estimate formed of the nature of the cough. Sometimes patients cough from reflex irritation without any need for expectoration, the sensitive character of the air-passages leading to frequent dry cough with slight alterations of temperature or with other laryngeal irritation. On the other hand, when the cough is associated with much expectoration and is indeed excited by the need of removing fluid, the whole line of treatment has to be modified. Dry cough has to be treated with sedatives, such as preparations of opium or morphine, which may be given in repeated small doses and combined with the use of demulcents, such as squill, tolu, or licorice. The treatment at this stage should resemble that ordinarily adopted during the dry stage of acute laryngitis or acute bronchitis. Frequently the dry, irritating cough may be soothed by copious draughts of warm milk or warm broth. For the relief of this symptom numerous mineral waters have also been given, more particularly those freely impregnated with salines, and patients are often sent to foreign health resorts to drink the waters which from their saline or alkaline nature may diminish the frequency of cough.

It is important not to adopt any measures which will directly check the morning cough which so frequently occurs in phthisis, since this is often excited by the accumulation of fluid within the air passages during the night, and it commonly ceases, or becomes less frequent, after a few pledgets of expectoration have been removed. As this morning cough is, therefore, due to local irritation, it should be favored rather than suppressed by means of sedatives. A glass of hot milk or a cup of weak tea on first arising may often facilitate the removal of this source of irritation; but sometimes it is advis-

able to resort to further measures, such as the administration of saline draughts on waking, or the use of a mixture containing potassium citrate or ammonium acetate, or the employment for a few minutes of a steam spray, or of an inhalation containing compound tincture of benzoin, turpentine, or guaiacol. The use of any of these for a short time will often serve to loosen the expectoration, and thus to render the act of coughing less frequent and less violent.

When using a spray or an inhalation in the early morning it is distinctly advisable not to continue the employment of either for more than from five to ten minutes, or at all events to discontinue their use after the relief of the sense of irritation; and, further, neither sprays nor inhalations should be employed if the circumstances necessitate an out-door occupation. There is always some risk of favoring bronchitic affections by using inhalations or sprays shortly before going into the open air, while, on the other hand, benefit is often experienced from them at night when the chill to the surface of the body on first getting into bed provokes coughing.

After the removal of morning expectoration the treatment during the rest of the day must be directed to diminishing and checking the amount of liquid and mucous expectoration, since this is often copious and it is certainly exhausting. Reference has already been made to the use of morphine or other opiates for this purpose. To these hydrocyanic acid may be added with advantage, since it serves to render the parts about the larynx somewhat less sensitive. Codeine is another substance which has been used fairly frequently with the same object, and it may be administered in pills containing from $\frac{1}{2}$ to 2 grains of codeine, or of codeine phosphate, or it may be employed with other remedies in the syrup of codeine, which has recently been introduced into the *British Pharmacopœia*, and may be given in doses of from $\frac{1}{2}$ to 2 fluidrachms; it is convenient, perhaps, to bear in mind that this preparation contains $\frac{1}{4}$ grain of codeine phosphate in the fluidrachm. This syrup may be given with the fluid extract of licorice or other sedatives and flavoring agents. The syrup of wild cherry is often administered with syrup of codeine as a flavoring agent unless there are indications of dyspeptic trouble, when the amount of sugar in the two syrups might prove objectionable.

With the view of alleviating cough when the expectoration is not

very profuse, small doses of aromatic spirit of ammonia and morphine may be given. The following is a favorite formula :

R.—Spiritus ammoniæ aromatici ʒj.
Morphinæ hydrochloratis gr. $\frac{1}{10}$.

This may be mixed with a wineglassful of water to which $\frac{1}{2}$ ounce of fresh lemon juice is to be added.

When cough is very tiresome during the night great care must be taken with the measures intended to promote sleep. As a rule, especially when the fluid to be expectorated is abundant, it is very desirable to avoid the employment of morphine or opium, since, on the principles already described in connection with chronic bronchitis, this might give rise to anxiety by depressing the reflex excitability of the larynx, and thus permitting accumulation of fluid in the air passages. Sleeplessness due to the act of coughing may sometimes be kept in check by the administration of chloral hydrate and potassium bromide in ordinary doses, but the condition of the circulation must be borne in mind, and when there is much weakness butyl chloral may be substituted, or, still better, the frequency of cough may be to some extent controlled by the administration of one or other of the preparations of belladonna. Small doses of the tincture of belladonna, given at bedtime, will often allay cough and reduce expectoration sufficiently to enable the patient to obtain some hours of refreshing sleep. The same object may be attained indirectly by the administration of ipecacuanha and potassium iodide. If these are given during the day, expectoration is facilitated, and even though as much fluid as before may require removal, the act of coughing is rendered less prolonged and less violent.

When the digestion permits the use of cod-liver oil the improvement in the cough is often remarkable. The cough and expectoration are frequently found to diminish as the general nutrition is improved and the appetite increased ; this remedy may, therefore, be given with the direct object of treating cough, although its employment is more generally dictated by the desire to influence nutrition.

In considering the antiseptic treatment of phthisis, reference has already been made to the frequent employment of inhalations and sprays. Similar measures may be adopted for the relief of cough, but the substances thus used generally possess a sedative rather than an antiseptic action. Inhalations of the oil of pine, the oil distilled

from the fresh leaves of *pinus pumilio*, have been largely employed to reduce cough, while more direct sedatives are sometimes used, such as the juice of *cronium*, the activity of which is increased by the addition of potash or the inhalation of hydrocyanic acid—the vapor arising from 10 to 15 minims of diluted hydrocyanic acid mixed with cold water. Inasmuch as hydrocyanic acid is a somewhat dangerous remedy, the *aqua laurocerasi*, which contains 0.1 per cent. of hydrogen cyanide, is often preferred; the latter may also be used as a spray, so as to affect the pharynx and larynx. When the sensitive character of these parts persists in spite of this treatment, relief may sometimes be afforded by a spray of cocaine or of opium. In using these, however, caution must be exercised when there is much fluid to be expectorated, since, although they relieve the frequent cough of chronic irritation, they are undesirable when there is much bronchial catarrh.

The act of coughing is often associated with considerable pain, referred to some spot over the lung, where, in all probability, pleuritic adhesions are present or where tubercular pleurisy is proceeding. Under such circumstances measures to limit the movements of the thorax must be adopted. Sometimes great relief is afforded by the application of a broad strip of plaster over the site of pain, or in place of this the inflammatory process may be controlled to some extent by the application of counter-irritants over the affected area. Iodine may be painted on the skin, care being taken not to repeat the application to the same spot with sufficient frequency to cause blistering. When, however, the skin is unusually sensitive, and patients, having already been through the treatment with iodine, do not wish to repeat it, some relief may be derived from sedative liniments or liniments with a strong power of promoting counter-irritation. *Belladonna* liniment may be used in this way, but preference is often given to liniment of turpentine, or of aconite, or to the compound liniment of camphor.

Reflex or Mechanical Vomiting. Difficulty is sometimes experienced in deciding whether the vomiting which occurs in the course of phthisis is the result of cough or of dyspepsia. It is naturally important to arrive at a conclusion on this point, since the treatment of vomiting is markedly different under these two conditions. This symptom may arise immediately after a severe bout of coughing, and, as a rule, it is then not associated with any symptom of nausea or of dyspepsia, but is probably purely of a reflex character, the

result entirely of chronic irritation in the pharynx, which is increased during the act of coughing, and is also favored by the irregular movements of the diaphragm and of the abdominal muscles. In fact, the whole chain of circumstances strongly resembles the vomiting which so frequently is seen during an attack of whooping-cough, and although it does not indicate any affection of the stomach, it must be controlled as early as possible, since it interferes very largely with the nutrition and comfort of the patient. In connection with phthisis, however, the vomiting ordinarily occurs either during a meal or shortly after a meal has been taken, and it may arise when mastication and deglutition are interrupted by a short fit of coughing. This form of vomiting, therefore, must be treated by measures calculated to diminish the sensitiveness of the pharynx and larynx rather than by those intended to influence the work of the stomach. Reflex vomiting rarely occurs in phthisis, unless there is some degree of bronchial catarrh, and it has been asserted that the engorgement of the bronchial vessels, and, therefore, the amount of fluid within the bronchi, may be increased shortly after food has been taken, owing to the greater amount of liquid passing into the circulation. To relieve reflex vomiting it is advisable to minimize the liability to cough during a meal by giving some form of warm stimulant before food is taken, which will, in all probability, be followed by cough and by the removal of expectoration. A small quantity of brandy or of aromatic spirit of ammonia may be given, together with half a teacupful of hot milk, or of hot broth, half an hour or more before the time of a solid meal.

Many of the measures already enumerated for relieving the sensitive character of the larynx and pharynx will also tend to diminish the liability to vomiting. The spray of cocaine is particularly beneficial in these cases. It has been also recommended that, where this form of mechanical or reflex vomiting has occurred, nourishment should be taken in a somewhat concentrated form, and that a minimum of liquid should be consumed. Another device which has been found to give good results, is to favor the rapidity with which food is passed from the stomach to the duodenum by increasing the digestive power with a few grains of pepsin in conjunction with a little diluted hydrochloric acid. This may with advantage be given during a meal or immediately afterward.

Night-sweats. It will be convenient for the present to defer the consideration of the treatment of the vomiting of gastric origin

in phthisis, and to deal next with a symptom of greater frequency—namely, night-sweats. The night-sweats of phthisis are extremely exhausting, and they occur most commonly when the tubercular process is leading rapidly to much breaking down of lung tissue, and, therefore, they are often most marked when cough is severe and expectoration profuse. To some extent, therefore, the night-sweats are capable of being controlled or diminished by many of the measures already described for the treatment of cough. More recently, however, it has been found that the night-sweats are greatly reduced during the open-air treatment of consumption, more particularly during the autumn and winter months. Commonly they are also associated with great oscillations of temperature, the exhausting perspiration occurring during the evening hours, more particularly during sleep. Very often patients will complain of finding themselves bathed in perspiration when they wake to cough during the night, and still more frequently the perspiration is greatly increased during or subsequently to the act of coughing.

For the treatment of this symptom very numerous remedies have been advocated. Some are calculated to control the tubercular process, as, for example, calcium hypophosphite, which may be given in doses of from 3 to 10 grains. Some, on the other hand, such as quinine and digitalis, are given with the idea of controlling the temperature and increasing the strength, while arsenic is given also as a tonic and only indirectly affects the amount of perspiration. Brunton has employed strychnine, and found that it would arrest the secretion of night-sweat in phthisis and stop the debility which usually accompanies it; but he found that its stimulating effect upon the respiratory centre continued through the day, and hence irritation in the lungs caused more cough, so that, although the night-sweats were relieved, the use of strychnine is not without its drawbacks. On the other hand, many astringents have been recommended for their power of diminishing the action of the skin. The one which is perhaps most commonly employed is zinc oxide, which may be conveniently administered in a pill of from 3 to 10 grains. Ferric chloride in ordinary doses has been said to relieve this symptom in some cases, but it is apt to promote constipation, and, therefore, to necessitate the subsequent use of laxatives. The same objection applies to many other astringents, which are frequently used, such as the pill of lead acetate (3 grains) with opium (1 grain), or to the administration of opium with copper sulphate, the dose of

the latter for this purpose being $\frac{1}{4}$ grain to 2 grains. Tannic and gallic acids have been recommended in some cases and appear to produce beneficial results, but they must be employed in moderation, since they are apt to lead to dyspeptic troubles; and the same may be said, though in a less degree, of another remedy, namely, alum, which I have used with considerable satisfaction. I have found that alum, given in doses of from 3 to 5 grains, will frequently diminish the exhausting character of the perspirations. This remedy may be given alone or in conjunction with some aromatic. Dilute sulphuric acid and aromatic sulphuric acid are often credited with the power of relieving night-sweats, and they may be administered with remedies intended to diminish the frequency of cough. Comfort may often be increased by drying the surface and then sponging it rapidly either with hot water or with dilute acid. Acetic acid, or even vinegar, is often used for this purpose. The sponging should be followed by speedy drying and by a change of garments. These measures are, however, merely palliative, and they do not appear to control the amount of perspiration lost.

The various objections already urged against so many of the measures above mentioned do not apply to the use of atropine or of preparations of belladonna administered at bedtime; but while it is possible by means of these to diminish the activity of the skin and to lessen the frequency of cough and expectoration, they may produce a good deal of discomfort and dryness of the mouth, and they may even disturb vision by their influence on accommodation and on the size of the pupil. Hence, although they may be tried in severe cases, it is not wise to persist in their employment. Jaborandi and pilocarpine have also been recommended, and this is somewhat curious, inasmuch as pilocarpine is so strongly antagonistic to atropine. Small doses, $\frac{1}{20}$ of a grain, of pilocarpine nitrate have, however, been found to check the night-sweating in phthisis, although larger doses are powerful diaphoretics.

Picrotoxin has been administered hypodermatically or by the mouth in the treatment of the night-sweats of phthisis. When given hypodermatically from 3 to 6 minims of a solution containing 1 part in 360 of water may be administered. When given by the mouth the dose is extremely small, being only from $\frac{1}{100}$ to $\frac{1}{25}$ grain; this dose may be conveniently mixed with milk sugar and glycerin of tragacanth in a pill. Picrotoxin is said to have the advantage of producing an effect which lasts for several days, thus

rendering its frequent administration unnecessary; on the other hand, it is extremely poisonous, overdoses causing stupor, delirium, and convulsions, and it is reputed further to be slightly cumulative, hence it must be discontinued after two or three nights. Another advantage of picrotoxin is that it causes no dryness of the mouth or throat, but a recent writer says of this drug that, although it is certainly efficient in many cases, it is not more so than many other remedies.

Agaricus albus and agaric acid or agaricin have been strongly recommended for the night-sweats of phthisis. In large doses the former acts as a purgative, but smaller doses (10 to 20 grains) are astringent and will tend to arrest diarrhoea. Agaricin can be given in a pill (dose $\frac{1}{12}$ to $\frac{1}{6}$ grain), and to guard against any tendency to act upon the bowel as a laxative it may be given in conjunction with Dover's powder.

Camphoric acid, in doses of from 15 to 60 grains, given about two hours before the expected sweats, is highly valued by many American physicians.

Coto and cotoin have also been employed for their astringent action upon the skin, but they are perhaps more valuable in the treatment of those cases in which night-sweats are associated with much diarrhoea.

As a whole, however, the symptom of night-sweating appears to be so largely dependent upon the tubercular changes occurring in the lungs that, although it has been deemed necessary to enumerate these palliative remedies, the condition is really best treated by measures calculated to influence the lung changes. Of these measures the most hopeful, as already indicated, consists in the concurrent diminution of cough, expectoration, and night-sweats by the open-air treatment.

Pyrexia. The daily range of temperature in a case of phthisis shows oscillations which to a certain extent are indicative of the degenerative changes that are proceeding; the wider the oscillations the more rapid are the degenerative changes in the lung. Hence, this symptom, like the last, is one which is best treated indirectly by the employment of antiseptics or by change in the hygienic conditions which may diminish the extent of lung degeneration. Frequently, however, it is necessary to employ remedies which shall reduce the temperature. The wide oscillations, in which the high temperature recurs commonly at about the same hour every evening, naturally suggest the employment of quinine, which possesses such

strong antiperiodic powers. Though in cases of phthisis, as in cases of ague, this drug has been given in a single large dose toward evening, it is more usual to give it in smaller doses distributed throughout the day. Occasionally some benefit follows its employment, but the improvement is rarely comparable to that so commonly witnessed in the treatment of ague. During the administration of quinine, although the daily range of temperature may be reduced, oscillations between the morning and evening temperatures commonly remains. In all probability, quinine acts in these cases mainly as a tonic, and possesses very little power of influencing the growth of the bacilli or the degeneration which is the result of their growth. When there is much cardiac weakness digitalis may be combined with quinine, and sometimes the influence of the two in reducing temperature is more marked than when either drug is used alone.

Whitla speaks very highly indeed of the value of antipyretics, such as antipyrine and antifebrine, which he describes as blessings of great value. His employment of these drugs appears to be somewhat bold. He administers 30 grains of antipyrine, and in an hour gives 15 grains more, and in another hour 15 grains again, unless the temperature has fallen with the first or second dose, and he says that he has sometimes observed a drop of 10° F. I am afraid that I should regard a fall of temperature to this extent as indicating collapse of a dangerous nature, and I certainly could not advise the employment of antipyrine in such heroic doses; indeed, I hope never to obtain such a great fall of temperature as the result of any dose of medicine. With regard to antifebrine, Whitla recommends 4-grain doses every four or six hours, and he thinks that this drug produces a more steady and continuous action when given on the small dose system. It is somewhat curious to find that this author states with apparent satisfaction that since using antipyrine he has never had to employ sponging or to give wet packs for the high temperatures of acute or chronic tuberculosis. In my experience these measures are, as a rule, to be preferred to any distinct antipyretic of the nature of a drug, since to some extent they also relieve the night-sweats, which are so commonly associated with wide oscillations of temperature.

Salicylates have occasionally been used with a view of reducing temperature, and they have the advantage of acting to some extent as antiseptics.

In most cases of pyrexia in connection with phthisis, the dependence of the pyrexia upon lung changes must be borne in mind, and, further, it is well to remember that many of the antipyretics which are commonly prescribed may, on the one hand, produce dangerous collapse, or may, on the other, tend to disorder digestion, the latter result being more likely to occur in connection with the use of digitalis and of quinine in antipyretic doses. Pyrexia is in general best treated, like the night-sweats of phthisis, by attacking the cause, that is by measures adapted for the control of tubercular changes, whether these consist in the employment of antiseptics or in that of the open-air treatment; but should the night temperature be unusually high, it is better, in my opinion, to reduce it by the use of cold or tepid sponging than by the administration of drugs, which not uncommonly introduce a new element of danger.

Diarrhœa. Sometimes an attack of diarrhœa may occur in the course of phthisis and be of comparatively little moment; it is only when the action of the bowels becomes unusually frequent, and the frequency is persistent, that the diarrhœa is of serious importance. This symptom is often apparently due to a form of enteritis, which may be controlled by remedies; but in severe cases, especially when the symptom occurs toward the close of the case, it is often dependent upon an ulcerative process affecting the solitary glands and Peyer's patches. It becomes important, therefore, always to ascertain whether the symptom has its origin in any error of diet or in any drug that is being employed. Not uncommonly in children I have found that diarrhœa in phthisis is excited by the use of cod-liver oil, or by its continued administration in overdoses, and that under these circumstances the discontinuance of the drug and a little caution in the nature of the food will often suffice to check the condition. I have also seen this symptom associated with the frequent use of ipecacuanha, which may be given to assist in the removal of bronchial secretions. When, on the other hand, it appears to result from some error of diet, it may be treated, especially in children, by average doses of castor oil.

When the symptom is not very severe it may sometimes be controlled by using remedies similar to those employed in ordinary irritative diarrhœa, such as bismuth subnitrate or salicylate. This may be given in a full dose (20 grains of either), and if the diarrhœa persists it may be given in combination with opium, from 5 to 15 minims of the tincture being given with each dose.

Many practitioners prefer to treat the diarrhœa of phthisis with opium from the commencement, but, as previously indicated, there is some risk in using opium in large quantities when there is much expectoration loading the air passages; and inasmuch as this symptom of diarrhœa most commonly occurs rather late in the course of the disease, the administration of opium by the mouth is frequently contraindicated. I have for a long time been in the habit of employing alum for the control of the diarrhœa of phthisis, and I give it in 5-grain doses, repeated three or four times during the day, increasing the dose little by little if the symptom continues in spite of this treatment. When the diarrhœa is dependent upon enteritis, alum is frequently of great service, and even in cases associated with ulceration the number of actions daily is often reduced during its employment. As a rule, this remedy is well tolerated, provided its administration is commenced gradually and the dose increased only as toleration is established; but I have known it produce vomiting and nausea when used for children in injudiciously large doses. Other astringents are often used, as, for example, copper sulphate, which may be given in doses of from $\frac{1}{4}$ to 2 grains in a pill. Lead acetate is also frequently of service in this condition, and can be given in the pill of lead with opium.

As in the treatment of other forms of diarrhœa, preparations containing tannin or gallic acid may be of service. Logwood is often used, and it may be given in conjunction with the chalk mixture of the *Pharmacopœia*. The effect of these remedies is often greatly increased by the simultaneous administration of some form of stimulant. In children I have often seen diarrhœa arrested by the *mistura spiritus vini Gallici* of the *British Pharmacopœia*, which also appears to counteract the exhaustion which so commonly results from this symptom. The composition of this mixture is as follows:

R.—Brandy	4 fl ℥.
Cinnamon water	4 fl ℥.
Refined sugar	$\frac{1}{2}$ ℥.
Two yolks of eggs.	

Several remedies of recent introduction have been strongly recommended in the treatment of the diarrhœa of phthisis. Tannalbin, an insoluble compound of tannin with albumin, which contains about 50 per cent. of tannin, has been prescribed in doses of from 5 to 15 grains, which may be given between or after meals, in water or in milk, and it is credited with the power of passing through the

stomach unchanged, and being soluble only in the intestine. The amount given may be increased rapidly should the beneficial action not be quickly apparent. Thirty grains have been given as a single dose, and 150 grains in the course of the twenty-four hours. Another compound of tannin, tannigen, can be given in doses of from 3 to 8 grains, in cachet, or it may be given in milk or in gruel, and, like the last, its action is limited to the intestine. Bismal is another new remedy which has been given in this condition; it is a methylene digallate of bismuth. On account of its astringent properties it has been employed in chronic tubercular enteritis, and when given in daily doses of 30 grains it is stated to have given satisfactory results. It is best to commence its administration with doses of from 1 to 5 grains, and to increase the amount if necessary. It may be given, like tannigen, in milk or in gruel.

The diarrhœa of phthisis is often rebellious to the ordinary astringents, and one remedy after another is tried in vain. A comparatively new remedy, coto, therefore, merits trial, and indeed it has already been credited with successes. Coto, which is not official, is a bark, imported from Bolivia, rich in resinous principles. It may be administered in the form of a fluid extract (dose 2 to 6 minims), a tincture (dose 10 minims repeated), which must be suspended with mucilage, or as cotoin (dose $\frac{1}{2}$ to 2 grains), which can be given as a pill. It will be remembered that coto was one of the ingredients of the anti-choleraic mixture recommended by the Royal College of Physicians in 1892, of which the formula was as follows:

R.—Acidi sulphurici aromatici	℥xv.
Tincturæ opii camphoratæ	℥xxx.
Tincturæ chloroformi compositæ (B. P.) }	℥xx.
Tincturæ coto	
Syrupi aurantii floris	ʒj.
Aquæ menthæ piperitæ	q. s. ad ʒj.

It was advised that an ounce should be given every three or four hours in intractable cases of cholera. The compound tincture of chloroform in the above prescription is very similar to chlorodyne. The same formula might be of service in the diarrhœa of phthisis when other remedies have failed. Both the tincture and cotoin have been credited with remarkable results; indeed, the latter is said to be without an equal in the treatment of this particular form of diarrhœa, and both of them appear to diminish the exhausting night-sweats.

In spite of the numerous remedies which have been advocated for administration by the mouth, it will often be found necessary to control tubercular diarrhœa by the use of enemata or suppositories containing opium. For an adult an enema consisting of $\frac{1}{2}$ fluidrachm of tincture of opium with 2 fluidounces of mucilage of starch will often be found beneficial. It is important not to increase the bulk of this enema, as a greater quantity is not likely to be retained. In cases of unusual irritability of the rectum, it is sometimes found that even this dose is speedily returned, although administered directly after a motion. Under such circumstances a suppository of $\frac{1}{4}$ grain of morphine or of lead acetate (3 grains) and opium (1 grain), or a suppository of tannic acid (3 grains), may give better results. In intractable cases, more particularly in those occurring in children, milk should form a large part of the dietary, and its constipating effects may be increased by mixing it with a third of lime water.

Gastric Symptoms. The gastric symptoms in the course of phthisis frequently call for attention; the earliest and commonest being loss of appetite, which demands treatment, since it presents such a serious obstacle to satisfactory nutrition. Tonics are generally beneficial; quinine and preparations of cinchona, or one or other bitter infusion, as gentian, calumba, or quassia, will often cause improved appetite, especially if given with small doses of some dilute acid. But before adopting any form of treatment, it is important to impress upon the patient the necessity of expectorating the sputum instead of swallowing it—a disgusting habit which many may fall into under the impression that it is less objectionable to those about them. Until this habit is corrected, no treatment is likely to be of any service.

More important, perhaps, than the administration of tonics for the relief of anorexia is change of air, particularly for those whose occupation has hitherto rendered an in-door life almost a necessity. A short residence at the seaside, or in any country place where the conditions favor an out-door life, will be likely to be followed by speedy improvement of appetite. It is by no means essential for this result that exercise should be taken, since it has been found that in the open-air treatment of phthisis, even when patients are recumbent during the whole day, the appetite none the less improves. When dyspepsia is of a more advanced type, and is associated with pain and eructation, it must be treated on the principles laid down

for the treatment of catarrhal gastritis—that is to say, the pain may be relieved by small doses of opium, while the water-brash often gives way before the administration of alkalies shortly before a meal. Sometimes, however, in the place of alkalies, acids may be used in conjunction with bitter preparations, and these should be given shortly after food. Of the remedies more particularly recommended in the treatment of phthisis, creosote is the one which is most likely to be of service for the relief of gastric catarrh, provided that the dose be small. It must not be forgotten, however, that when using creosote or guaiacol for their antiseptic powers in controlling phthisis, these remedies are very likely to produce gastric symptoms; hence, if they are already being used in fairly large doses, they should be discontinued when the symptoms of dyspepsia arise.

Vomiting may occur in connection with cases of severe gastritis, and it has already been indicated that the treatment then adopted must differ from that used when vomiting arises after cough. The vomiting of gastritis is always associated with much anorexia, nausea, and probably with pain, which is relieved to some extent by the act of vomiting. Under these circumstances gastric sedatives must be used, such as preparations of opium, of bismuth, and perhaps hydrocyanic acid. Of the bismuth preparations those which are insoluble are the most valuable. The subcarbonate, the oxide, and the subnitrate can be given in relatively large doses with mucilage to suspend them; they produce most beneficial results when given upon an empty stomach. Bismuth salicylate has also been used for this purpose, and is particularly serviceable when salicylic acid is likely to be required to control fermentative changes occurring in the stomach or intestine. It is often found, however, that simpler remedies will occasionally relieve symptoms of gastritis; as, for example, small doses of ammonium carbonate and of rhubarb, given together in a mixture, or in small cachets after meals, and they are especially beneficial when the gastric catarrh is associated with constipation. The latter symptom will sometimes demand special treatment, more particularly in those who are confined to their bed or who are kept absolutely at rest during the open-air treatment. For the relief of constipation the amount of rhubarb may be increased, or sometimes benefit will be found to result from the daily administration of a larger quantity of cod-liver oil. As a general rule, the milder laxatives and purgatives give the best

result. Small doses of aloes or of aloin, together with rhubarb or senna, will generally be found preferable to the use of colocynth or of calomel. A mild purgative pill, taken at night, is often with advantage succeeded by a dose of some saline aperient water taken in the early morning. A dose of Carlsbad water, or of Carlsbad salts, a dose of Hunyadi, or of Apenta, will generally tend largely to increase comfort.

Since the above was written it is interesting to find that many of the observations in the foregoing pages have received valuable confirmation at the recent International Congress on Tuberculosis. Dr. Pye-Smith has written a brief memorandum on the medical aspects of the results of treatment laid before the Congress, from which the following conclusions are drawn :

That tuberculous disease of the bones and joints, of the glands and skin and abdomen, though dangerous, is not incurable, and by the modern methods of operative medicine is in most cases successfully cured.

That tuberculosis of the lungs (phthisis or consumption) is frequently cured, and probably more often now than formerly.

That abundant food, particularly of a fatty nature, and a life in the open air are no less valuable in the treatment than in the prevention of phthisis.

That the influence of climate, altitude, temperature, and dryness of the air and soil, of travelling and of sea voyages, has been very differently estimated at different periods, and that while each is in various degrees important, popular opinion probably exaggerates their power.

That there is no specific drug which has direct influence upon consumption, but that many, both old and new, have valuable effects upon its complications.

That the prospect of improved success in the treatment of tuberculosis in general, and of consumption in particular, by the advance of pathology and the progress of medicine and surgery, is a hopeful one—almost as hopeful as that of limiting the spread of the disease by preventive measures.

The following observations are the outcome of the work of the Congress concerning the prevention of tuberculosis :

a. The primary importance of free ventilation and wholesome and abundant food. Improvement in the dwellings and the food of the poorer classes in this country and their increasing cleanliness

and sobriety have not only diminished sickness generally, but directly reduced the number of deaths from consumption until the mortality from this cause is less in London than in any other large city.

b. The prevention of infection of the lungs by the bacillus of tubercle depends chiefly on rational treatment of the sputa of consumptive patients, or, rather, for practical purposes, of the sputa of all those affected with cough and expectoration. The phlegm should never be deposited on the ground or on a handkerchief, where it can dry up; it should be kept moist until it can be destroyed by heat, and the vessel used to receive it should contain phenol or some other antiseptic solution.

c. The prevention of infection by tuberculous milk may be accomplished either by boiling all milk given as food to children, or by inspection of dairies, so as to prevent tuberculous milch cows being used.

d. The prevention of infection by meat can be secured by careful and thorough inspection of carcasses, or by diagnostic testing of cattle with tuberculin. This, the only undoubtedly useful application of the so-called tuberculin, has the drawback that after the effect of the inoculation has passed off a tuberculous animal becomes immune to it for a time, and so may be passed as healthy.

CHAPTER XXIII.

CONSTITUTIONAL DISEASES.

Rheumatic Fever—Chronic Rheumatism—Chronic Muscular Rheumatism,
Lumbago, Torticollis, Pleurodynia.

Rheumatic Fever. The treatment of rheumatic fever has within the last few years undergone a complete change, and this change is claimed to be extremely beneficial and to have totally displaced former methods of treatment. The present treatment is based on clinical experience of the actions of a certain group of drugs, the salicyl group. This group, when first introduced, was greeted with extravagant praise, and numerous statistics were brought forward to support the exaggerated statements made on its behalf. Now that sufficient time has elapsed for more extended observations, it is, I think, generally recognized that the benefits obtainable with the members of this group have been distinctly overrated.

There is now overwhelming testimony in support of the idea that the condition known under the name of rheumatic fever practically occurs in two distinct forms, one of which is mild and of short duration, the other severe and frequently associated with various complications. The former rarely calls for special treatment, this form of rheumatism subsiding in a short time when the patient has been placed under suitable conditions. The latter, on the other hand, requires more energetic treatment, and it is in this severe form that the group of salicylic compounds affords relief which is beyond dispute, even though it does not equal the extravagant claims made on its behalf when first introduced.

In the milder form of rheumatic fever the symptoms are marked by a moderate rise of temperature and by the occurrence of pain, which may be intense, in one or more joints. These symptoms are, however, sufficiently severe for patients to seek admission into hospitals, or for those of a better class to call for advice and to remain in bed. The milder cases of rheumatic fever include the majority of the rheumatic patients who apply for admission into hospitals, and though these are now ordinarily submitted to the same plan of

treatment adapted for the more severe cases, it has been found that in the large majority rest in bed and modifications of diet may alone be trusted to cause fall of temperature within three or four days.

When treatment with the salicylic group was introduced the mild character of a large number of cases of acute rheumatism and the fall of temperature with diminution of pain, which, in mild cases, occurred naturally, was without doubt attributed to the beneficial action of the medicinal remedies employed. At the present time it has, however, become so well recognized that in all cases the pain and fever can be beneficially influenced by salicylates that these remedies are now employed almost as a matter of routine from the commencement of the attack.

With the first appearance of the symptoms of every case of rheumatic fever the first essential in the treatment consists in ordering the patient immediately to bed, and in so doing it is well to remember that since it is possible that the case may last for many weeks, and that it will most probably be marked by profuse perspiration, it is desirable to see that the bed is comfortable, and supplied with a spring mattress, if possible. Feather beds are undesirable, since, although comfortable when frequently made, they are apt to become extremely uncomfortable if the patient is so ill that it is inexpedient to move him frequently. It is often recommended that patients should be placed between blankets, so as to avoid the chill which might otherwise follow profuse perspiration. Generally, it is sufficient to replace the lower sheet by a blanket, and to envelop the patient in a light woollen night-gown, capable of being opened readily from head to foot, and with the sleeves split, so as to afford the greatest facility for the examination of the chest or for effecting a change when the shirt becomes saturated with perspiration. Comfort is frequently increased by wearing a light woollen cape over the shoulders. The painful joints should be wrapped in cotton-wool covered with a light bandage, and, with the view of alleviating pain, all movements should be discouraged.

When the rheumatism affects the ankles or knees it is sometimes found that even the pressure of the bedclothes is sufficient to cause much discomfort. This can easily be avoided by the use of a cradle to support the bedclothes.

With regard to other treatment, it will be necessary to modify the diet in accordance with the degree of febrile disturbance and to employ remedies to relieve pain and to check restlessness ; to admin-

ister a saline purgative at the commencement of the treatment, as in other febrile conditions ; to employ salicin, salicylic acid, or salicylates ; to give copious draughts of liquid, which may with great advantage be rendered alkaline ; and later, if necessary, to employ remedies of a tonic nature, such as quinine.

Having thus briefly indicated the general line of treatment, it will be well to enter into greater detail. First, with regard to diet. During the height of the fever this must consist purely of liquid, and there is considerable advantage in encouraging the consumption of fairly large quantities of fluid to replace the amount which is lost by the profuse perspiration. Milk is usually extremely beneficial, and patients may take three pints or more in the twenty-four hours. Should the milk disagree it may be more easily tolerated if rendered alkaline by the addition of sodium bicarbonate and sodium chloride, which may be added in the respective proportions of 30 grains of the former and 15 grains of the latter to a mixture of one pint of milk with a pint of boiled water. A jug containing such a mixture, carefully cooled, should be placed by the patient's bedside, and 8 ounces or more may be given at frequent short intervals. Occasionally this is more readily taken if given alternately with some other cooling drink, as, for example, a mixture of lemon juice and water with about 20 grains of potassium bicarbonate to the pint. It is important to notice that with these cooling draughts a large proportion of sodium bicarbonate and potassium bicarbonate will be administered in the twenty-four hours, and such an amount cannot fail to have a beneficial influence.

Passing next to the medicinal treatment, there is overwhelming testimony in favor of the administration of members of the salicyl group ; and although salicylic acid was the first to be introduced, and gave such satisfactory results as to pave the way for the subsequent administration of salicin, this, in turn, has been displaced to a very great extent by sodium salicylate. Salicylic acid is somewhat difficult to administer on account of its extreme insolubility (1 in 550 of water). It is true that it may be dissolved by the addition of alkaline substances, but this so-called solution of salicylic acid is really a solution of an alkaline salicylate.

Salicin is more soluble (about 1 in 28 of water), and has been given either in mixtures, in cachets, or in pills. It has an extremely bitter taste, which is more persistent than the saline taste of sodium salicylate. It may be administered in doses of from 5 to 20 grains,

repeated three or four times in the twenty-four hours, and, as compared with sodium salicylate, it causes less cardiac depression and less disturbance of digestion. On the other hand, it does not appear to act so rapidly or so effectively. Salicin was introduced by Mac-lagan in 1876, and in the following year sodium salicylate was brought into notice, and from that time has maintained its ground in the treatment of acute rheumatism.

Sodium salicylate is soluble in an equal part of water, and, hence, can be readily given in solution, although its somewhat unpleasant saline taste has occasionally led to its administration in cachets. With salicylic acid and with sodium salicylate toxic symptoms have been observed, but the investigations of Charteris have shown that these are dependent upon the presence of impurities due to the artificial preparation of the acid from carbolic acid. The *natural* acid, prepared from salicin, from the oils of wintergreen and sweet birch, is free from creosotic acid, the toxic element in the artificial salicylic acid.

The natural acid and its salts are free from danger, but an artificial acid, termed "physiologically pure," is often employed, as it is less expensive.

Although the value of salicylic acid and salicylates in acute rheumatism has been established mainly by clinical observation, an interesting explanation of their mode of action has recently been suggested.

Mordhorst¹ considers that there is an intimate relationship between gout and rheumatism. He thinks the latter is but a preliminary stage of gout, and he attributes the pains and swellings of rheumatism to the formation of uratic granules in the affected parts. He holds that urates are deposited in granular form from saturated solutions under certain conditions, and he maintains that when the urate retains its granular form for a longer or shorter time the result is seen in rheumatism, but when it becomes converted into crystalline sodium biurate, gout is developed. On this theory he explains the benefits derived in rheumatism from the use of sodium salicylate, which, he believes, exerts a solvent action upon the granular urate. He found experimentally that the addition of various neutral salts of sodium to weak solutions of sodium carbonate saturated with uric acid caused precipitation of granular urate, while sodium salicylate

¹ Centralblatt f. innere Medicin, 1898, vol. xix. p. 409.

delayed the granular formation, or, if added after the granules were formed, it caused them to be redissolved, acicular crystals falling within two to five hours.

He finds that nothing favors the precipitation of granules of urate more than the addition of acids, while nothing hinders this change more than the addition of sodium salicylate, carbonate, or bicarbonate. But, on the other hand, while sodium salicylate hastens the change of the granules into uratic needles and cuts short the inflammatory stage, the presence of the needles may readily give rise not only to relapses, but to actual gout. In this way the rapid subsidence of the inflammatory symptoms, and the frequent relapses in both gout and rheumatism, after the administration of sodium salicylate are easily explained.

Another statement, which has an important bearing on treatment, is that the granular urate is susceptible of oxidation, whereas the crystalline biurate is not. Administration of sodium carbonate or bicarbonate does not directly favor the solution of the crystalline biurate, but does so indirectly by encouraging the oxidation of uric acid as it is formed, the crystals being the more readily dissolved the less the amount of uric acid present in the body fluids. Finally, he advocates the administration of the bicarbonate in the form of those mineral waters which contain carbonic acid and common salt, and are as free as possible from lime.

When sodium salicylate is used, the benefits obtained are speedy diminution of pain and rapid fall of temperature, and beyond all dispute these beneficial results are obtained in almost every case of rheumatic fever, but to gain the greatest amount of benefit from salicylates much depends upon the mode of administration. When the patient comes under observation, as a rule, he has been ill for three or four days, and it is advisable to commence the treatment at once with a fairly large dose (30 grains), and to repeat this dose every four hours during the first twenty-four hours unless the temperature meanwhile falls. When the temperature falls and the pains subside, it is well to reduce the amount of salicylate, both in actual quantity and in frequency of administration. Even in cases of moderate severity, 20 grains may with advantage be taken three times a day, and this dose should be continued for a week at least after the temperature has reached the normal. In yet milder cases, so soon as the discomfort has passed away, the salicylate may be reduced to 15 or even 10 grains three times a day :

R.—Sodii salicylatis	gr. xv.
Spiritus chloroformi	℥x.
Liquoris ammonii acetatis	ʒij.
Aquæ	q. s. ad ʒj.

There is distinct advantage in employing a large dose at the commencement of the treatment, and also in reducing this dose as soon as possible. Under the influence of the large dose we obtain the maximum benefit in a short time, and thus curtail the duration of suffering, while, on the other hand, it is well to remember that a large dose if persisted in may produce symptoms of headache, ringing in the ears, and deafness, comparable to the symptoms produced by overdoses of quinine; in some cases hæmaturia may also follow overdoses of salicylates.

Independently of the distinctly toxic symptoms, salicylates are not only prone to disturb digestion, but they may also cause much depression.

To avoid nausea or sickness the salicylate is frequently given thus :

R.—Sodii salicylatis	gr. xx.
Aquæ cinnamomi	ʒj.

Or it may be prescribed in the effervescing form :

R.—Sodii salicylatis	gr. xx.
Sodii bicarbonatis	gr. xx.
Syrupi aurantii	ʒj.
Aquæ chloroformi	q. s. ad ʒjss.

This dose can be given with 17 grains of citric acid or a tablespoonful of lemon juice. In the latter case the syrup of orange is replaced by $\frac{1}{2}$ drachm of simple syrup.

Latham believes nausea may be prevented by giving the natural salicylic acid in pills, which are insoluble in the stomach, but soluble in the alkaline secretions in the duodenum.

He recommends¹ that the only kind of salicylic acid employed should be that obtained from the vegetable kingdom. It should be prescribed without any alkali or base :

R.—Acidi salicylici	gr. c.
Pulveris acaciæ	gr. xv.
Mucilaginis acaciæ	q. s.

M.—The mass is allowed to stand and harden, and is then divided into thirty pills. Each pill contains a little more than three grains. In acute rheumatism a dose of 20 grains (six pills) is given every hour for three doses, and then every four hours, or in sufficient quantity to bring the patient fully under the influence of the drug, as shown by buzzing in the ears, headache, or slight deafness.

¹ Medical Magazine, March, 1895.

It has been suggested that when the continued employment of salicylic acid or salicylates causes disturbance of digestion, these drugs might be beneficial if applied to the skin as ointment or if given by rectal injection. For the former purpose the following ointment may be applied to the painful parts, covered lightly with cotton-wool, and renewed night and morning :

R.—Acidi salicylici	3 iij.
Olei terebinthinæ	3 iij.
Lanolini	3 iij.
Adipis q. s. ad	3 iij.

Bourget,¹ of Lausanne, estimated the amount of acid recovered from the urine of patients under observation, and found that absorption was much more rapid when a fatty ointment was used than when the salicylic acid was mixed with vaseline or glycerin. Ruel² states that the method has been in use for more than six years in Geneva, with excellent results. He advises that an alcoholic solution of salicylic acid be mixed with twice its volume of castor oil and applied on compresses covered with oil-silk. If the compresses are well applied, salicylic acid may be detected in the patient's urine about twenty minutes after they are put on.

Erlanger³ finds that although absorption from the rectum is more slow, the results are as satisfactory as when given by the mouth. He gives the following rules for its administration : The rectum should first be emptied by a preliminary injection ; the solution should be lukewarm. The following is a convenient formula, and the patient must be instructed to retain the clyster :

R.—Sodii salicylatis	3 jss.
Tincturæ opii	℥xv.
Aquæ q. s. ad	3 iij.

The toxic symptoms of salicylates may be combated by the administration of diluted hydrobromic acid, but when used with this object the acid must be given in separate solution, since the result of attempting to combine diluted hydrobromic acid with sodium salicylate is that sodium bromide is formed and salicylic acid is, in all probability, precipitated, owing to its insoluble character.

The hæmaturia which occurs with sodium salicylate is not very common, but the possibility of its occurrence should be remembered,

¹ Therapeutische Monat., 1893, p. 531.

² Rev. Méd. de la Suisse Rom., 1893, p. 484.

³ La France Médicale, No. 1, 1895.

since otherwise the presence of blood in the water may be regarded as a serious complication, when in reality it is of little moment, since it ceases with diminution in the amount of salicylate administered.

It was at one time claimed in favor of sodium salicylate and of other members of this group that the liability to pericardial and endocardial complications was diminished by their administration. This statement was one which was extremely difficult to prove or to disprove. Certainly, inasmuch as the duration and severity of rheumatic fever are reduced by the administration of salicylates, it would appear possible that the liability to these secondary inflammations is also diminished. Practically, however, every case of acute rheumatism must be regarded as possessing the potentiality of cardiac changes, and even when the duration of the disease has been apparently shortened by salicylates, the patient should be kept in bed for a time and the treatment continued, while the character of the sounds of the heart should be noted frequently. It was at one time stated that the employment of members of this group increased the liability to relapses. The truth of this is, however, somewhat uncertain, and the occasions on which these relapses have followed the employment of salicylates are, in all probability, to be explained by imprudence during the early convalescence, which is peculiarly likely to occur, since the patient feels relatively well, and, in the absence of fever and pain, fails to see the necessity for continued caution.

Since the introduction of the treatment with salicylates many of the older forms of treatment, which in their time had given much satisfaction, have been discarded. Perhaps the most important of these was the treatment with alkalies, such as potassium bicarbonate, which long found favor when prescribed thus :

R.—Potassii bicarbonatis	.	.	.	.	.	.	gr. xx.
Spiritus ammoniæ aromatici	.	.	.	.	.	.	℥xx.
Spiritus chloroformi	.	.	.	.	.	.	℥x.
Infusi calumbæ	.	.	.	.	.	q. s. ad	℥j.

Even in the present time the belief in the treatment with alkalies has not been entirely displaced, and when salicylates are being prescribed, alkalies are often largely used with milk or in the form of alkaline drinks. When salicylates disagree, the alkaline treatment with full doses of potassium bicarbonate may be tried.

For the relief of pain it is sometimes advisable to employ opium, though, as a rule, pain is so far controlled by salicylates that there is rarely any need for more active anodynes, and, moreover, opium

possesses the disadvantage of deranging the digestion and of favoring constipation. When, however, pain persists in spite of other treatment and disturbs the patient's sleep, it may be advisable to give opium in moderate doses, especially at night-time. The disadvantages of opium can, to some extent, be overcome by the administration of saline purgatives, and even when opium is not being taken, saline purgatives are frequently of service in the early treatment. Opium is, however, perhaps of greater service when there are indications of endocarditis or pericarditis, since under these conditions it not only allays pain, but quiets much of the restlessness which so frequently precedes delirium. With endocarditis, or with pericarditis, opium may be applied with advantage over the cardiac area for the relief of pain, but this should not preclude the simultaneous internal use of the drug.

Potassium iodide has often been recommended in the treatment of rheumatic fever, but it appears to be of much less service in acute than either in subacute attacks or in those which, having started by being subacute, tend to assume a chronic type. As in gouty conditions, the benefits which result from the administration of potassium iodide are, in all probability, largely due to the depressant influence upon the blood-pressure.

Other compounds derived from salicylic acid, or containing salicylic acid or a salicylate, are often used in acute rheumatism, although salol—a combination of salicylic acid and carbolic acid—possesses the inconvenience of giving rise to toxic symptoms when employed frequently or in large doses. Hence, notwithstanding its powerful action as an antipyretic, it is not to be recommended for habitual use.

Salophen appears to give more satisfactory results; it was introduced to replace salol, owing to the ready decomposition of the latter with the elimination of phenol. Salophen is only a mild antipyretic, though it has frequently been found to cause rapid diminution of pain and swelling in cases of acute rheumatism. Like sodium salicylate, however, it does not appear to afford any protection against relapses, nor does it insure the absence of cardiac complications. It has been employed in doses of from 10 to 30 grains, which are most conveniently given in cachets. It has recently been urged in favor of salophen that, on account of its rapidity of action and the way in which it is tolerated even by the most delicate patient, it is preferable to all other salicylic preparations in the treatment of this disease.

Reference has already been made to the value of local treatment of the affected joints, and the advantages of enveloping these in cotton-wool, held in place by light flannel bandages. Occasionally, when the pain is very severe, distinct benefit results from fixing the limbs lightly upon splints, so as to insure immobility. Occasionally it is recommended that the cotton-wool should be surrounded with some impervious covering, but this is generally undesirable, particularly when there is very free diaphoresis. The local treatment by alkalies, or by anodynes, has often been advocated, as, for example, the application of a lotion consisting of diluted laudanum rendered alkaline by the addition of sodium bicarbonate. This may be applied by soaking in the lotion strips of linen or lint, which are held in place around the joints by cotton-wool and a light flannel bandage. Sodium salicylate may be applied in a similar way, and recently the salicylate of methyl has been found of some service. Catrin,¹ after trying the external application of salicylate of methyl in a series of cases of acute rheumatism and other articular diseases, considers that though the value of this treatment is incontestable, it proves most efficacious in subacute and chronic cases. Sterling, quoted in the same volume, draws attention to various details connected with the external application of salicylic acid. He believes that variations in the thinness and delicacy of the skin in different individuals exert an influence upon the efficacy of the method, and he finds that women, as well as young and fair persons, are more suitable than older people and those of darker complexion. He employs an ointment containing turpentine as a corrosive of the epidermis, but he discontinues the turpentine when, after several applications, the epidermis appears to be sufficiently destroyed. He considers that the perspiration of rheumatic persons being retained by an impermeable dressing favors the absorption of the drug. This local treatment with salicylic acid is, however, conjoined with the simultaneous administration of sodium salicylate during the earlier stages of the attack. The advantages claimed for this double form of treatment are that smaller doses of salicylate can be trusted to produce beneficial effects, while gastric disturbance is avoided, and, further, that, particularly among less intelligent classes, greater confidence in the treatment is insured by the direct application of the remedy to the seat of pain.

¹ Year-Book of Treatment for 1899, p. 148.

Among other local measures that have been advocated must be mentioned the employment of blisters. These have been used more especially over the knee-joint; they are, however, not advisable at the commencement of an attack, although they may be of service when the pain and swelling continue in spite of other forms of treatment. The same remarks apply to the use of Paquelin's cautery for the relief of acute rheumatism. This treatment is too severe to be employed unless all other measures of relief have failed.

Recently many attempts have been made to prove that acute rheumatism is an affection dependent upon some bacillary growth, and the wave of bacteriological investigations has been followed by somewhat curious recommendations for the treatment of this disease. Thus, for example, the intravenous injection of corrosive sublimate has been advocated; but the cases quoted are scarcely sufficiently numerous to allow of any definite statements as to the value of this treatment, although it is claimed that in two cases in which salicylate failed to give relief, injections of corrosive sublimate proved very efficacious.

Yet more heroic is the recommendation to open, irrigate, and drain affected joints. This, however, has been advised by J. O'Connor,¹ of Buenos Ayres. This treatment results, apparently, from the view that the disease is to be ascribed to an infection which, entering by the tonsils or other channels, lodges in the joints, where the poison is elaborated and poured into the system and thus conveyed to fresh articulations and to the heart.

Several complications may occur in the course of rheumatic fever and call for special treatment. Hyperpyrexia is the most important, as it threatens life. The temperature may rise rapidly to 108° F., or even higher, and ordinarily this rise occurs shortly after the onset of the fever, and is associated with delirium. During the rise of the fever the pulse becomes feeble, there is marked prostration, and the case may end with stupor. Whenever in the course of rheumatic fever the temperature rises rapidly to above 105° F., the use of some antipyretic measures other than salicylates must be considered. The drugs which have been introduced as antipyretics—such as antipyrine, antifebrine, and so on—are distinctly not to be employed in this form of pyrexia, since they frequently tend to produce

¹ Glasgow Medical Journal, 1898, p. 269.

still further prostration, owing, to a great extent, to their power of interfering with the due oxygenation of the blood.

Occasionally the hyperpyrexia may be combated by an increased dose of salicylates, but the weakness of the pulse will again contraindicate the employment of salicylates in very large dose, and it therefore becomes advisable to employ antipyretic measures which either do not influence the circulation or whose influence can be counteracted by the administration of stimulants. The employment of the cold bath as a means of reducing the temperature has often been advocated. Should this be used, it is well to commence with a temperature of from 90° to 100° F., which gives no fresh shock to the system, and to reduce the temperature gradually by the subsequent addition of cold water until the bath is at or near 70° F. During the time of immersion signs of collapse must be carefully watched for, since they call for the immediate administration of some diffusible stimulant, and they may even render it imperative that the patient should be at once removed from the bath.

The patient must be carefully lifted from the bed to the bath, owing to the pain which is likely to be caused by any involuntary movement. Although the bath affords perhaps the quickest and simplest mode of reducing the temperature, it possesses the great disadvantage of increasing pain even when the utmost care is taken, and accordingly it is usually preferable to sponge the patient with ice-cold water, or to rub the surface of the body with lumps of ice enveloped in flannel. When employing either of these methods the temperature may be still further reduced by giving fragments of ice frequently. Ordinarily, as the temperature of hyperpyrexia falls, the delirium and other urgent symptoms pass away.

The cardiac complications have already been mentioned. Pericarditis is readily recognized owing to the pain and to the friction sounds, and it calls for the administration of opium and for local treatment with leeches, poultices, or blisters, which have already been mentioned in the description of the treatment of pericarditis. Endocarditis is, unfortunately, not so easily detected in the early stages, since the characteristic murmurs may be absent when there is but little dilatation of the orifices or but little obstruction to the course of the circulation. Or, again, the feeble sounds of commencing endocarditis may be entirely masked by the rasping friction sounds of pericarditis, or by an excessive accumulation of fluid in the pericardium. When, however, the occurrence of endocarditis

is suspected, opium must be administered, and, as a rule, it is well to give tonic remedies, such as arsenic and iron, while, if the pulse becomes rapid or irregular, digitalis or strophanthus should be used.

Sometimes, with pericarditis or with endocarditis, marked cerebral symptoms may arise, and should be dealt with partly by the continued use of anodynes or narcotics and partly by the administration of stimulants. The supervention of mild cerebral symptoms in the course of rheumatic fever almost always forms an indication for increasing the amount of stimulant. In children cerebral symptoms may often be associated with chorea, but chorea more commonly makes its appearance when the conjoined symptoms have not been very severe, although the rheumatic nature of the attack has been indicated by slight pains, and perhaps by endocardial or pericardial complications. When chorea occurs during the course of rheumatic fever in children, it is best treated by salicylates and stimulants, the administration of arsenic and iron being, perhaps, of greater service in the more common form of chorea which occurs subsequently to an attack of acute rheumatism.

Pulmonary complications, such as pneumonia and pleurisy, occasionally arise, especially in cases marked by endocarditis and pericarditis, but these complications are to be treated upon general principles, since the association with rheumatic fever does not influence the course of these affections except in so far as it adds to their gravity.

It remains to mention the treatment advisable during convalescence. The chief feature of this treatment lies in enforcing rest long after the patient feels absolutely well, and this rest is the more important when there is reason to believe that the heart has been affected, even though no murmurs may be heard. It is a fact of common experience that, under such conditions, if patients are allowed to leave their beds at an early date and to resume their ordinary occupations, they will probably within a few weeks or months come back for treatment with well-developed cardiac murmurs. Hence, rest is an essential during convalescence, and even after the patient has been allowed to get up he must be counselled to avoid any form of exercise or occupation which entails strain upon the valves of the heart.

During the period of rest the diet should be gradually rendered more nutritious and more solid. Nourishing broths may gradually give place to fish and chicken, and these in turn may make way for

small quantities of well-cooked meat. During convalescence small quantities of stimulant may be given, but this should preferably consist of well-diluted spirit rather than of wine or beer, and unless there is much weakness of the pulse, stimulants will probably be unnecessary. Usually during this time benefit follows the administration of quinine, of iron, or of arsenic, and iron and digitalis are especially of value when the pulse remains rapid after pericardial or endocardial trouble.

The return to the normal condition is frequently slow, and when dealing with rheumatic fever which has lasted some weeks it is advisable, even after the temperature has fallen, to continue the use of salicylates for another fortnight; and indeed they may be resumed from time to time if there is still complaint of pain about the joints. With regard to prophylactic treatment, it is well to remember that one attack of acute rheumatism occurring in a young adult frequently forms the precursor of other attacks, and that though the first attack may be mild, subsequent attacks may be marked by symptoms of greater severity. Hence, those who have once suffered from rheumatic fever should be warned of the dangers of a recurrence, of the need of avoiding exposure to damp and chill, and of the necessity of warding off these dangers by wearing warm, light clothing of an absorbent character, so as to diminish the risk of chill after mild perspiration. Should the patient's means permit, convalescence may be hastened by residence in a warmer climate, and the liability to subsequent attacks may be lessened by spending the winter in southern California.

Chronic Rheumatism. There is some tendency at the present time to exclude chronic rheumatism from the list of diseases, and to refer chronic conditions of pain connected with the limbs and the joints either to osteo-arthritis, the so-called rheumatic gout, or else to true gout. It is, however, a clinical fact that many forms of pain defy the treatment applicable to these two conditions, while they are relieved by measures which are but modifications of the treatment of acute rheumatism. It must further be noted that these painful conditions frequently arise under circumstances which are ordinarily credited with the power of exciting rheumatism, while, apart from pain, most of the clinical features of osteo-arthritis and of gout are absent.

It will be convenient to consider the treatment of this affection under two distinct headings—viz., Chronic Articular Rheumatism

and Chronic Muscular Rheumatism, the latter including many forms to which special names have been applied.

Chronic articular rheumatism may occur as a sequel to an acute or subacute attack, but more commonly it arises independently, and is marked chiefly by pain on movement, together with an almost inappreciable degree of thickening of the structures around the joints. This thickening may be found to depend upon slight inflammatory action affecting the capsule and ligaments, with similar changes in the synovial membrane, which may result in slight effusion. Frequently the adjacent sheaths of tendons partake in the inflammation, and the formation of adhesions increases the pain and difficulty of movement. It is somewhat characteristic of this affection that one or two joints only are ordinarily attacked, also, that although there may be much pain and impaired mobility, these discomforts may be completely overcome by passive movements. It is rare for marked constitutional symptoms to be present, unless the condition has so far limited activity that the general health suffers. When febrile symptoms occur, the pains are to be referred to recurrent attacks of subacute rheumatism rather than to chronic rheumatism.

Chronic articular rheumatism is best treated by the adoption of local measures, although it is to some extent capable of being reduced by internal medication. The local measures which are of the greatest service are those which promote freedom of circulation through the affected part, and this indication may entail the employment either of counter-irritants or of other measures which promote restoration of the powers of movement. Of the counter-irritant measures the application of iodine in the neighborhood of the painful part is perhaps the one most generally adopted. This will frequently lead to desquamation, and may perhaps produce a blister, especially when the iodine is used daily in concentrated form. When this occurs, the iodine must be discontinued, as otherwise it would cause intense pain. Since, however, the affection is chronic, it is better to avoid the above results by painting successive bands around the affected part and not repeating the application to the same spot daily.

In very chronic conditions which resist this form of treatment more energetic counter-irritation may be obtained by the use of Paquelin's cautery or by the application of small flying blisters around the affected joint. When the surface has peeled off after either of these forms of treatment, passive movements may be made, and the limb may be rubbed gently with the liniment of potassium

iodide. (Soap, $\mathfrak{z}\text{ij}$; potassium iodide, $\mathfrak{z}\text{jss}$; glycerin, $\text{fl}\mathfrak{z}\text{j}$; oil of lemon, $\text{fl}\mathfrak{z}\text{j}$; and distilled water, $\mathfrak{z}\text{x}$.) When there is much complaint of pain, equal parts of chloroform and opium liniments (equal parts of soap liniment and tincture of opium), or of chloroform and belladonna liniments, may be used, the liniment being applied to the joint upon lint, and the movements restricted by surrounding the joint with cotton-wool. Should there be distinct evidence of effusion which does not diminish when any of the above forms of treatment have been applied, liniment of mercury (ointment of mercury, strong water of ammonia, camphor liniment) and liniment of potassium iodide with soap (the formula as given above), in equal proportions, may be similarly applied to the joint. The action of any of the above remedies may be favored by the previous use of a hot douche, which assists local dilatation of vessels, and hence favors absorption.

Reference has already been made to the value in these cases of passive movements and of massage. These serve not only to promote the circulation in the affected part, but also to break down recent adhesions and to increase the strength of the affected limb. Occasionally electricity is used in conjunction with massage; this is most serviceable when the muscles have become somewhat atrophied. Some observers, however, maintain that continuous currents will favor the restoration of the limb to the normal size and will also diminish pain. Although, in the treatment of this condition, it has long been customary to send patients to hot springs, it is generally admitted that the character of the mineral springs is of very secondary importance, while the chief benefit is derived from the massage, the movements, and the actual temperature of the water.

Before resorting to any of the springs, it is well to note that there are certain dangers incidental to their employment. These are seen most markedly in the discomforts experienced by those who suffer from heart disease or from kidney disease, and the tendency to fainting is considerable when the patient is advanced in years. With these reservations, however, much relief may ordinarily be obtained from a short course at one of the thermal waters; but there is little doubt that the benefit is to some extent due to the change of air and to the general hygienic conditions which are usually enforced.

The treatment of chronic articular rheumatism by remedies administered internally is generally full of disappointment, and in a large number of cases it may be doubted whether much good is derived from any treatment other than the adoption of tonic measures. To

some extent, those who suffer from this form of rheumatism are ordinarily rather debilitated; and they may improve with tonics, such as quinine, or the various salts of iron, or sometimes with preparations of arsenic. But when it is desired to adopt measures more particularly directed against the rheumatic tendency, some of the drugs which are most to be trusted for the acute form of rheumatism are of very little service. Occasionally sodium salicylate or salicin may afford some relief, particularly if administered at the time when the rheumatic pains are most pressing, especially if the attack appears to have any distinct reference to exposure to cold or damp, and also when the condition is marked by any slight oscillation of temperature. For the ordinary chronic form of pain with limitation of movement these drugs are of little avail.

In the more chronic forms of the affection full doses of potassium iodide or of sodium iodide may be tried, and should the condition be due to gonorrhœal infection they may be beneficial, although under such circumstances it is essential that measures should be adopted for the treatment of the cause. Thus, iodides are occasionally of greater service when given with potassium bicarbonate in fairly large dose, but with any of the foregoing remedies it is always advisable to combine the administration of some form of stimulant—as, for example, aromatic spirit of ammonia—either with the medicine or with the food, so as to counteract the depressant influence of these drugs. Sulphur may be given internally with the view of acting as a slight laxative, and when patients are unable to visit any of the sulphur springs they frequently derive advantage from the use of the confection (sublimed sulphur, $\mathfrak{z}\text{iv}$; potassium tartrate, $\mathfrak{z}\text{j}$; powdered tragacanth, gr. xvij; syrup, $\mathfrak{fl}\mathfrak{z}\text{ij}$; tincture of orange, $\mathfrak{fl}\mathfrak{z}\text{ss}$; glycerin, $\mathfrak{fl}\mathfrak{z}\text{jss}$), the lozenge (precipitated sulphur, gr. v; potassium bitartrate, gr. j; sugar, gr. viij; acacia, gr. j; tincture of orange, $\mathfrak{m}\text{j}$; mucilage of acacia, $\mathfrak{m}\text{j}$), or the compound licorice powder. Should, however, all these measures have been tried without success, it is advisable to employ remedies which are more commonly given in the treatment of gouty conditions.

Some cases of chronic articular rheumatism improve with moderate doses of colchicum, either of the wine of the root, in doses of 10 to 30 drops, or the extract, in doses of $\frac{1}{4}$ to 1 grain, which may be given conveniently in pill form with eunonymin or with the extract of cascara sagrada; a preparation of guaiacum may also be used.

The dietetic and hygienic treatment of chronic articular rheumatism is somewhat more satisfactory, since, by modifications of diet and by due regulation of exercise, considerable benefit may be obtained. Should the patient be obviously in a weak state of health, the diet may require to be rendered more nutritious, having due regard, however, to the tendency to constipation and to other digestive disturbances. In general, it is well to avoid the use of all forms of alcoholic beverages, particularly those which are fermented and contain saccharine principles. Sometimes, however, digestion appears to be improved by a small quantity of whiskey or of brandy taken with or after the principal meals.

There is considerable evidence to show that those who suffer from this affection may derive benefit from great reduction in the ordinary quantity of meat, while at the same time the amount of fresh vegetables and fruit is increased. To some extent this improvement is perhaps referable to the diminution of habits of constipation, though doubtless the vegetable acids are of service.

With regard to exercise, it is always well to encourage rheumatic patients to indulge in moderate forms of athleticism, since this will not only serve to diminish the fixation of the joints, but it will also improve the general condition. The association of this malady with damp suggests the use of warm woollen clothing, and indicates also that those whose means permit should pass the winter months in some warm, dry climate.

Chronic Muscular Rheumatism. Chronic muscular rheumatism differs from the foregoing in affecting special muscles rather than the joints, although it resembles it in the pain produced by movement and, to some extent, in the chronic type of the malady. This condition has received various names according to the special muscles affected, such as lumbago, torticollis or stiff neck, and pleurodynia. It is characteristic of this affection that, although it is chronic in its course, the onset is usually acute. The pain may commence quite suddenly with what appears to be very slight provocation, as, for example, some overstrain or movement in which the individual is scarcely conscious of having put forth any particular exertion. This is seen in the most marked way with the onset of lumbago. The affection, however, may also result from constant strain of special groups of muscles, as, for instance, from the stiffness which ensues after prolonged railway travelling, especially if the conditions have necessitated the maintenance of an awkward posture for many hours in succession.

The treatment of this affection must to a large extent depend upon the site of the attack and upon its severity. The first essential in severe cases is to secure rest and warmth, so that, although the disease is not in itself serious, it may entail rest in bed for some days when large groups of muscles are attacked. Even in lumbago, which is frequently regarded as a trifling affection, complete rest will often shorten the attack, and so long as the patient remains in one position he may be free from pain. When, however, the pain continues, or is extremely severe, it may call for the administration of narcotics, of which morphine is undoubtedly the most convenient.

Some forms of chronic muscular rheumatism may be much relieved by the local application of dry heat, of which the well-known domestic remedy for lumbago furnishes a good example. This consists in the application of a hot flat-iron over the affected part, which is protected by one or two layers of flannel. When this treatment is inconvenient, benefit may result from the inunction of stimulating liniments, such as that of turpentine, the good effect being undoubtedly due in great part to the friction and massage of the affected muscles. In severe chronic lumbago, which resists these measures, relief may sometimes be obtained by the use of dry cupping. When the condition affects a large number of muscles, a hot bath may be very beneficial; the muscular relaxation and the free circulation and perspiration which result all tending to relieve the condition.

With regard to internal remedies, the powder of ipecacuanha and opium, given repeatedly during the day, will often reduce pain; but should the opium disagree, further relief may sometimes be obtained by the use of the lithium carbonate or citrate, and potassium bicarbonate. These drugs are more particularly useful in those cases in which the evidence of concentration of the urine, indicated by a high specific gravity and by the deposition of various renal salts, indicates that the symptoms may perhaps have their origin in a gouty diathesis.

When the onset is less acute and the course is more chronic, the affection may defy the above-mentioned remedies; various additional forms of local treatment may then be used—in fact, the treatment will resemble very closely that ordinarily adopted in cases of chronic articular rheumatism. For example, it may be advisable to employ counter-irritants over the affected part, such as iodine, or the liniment of potassium iodide with soap (soap, $\mathfrak{z}\text{ij}$; potassium iodide, $\mathfrak{z}\text{jss}$; glycerin, $\mathfrak{fl}\mathfrak{z}\text{j}$; oil of lemon, $\mathfrak{fl}\mathfrak{z}\text{j}$; and dis-

tilled water, fl $\bar{5}$ x); or, in more inveterate cases, flying blisters may be serviceable, while the actual cautery or Paquelin's cautery may sometimes be required.

The intimate relation of gout and of rheumatism is perhaps most fully demonstrated clinically in this group of cases, which lend some support to Mordhorst's supposition of the dependence of rheumatism upon forms of granular urates which are deposited in the affected areas. This supposition will also serve to explain the immediate benefit which may occasionally follow the use of salicylates, even though the chronic condition is only alleviated and not cured. The following mixture is often useful in some forms of lumbago :

R.—Sodii salicylatis	. . . . .	gr. x.
Potassii iodidi	. . . . .	gr. v.
Extracti sarsaparillæ fluidi	. . . . .	$\bar{3}$ ij.
Aquæ	. . . . . q. s. ad	$\bar{3}$ ss.

M.—Sig. To be taken in water thrice daily, after meals.

CHAPTER XXIV.

CONSTITUTIONAL DISEASES—*Continued.*

Gout—Theoretical Considerations—Acute Gout—Subacute and Chronic Gout—Metastatic Gout—Irregular Symptoms referable to Gout—Osteo-arthritis.

Gout. The number of diseases and of symptoms which have been referred to this condition are almost endless, and although many of these must be dealt with as manifestations of gout, it will be convenient in the first place to consider the disease in two main forms—the acute and the chronic—reserving for subsequent consideration those symptoms which appear beyond doubt to depend upon the same cause, even though their origin is not at first sight so manifest.

The various views that have been taken of the pathology of gout need scarcely detain us here, although it may be of service to state briefly that all observers appear to be agreed upon the importance of uric acid and its compounds in connection with the causation of gout. The researches of the late Sir William Roberts and others have shown that uric acid forms three classes of salts: First, a class of neutral urates, in which a metal takes the place of all displaceable hydrogen; these neutral urates do not exist in the living organism, although they may be obtained by chemical processes. Second, a class of biurates, in which a metal takes the place of part of the displaceable hydrogen, thus forming acid salts comparable to sodium bicarbonate, and, like this salt, although chemically it may be termed an acid salt, in reality the biurate gives no acid reaction to test papers. Third, the quadriurates, whose composition is best explained by stating that a metal takes the place of one-fourth of the displaceable hydrogen in two uric acid molecules.

The important biurates and quadriurates which occur in the body are the sodium salts, and it appears to be now generally recognized that of these two the quadriurate saturates in the blood of gouty subjects, and that this compound is an unstable body which ultimately may unite with some of the sodium carbonate of the blood, and thus form sodium biurate. The quadriurate is comparatively

soluble, while the biurate is comparatively insoluble; hence, when the biurate has been formed in any quantity, it is readily deposited in crystals in various structures, and this deposition of sodium biurate appears to be the immediate exciting cause of an acute attack of gout. The deposition ordinarily occurs within the synovial membranes, and leads first to the accumulation of crystals upon and within the articular cartilage, and, secondly, to a form of inflammation to which many of the symptoms are directly referable.

Since the treatment of gout may to some extent be influenced by the views held of its pathology, it may be interesting here to give the conclusions which have been recently arrived at by Dr. Luff as to the pathology of gout:¹

1. Uric acid is not normally present in the blood of man and other mammals, nor in the blood of birds.
2. Uric acid is normally produced only in the kidneys.
3. Uric acid is normally formed from urea, probably by conjunction of that substance with glycocin in the kidneys.
4. Uric acid is present in the blood in gout as the soluble sodium quadriurate. In its soluble form it is not a toxic agent. It deposits from the blood as sodium biurate, which acts passively and physically as a foreign body in the tissues or organs in which it is deposited.
5. The presence of uric acid in the blood in gout is due to its deficient excretion by the kidneys, and to the subsequent absorption of the non-excreted portion into the blood from these organs.
6. Gout is probably always preceded by some affection of the kidneys, functional or organic, which interferes with the proper excretion of uric acid. The probable seat of the kidney affection giving rise to gout is in the epithelium of the convoluted tubes.
7. In certain blood diseases and disorders accompanied by leucocytosis, uric acid is formed within the system from nuclein. In such circumstances it passes at once into the blood, and is rapidly eliminated by the kidneys.

Acute Gout. The symptoms which precede an attack of acute gout are sometimes ill defined. Occasionally there may be slight pain in one or more of the joints, but more commonly, in spite of some previous tendency to dyspepsia and mental depression, the individual feels better shortly before the immediate onset of the

¹ Gout, its Pathology and Treatment, pp. 103, 104.

attack. Frequently this onset occurs during the night, the patient waking with severe pain, which, in the first attack, usually commences in the great toe. This pain rapidly increases, and is always intensified by the slightest movement. Sometimes it is followed by a moderate rise of temperature, which, however, may fall with diminution of pain and with slight perspiration. The part affected is then found to be somewhat swollen, the skin shining and tense, and the veins in the neighborhood distended. After this acute onset the pain may return on successive nights for a week or even a fortnight. As the swelling subsides the pain diminishes, but is replaced by much irritation of the skin, which may pit on pressure and will subsequently desquamate.

Of the minor phenomena of an attack of gout it may be mentioned that the temperature rarely rises above 100° to 102° F., that even with this temperature there is much thirst and anorexia, and that the urine is commonly scanty, high-colored, and cloudy from deposition of urates. In addition, it sometimes contains a small amount of albumin. This, however, is ordinarily transient, disappearing entirely after the severity of the attack has passed off. Sometimes the albuminuria is, however, permanent, and is an indication of chronic renal trouble.

Although an acute attack of gout commonly commences in the great toe, the site affected may be determined by any previous slight injury or strain; sometimes the knee, the elbow, or the wrist may take precedence of the great toe.

The treatment of an acute attack of gout must be considered with reference partly to local treatment, partly to general internal medication. Concerning the former, the most important indication is to allay pain as early as possible. To some extent this may be reduced by the position of the affected limb. It should be slightly raised upon a soft pillow, so as to be a little above the level of the body, and the weight of the clothes should be taken off by means of a suitable cradle. In spite of the inflammatory appearance of the affected part, it is better to avoid the application of leeches or the employment of blisters to act as a counter-irritant, as these appear to have no beneficial effect. Advantage results, however, from the application of warm, soothing lotions, and, pending the arrival of a suitable medicinal lotion, some relief will often be obtained by packing the affected limb with a light, warm fomentation, which can be enveloped in cotton-wool and surrounded with oil-silk.

Greater relief is, however, afforded by the use of alkaline lotions containing half an ounce of sodium carbonate to a pint of warm water, or, if the lotion is not prepared on the spot, the same amount of sodium carbonate in half the quantity of water may be obtained and mixed with an equal bulk of hot water when required for use. The sedative action of this lotion may be increased by the addition of a couple of drachms of laudanum.

Many other local applications have been recommended, as, for example, a mixture of morphine hydrochlorate, 10 grains, with liniment of belladonna, 3 ounces, which is to be used on lint under oil-silk, after mixing a teaspoonful with a tablespoonful of hot water. Liniments have also been suggested of menthol, camphor, or opium, or of morphine hydrochlorate with atropine. The last may be prepared with oleic acid, so as to contain 15 grains of morphine and 3 grains of atropine in an ounce of oleic acid, and may be painted over the painful part previous to wrapping the limb in cotton-wool. In general terms it may be stated that the applications which involve the least movement and the fewest changes are those which appear to be most comforting.

At the commencement of the attack the treatment should include the use of purgatives, of sedatives, and of specific remedial agents. The selection of a purgative may, perhaps, to some extent, be influenced by the patient's wishes, especially if he has had previous experience of gouty attacks. Ordinarily, however, it will be found beneficial to employ a fairly brisk purgative, such as 3 or 4 grains of blue mass, and the action may be increased by the addition of $\frac{1}{4}$ grain of podophyllum resin or of a couple of grains of euonymin. Such a pill, taken at night-time, should be followed by the use of a saline mixture in the early morning. This mixture should have magnesium sulphate as its principal ingredient. This was frequently given in the effervescent form, but inasmuch as this involves the presence of sodium bicarbonate, it is, according to most modern views, inadvisable. Other salines or purgative mineral waters may be employed, but those which contain sodium are contraindicated.

The selection of the sedative must be guided by the existing symptoms, and still more by knowledge of the previous medical history of the patient. Naturally, the severity of the pain appears to call for the employment of opium or of morphine, but these remedies are frequently dangerous when the individual is the subject of chronic kidney mischief; hence, they must be avoided whenever a small trace

of albumin has been detected, unless, indeed, previous knowledge of the patient renders it certain that this presence of albumin is a natural symptom of the existing attack rather than an indication of chronic kidney mischief. Certainly, with patients seen for the first time it is safer to avoid the internal administration of morphine or opium, especially when there is a small amount of albumin, the only exception to this rule in gout being when the age or weakness of the patient renders the continuance of pain even more dangerous. Under these circumstances it is best to give opium, either as the tincture or as Dover's powder, rather than to inject morphine subcutaneously.

Occasionally, benefit results from the employment of hyosine hydrobromate or of hyoscyamine sulphate—two hypnotics which can frequently be used in the presence of chronic kidney mischief. These give better results than many of the other hypnotics, such as chloral, trional, or paraldehyde, which are often recommended. Some observers, however, speak with great confidence of the benefits obtainable from a mixture of chloral hydrate, potassium bromide, and tincture of hyoscyamus.

The measures hitherto enumerated must be regarded as palliative rather than curative, and we must trust to the use of other drugs for the cure of the attack or for the reduction of its duration. In this connection there has been much difference of opinion of late years, and it is impossible to give satisfactory directions for the curative treatment without entering upon somewhat debatable ground. Most observers are, however, agreed at the present time that the first essential during an acute attack is to bring the patient thoroughly under the influence of colchicum. This drug had perhaps fallen into some discredit, owing to the inordinate doses employed, and for a time it was replaced in practice by various alkalies, and more recently strong statements have been made concerning the value of salicylates in promoting the elimination of uric acid. Apart from the employment of overdoses it is possible that the disinclination to employ colchicum was to some extent the result of the difficulty of explaining its action on any satisfactory pharmacological grounds; while, on the other hand, experimental evidence seemed to favor both the use of the alkaline carbonates and perhaps also of the salicylates.

Colchicum appears to be beneficial when the wine of the root is used in doses of from 15 to 20 minims at the commencement of the attack, the quantity given being subsequently reduced to from 5 to 10 minims when administered three times during the day. There

is much evidence to show that the action of colchicum may be increased by the addition of potassium citrate, in doses of 40 grains, which acts as a diuretic and diminishes the acidity of the urine. The influence of the two is to reduce inflammation, to relieve pain, and to shorten the attack.

Various theories have been put forward to explain the good results obtained from the use of colchicum. It has been suggested that the benefit might be partly due to a diminution of the uric acid production, thus arresting the absorption of uric acid from the kidneys, and so preventing the further deposition of biurate in the affected parts. Colchicum is certainly a powerful cholagogue, and may thus check the formation of glyccin, and hence reduce the amount of uric acid formed in the kidneys. In support of this view may be mentioned the clinical fact that the elimination of uric acid is always diminished when colchicum is being taken.

During the employment of colchicum it has been pointed out that diuresis commonly occurs together with increased secretion of the stomach, the intestine, the liver, and the skin, and it has been recommended accordingly that the drug should be given in sufficient quantity to cause these increased secretions, but that the amount should stop short of producing nausea and vomiting. With regard to the relative action on the kidneys and on the skin, it is commonly found that diuresis is greatest when diaphoresis is slight. The chief argument against the employment of colchicum lies in the vascular depression which may ensue after using large doses, but this argument tells rather against the continuous employment of colchicum in large doses than against its use in fairly large doses at the commencement, and in moderate doses subsequently.

The value of sodium salicylate rests upon a much more uncertain basis, since, although some observers speak very highly of it, others state that it has been found useful, but inferior to colchicum. Others, again, consider this remedy dangerous, more particularly when there are any indications of renal disease. Dujardin Beaumetz practically recommends that sodium salicylate should be avoided if albumin is present in the urine. I must admit that I have employed this drug somewhat largely in cases of acute gout, but although it has occasionally appeared to diminish pain, it has certainly caused no material shortening of the attack, and on several occasions I have thought that the duration of the attack had perhaps been increased by it.

With regard to the administration of alkalies, though this rests upon a large amount of clinical and experimental work, their use of late years has been assailed, notably by the late Sir William Roberts and by Dr. Luff. The former considered that the use of alkalies depended upon the hypothesis that by increasing the alkalinity of the blood they increase its solvent power on materials of gouty depositions, and he maintained that alkalescence, as such, has no influence whatever on the solubility of sodium biurate. Dr. Luff's experiments have led him to the following conclusions :

1. The alkalinity of the blood is apparently not appreciably diminished during a gouty attack.

2. The solubility of uric acid in the blood is not affected by a diminished alkalinity of the blood produced by the addition of organic acids.

3. The deposition of sodium biurate is not accelerated by a diminution of the alkalinity of the blood.

4. An increased alkalinity of the blood does not increase the solubility of deposits of sodium biurate.

5. The administration of the ordinary alkalies of lithium salts, of piperazine, and of lysidine, with the object of removing gouty deposits, appears to be useless.

6. No general acidity of the system is associated with gout.

7. No relationship exists between the acidity of the urine and the alkalinity of the blood.

8. The administration of salicylates with the object of removing gouty deposits appears to be useless, and their employment in the treatment of gout is contraindicated.

During the first day or two of an acute attack of gout the diet of the patient must be restricted entirely to milk, since it is important that no articles should be given which favor the increased formation of uric acid : the so-called milk diet may include, in addition to milk, the thickening of the milk by various carbohydrates, as, for example, with tapioca, rice, or sago, or the use of bread and milk or arrow-root and milk. This form of diet should be continued so long as the pain is severe, but with the subsidence of the acute attack increased liberality of diet may be permitted, though for a length of time it is advisable to avoid the use of any strong soups, meat extracts, or essences, on account of the large proportion of nitrogenous material they contain and their tendency to promote the formation of uric acid. The only indication for the employ-

ment of alcohol during an acute attack must be found in the weakness of the pulse, whether this is due to the nature of the remedies that have been employed or whether it is a constitutional condition. Should the use of stimulants appear to be imperative, it is best to resort to whiskey, well diluted with warm water, or with Salutaris water, in preference to any of the alkaline waters which may contain sodium.

Subacute and Chronic Gout. The treatment of subacute and chronic gout is almost as important as the treatment of an acute attack, and when once the gouty diathesis has been declared, measures must be taken to ward off subsequent attacks and to relieve the discomforts incidental to gout, when it occurs in the chronic or subacute form. The chief indications, so far as prophylactic treatment is concerned, lie in the prevention of the formation of uric acid and of its conversion into biurates. These processes can, to a large extent, be hindered by measures which favor the due elimination of nitrogenous waste, while at the same time the dieting and the habits will require suitable modification. Subsequently to an acute attack, colchicum may still be used in small doses, so long as there is no pain or enlargement about the joints. Frequently, however, as the severity passes off, complaint is made of the depressant action of colchicum, and it then becomes necessary to administer either potassium iodide or guaiacum.

The following prescriptions for mixtures containing potassium iodide, to be taken three times a day, are often employed in London hospitals :

R.—Potassii iodidi	.	.	.	.	.	.	gr. v.
Ammonii carbonatis	.	.	.	.	.	.	gr. iiij.
Infusi gentianæ compositi	.	.	.	.	.	.	℥j.
R.—Potassii iodidi	.	.	.	.	.	.	gr. v.
Spiritus ammoniæ aromatici	.	.	.	.	.	.	℥xv.
Infusi quassie	.	.	.	.	.	.	℥j.
R.—Potassii iodidi	.	.	.	.	.	.	gr. v.
Spiritus ammoniæ aromatici	.	.	.	.	.	.	℥xx.
Infusi gentianæ compositi	.	.	.	.	.	.	℥iv.
Aquæ	.	.	.	.	.	q. s. ad	℥j.

Guaiacum is somewhat difficult to prescribe, owing to the nauseous appearance of most mixtures of this drug, due to the precipitation of the resin. The composition of the *mistura guaiaci* of the *British Pharmacopœia* is as follows :

R.—Guaiaicum resin	$\frac{1}{2}$ ℥.
Refined sugar	$\frac{1}{2}$ ℥.
Powdered tragacanth	35 gr.
Cinnamon water	20 ℥.

The dose is $\frac{1}{2}$ to 1 ounce, and is not very readily taken, and the same applies to the ammoniated tincture of guaiacum of the *United States Pharmacopœia*. Although undoubtedly guaiacum resin lozenges are more often used for throat affections than for their constitutional effect, they may be given with benefit, provided they do not produce too much diarrhœa. This symptom is somewhat readily produced by preparations of guaiacum, and although some degree of laxative action is desirable subsequently to an acute attack of gout, the guaiacum may have to be discontinued if this symptom causes much discomfort. Frequently it is desirable to stimulate the action of the liver from time to time by other laxatives in addition to guaiacum, as, for example, by euonymin and blue mass or calomel; while some patients find it advisable to use either the compound licorice powder, or the confection of sulphur, or the sulphur lozenge, to obtain greater regularity of action, since the general tendency is toward constipation.

Moderate diuresis should be promoted by the free use of diluents, and of these the most satisfactory is water, which should be taken both on retiring to rest and on first rising. Some patients prefer to take warm or rather hot water, and maintain that it not only causes less disturbance of digestion, but even promotes digestion, if taken almost as hot as it can be tolerated after meals. I am convinced that much harm has been done to the digestive organs by the drinking of water at too high a temperature, though at a moderate temperature beneficial results may ensue. Those with a gouty diathesis may find that the water is more readily taken if about a third of its bulk of cold milk is added, and this mixture taken at night will often promote sleep and break the habit of taking stimulants before bedtime.

With the view of obtaining greater diuretic action and of diminishing the risk of the deposition of the biurate, it is advisable to reduce the acidity of the urine, or even to render it slightly alkaline by the liberal employment of vegetable foods and the occasional use of potassium citrate or potassium acetate. Some observers recommend the free use of alkaline mineral waters. On theoretical grounds, those which owe their alkalinity to the presence of sodium

compounds should be avoided, as they might possibly favor the formation of sodium biurate.

On a previous page reference has already been made to the observations of Mordhorst (*see* Acute Rheumatism), who considers that gout and rheumatism are intimately connected, gout depending upon the deposition of crystals of sodium biurate, while rheumatism is due to the formation of granular urates. He maintains that sodium carbonate and bicarbonate, although they do not directly favor the solution of crystalline biurate, indirectly prevent its deposition by encouraging the oxidation of uric acid as it is formed, and he recommends the free use of the bicarbonate in the form of mineral waters containing carbonic acid and common salt, and as free as possible from lime. It may be added that Mordhorst believes that part of the uric acid formed is at once excreted by the kidneys, part is oxidized and thus destroyed, and part, again, may be held back and stored in the tissues.

The chief feature in the dietary of those with gouty tendencies is the avoidance of excess of any kind. The diet should be light and easily digested, and it should contain only a small proportion of proteid matter, whether this be animal or vegetable. Owing to the relatively large amount of proteid material it contains, meat is to be taken sparingly, and it is best reserved for a single meal, preferably luncheon rather than dinner. Green vegetables are of distinct advantage in the treatment of gout, and of these the most beneficial are spinach and Brussels sprouts. The former may be obtained at almost any time of the year, since the carefully dried spinach does not appear to lose any of its advantages if properly cooked.

While encouraging moderation, it is not advisable to reduce the amount of food to such an extent that the patient always has a sense of hunger and craving. By judicious management and by frequent changes, toleration of the privations can be established.

The chief articles which have to be avoided are alcoholic drinks, more particularly those which contain a relatively large proportion of sugar, such as sweet wines, together with the various forms of ales or stout.

In general terms it may be stated that it is well to avoid the use of sugar in any form, and also of pastry; both of these are apt to disturb digestion, which is rarely good in gouty individuals. For the same reason it is advisable to forbid the use of salt meats and of smoked and dried fish. The rule as to the abstinence from alcohol

must sometimes be broken when the circulation is weak and also when the appetite and digestion in old people appear to be better when a moderate supply of good whiskey well diluted is administered toward the end of the meal.

It must be admitted, however, that it is impossible to lay down any definite rule for the diet of gouty patients, since in some individuals attacks appear to be warded off by various articles which in others distinctly favor the onset of an acute attack ; thus, for example, some individuals are distinctly more free from pain when taking champagne—a wine which commonly favors chronic or sub-acute attacks.

In general it is well to encourage habits of activity ; moderate exercise in the open air is distinctly of advantage, and it appears frequently to reduce pain and to some extent to diminish the swelling around the joints. Some discretion, however, must be used in the form of exercise recommended, since the influence of gout upon the cardiac walls cannot be ignored. Shortly after an attack of acute gout, passive movements and massage should be employed, but the greatest tenderness must be used in these processes, since with any undue violence, particularly at an early date, there is strong probability of inducing further deposits.

When the joint remains swollen, benefit sometimes results from the use of liniment of camphor, or of potassium iodide with soap liniment.

For the treatment of gouty deposits and deformities many of the foreign thermal springs and baths have been recommended, as, for example, Wildbad, Gastein, and Aix-les-Bains ; in England, Bath or Buxton ; or, in the United States, the Hot Springs of Arkansas. Much benefit is undoubtedly due to warmth, to massage, and to the passive movements which are employed ; but, in all probability, the warm water which is taken internally plays a large part in the relief of the symptoms, acting both as solvent and eliminant. The use of baths is distinctly contraindicated, however, during an acute attack, and also at all times for those patients who suffer from weakness of the circulation or who are enfeebled by age. As in other joint affections marked by thickening and immobility, the local application of hot air, as in the Tallerman or Dowsing process, has been strongly recommended. In true gout, however, this treatment appears to be of less service than in rheumatoid arthritis.

Metastatic Gout. Metastatic gout is a form which occasionally follows the sudden arrest of an acute attack of gout, and in this

affection the symptoms may be either gastro-intestinal, or cardiac, or cerebral. The gastro-intestinal type is marked by vomiting, severe abdominal pain, and palpitation; the cardiac by pain referred to the region of the heart, with palpitation and tendency to fainting; the cerebral by irregular cerebral symptoms, of which the most important are those connected with apoplexy or with inflammation of the meninges. Should any of these indications follow the sudden arrest of an acute attack, it is, as a rule, desirable to attempt to reproduce the articular affection by hot applications over the joint which was originally attacked, the action being sometimes favored by hot mustard and water. The various forms of metastatic gout require suitable treatment. Thus the gastro-intestinal calls for the administration of gastric sedatives, such as hydrocyanic acid and salts of bismuth. The cardiac form requires the administration of digitalis or strophanthus, while for the relief of angina, amyl nitrite may be given as an inhalation, or the solution of trinitrin may be employed internally. For the cerebral symptoms the treatment must depend upon their nature. With indications of hemiplegia, or of inflammatory action in the meninges, moderate venesection may be performed, or leeches may be applied over the mastoid region or the temples; and in the cerebral affection it is also frequently desirable to insure the free evacuation of the bowel, either by croton oil or by calomel, if the patient is sufficiently conscious for the latter to be taken.

The Treatment of Irregular Symptoms Referable to Gout.

In gouty individuals numerous symptoms may arise which are undoubtedly referable to gout. These may affect (1) the alimentary tract, (2) the air passages and lungs, (3) the heart and vessels, (4) the nervous system, (5) the genito-urinary system, and (6) the skin, while the disease is undoubtedly intimately connected with glycosuria and diabetes. Many of the irregular types of gout must be treated on general principles, though the form of gouty dyspepsia, which is often of a prolonged and obstinate character, may be reduced at least in duration if, in addition to the ordinary gastric sedatives, some distinct treatment for gout is simultaneously adopted, as, for example, the administration of colchicum, of guaiacum, or of potassium iodide. Similarly with regard to the asthmatic and bronchitic attacks, although expectorants may be of some service, the use of potassium iodide is still more beneficial. The two chief cardiac symptoms are palpitation, with perhaps irregular action, and a

tendency to anginal attacks. Both entail rest and the use of a mercurial purgative, followed by magnesium sulphate. The irregularity, however, calls for the administration of digitalis, and strychnine; in some cases the latter drug may be used alone when there is much evidence of nervousness. The angina attacks may to some extent be controlled by nitroglycerin and amyl nitrite, but in general they call for the employment of potassium iodide in fairly large dose. When these attacks persist, however, it is well to employ colchicum or guaiacum. Some of the forms of gout which affect the nervous system, such as migraine, neuralgia, neuritis, and sciatica, will require separate detailed consideration, since in some instances these nervous symptoms may be referable to other conditions. Notwithstanding the intimate connection between gout and a gouty kidney, it is in these cases almost impossible to influence the kidney beneficially in any other way than by diminishing the frequency with which it is irritated by gouty attacks.

The most tiresome of all skin affections connected with gout is eczema. This often recurs annually, and in old people the condition may be almost always present. This form of eczema is most common upon the face and forehead, in the flexures of the joints, and around the scrotum and prepuce, or the vulva. Frequently gouty eczema is replaced from time to time by prurigo and pruritus, which generally affect the same situations, and may lead to much excoriation. Even when the skin appears to be perfectly free from irritation, complaint may be made of stabbing or pricking pains, which are followed by intense itching. The treatment of these conditions involves not only the ordinary local applications suitable to eczema, but also the constitutional treatment required by gout. It is often found that gouty eczema appears to originate from excesses in diet with regard not only to alcohol but more particularly to sugar. Abstinence from alcohol and a non-saccharine diet are essentials in the treatment of gouty eczema. Although, in general, it is desirable to avoid much moisture over eczematous surfaces, marked benefit frequently results from the occasional use of alkaline or of bran baths, and the bran bath may be rendered more pleasant if the bran is previously impregnated with eucalyptus oil or some other fragrant material. Such baths may be employed once or twice a week, according to the extent and severity of the eczema, and subsequently the surface should be lubricated with a soothing application, such as may be prepared from zinc oxide and liquid petroleum; this may

be lightly applied over the irritated surface with a large brush. The pruritus and prurigo may be controlled to some extent by the same applications, although in severe cases greater benefit results from the employment of a solution consisting of laudanum, the solution of lead subacetate, and rose water.

Saline purgatives are frequently beneficial in this form of eczema, which is certainly rendered worse if, through inattention, the patient is allowed to become constipated.

When gouty eczema is very obstinate it may frequently be relieved by the use of sulphur waters, which may be taken internally as well as used as baths. With this object many individuals with gout resort to Harrogate, Strathpeffer, or Llandrindod, where the sulphur springs are cold, or they go to Aix-les-Bains, Aix-la-Chapelle, Bagnères-de-Luchon, and other spas, where the water is warm or hot. In the United States patients may be sent to the hot or cold sulphur springs of Virginia.

Other skin affections—such as herpes, psoriasis, urticaria, or carbuncles—are occasionally found in connection with gout. These conditions rarely call for local treatment, though they necessitate the use of colchicum, of guaiacum, or of alkalies, and also the occasional employment of magnesium sulphate.

With regard to glycosuria and diabetes, which occur with gout, these are, as a rule, rather late symptoms, and rarely give rise to very much constitutional disturbance, though they may both favor the onset of eczema or of prurigo. The glycosuria may ordinarily be readily checked by modifications of diet, which indeed are also most desirable on account of the gout, with which the glycosuria is associated. This symptom frequently occurs in old people in whom it is somewhat hazardous to enforce any great change in their ordinary dietary, and it is then rarely wise to adopt the strict regimen necessitated by diabetes when it arises in young adults. Usually it is sufficient to insist on discontinuance of sugar, and to reduce the amount of carbohydrates taken, rather than to attempt to discontinue their employment. These patients often do well when allowed to take moderate quantities of well-toasted bread, while they fail rapidly if bread is withheld and some form of gluten substituted. Direct medicinal treatment is rarely required to influence the amount of water or sugar passed, but there is advantage in the occasional use of some mild hepatic stimulant, such as a mercurial pill with euonymin, while the customary treatment for chronic gout may be beneficial.

There is one symptom in connection with gout which scarcely belongs to any of the above headings, but is one which is familiar to all who suffer from gout, and perhaps still more obvious to their friends. This symptom is irritability and uncertain bursts of temper on slight provocation. This symptom, which is perhaps most commonly seen with gouty glycosuria, may often be controlled by the administration of from 10 to 20 grains, or more, of potassium bromide with the same proportions of potassium bicarbonate. The former perhaps renders the patient less sensible to external irritation, while the latter to some extent may favor the removal of the underlying cause.

In the selection of the various mineral waters for the different forms of gout, reference to the following table, which is included in Dr. Luff's book on *Gout, its Pathology and Treatment*, will undoubtedly be of service :

Object of taking the water.	The waters best suited for the purpose.
Absorption of gouty deposits from the joints and tissues.	Aix-les-Bains, Bath, Burton, Contrexéville, Gastein, Pfäfers, Strathpeffer, Teplitz, Vittel, Wildbad.
Treatment of gouty dyspepsia.	Brides-les-Bains, Carlsbad, Ems, Homburg, Kissingen, Neuenahr, Royat, Vals, Vichy, Wiesbaden.
Treatment of gouty congestion and torpor of the liver, and of gastro-intestinal catarrh and torpor.	Baden-Baden, Bourbonne, Carlsbad, Cheltenham, Contrexéville, Harrogate, Homburg, Kissingen, Leamington, Llandrindod, Marienbad, Neuenahr, Tarasp-Schuls, Vals, Vichy, Vittel, Wiesbaden.
Treatment of gouty affections of the respiratory organs.	Ems, Royat.
Treatment of gouty glycosuria and diabetes.	Carlsbad, Contrexéville, Kissingen, Leamington, Llandrindod, Marienbad, Neuenahr, Vals, Vichy, Vittel.
Treatment of gouty skin affections.	Sulphur waters and baths.

Osteo-arthritis. This condition has received various names, though the above is perhaps the one which is least open to objection. It has been termed rheumatic gout, even though its connection with either rheumatism or gout appears to be entirely fallacious. It is also known as arthritis deformans, from the characteristic alteration in the shape and structure of the affected joints. The amount of deformity and the consequent wasting of muscles from disuse are very marked features in this disease. The deformity is due, prima-

rily, to the formation of osteophytic growths, forming additional margins to the articular surfaces. As these develop they cause displacement of the normal axis of the limb, and they frequently lead to thickening of the fibrous structures around the joints, the combined result being to render movement painful and even impossible in advanced cases.

Even before the formation of osteophytes the cartilage which covers the ends of the articular surfaces becomes degenerated and eroded, and the ends of the bones become somewhat more dense and smooth and frequently enlarged independently of osteophytic growths.

The condition is commonest among females, and it assumes its most hopeless type when it occurs during adolescence or in early middle life. One feature which cannot be disregarded in connection with any system of treatment is the disturbance of rest resulting from pain. The pain of osteo-arthritis is generally worse at night-time, but during the day moderate movements are likely, even in the early stages of the malady, to lead to great pain. This disturbance of sleep inevitably causes depression of the general health, with loss of appetite, which lead to impaired nutrition, associated with various nervous symptoms which greatly increase the distress. Any course of treatment, therefore, must be calculated not only to relieve pain, but also to secure sleep and to improve the general health, for it is generally admitted that with impaired health the progress of this disease is more rapid.

The connection of osteo-arthritis with various forms of neuroses must not be overlooked, since undoubtedly there must be an intimate relation, not only with general mental disturbance, such as may arise in connection with anxiety or sorrow, but also with numerous forms of uterine or ovarian irregularities. Although the disease ordinarily affects a large number of joints, it commonly commences in the smaller ones, particularly those of the hands and feet; but in advanced cases much of the deformity is due to alterations in the shape and structure of the knees and elbows. Perhaps the greatest amount of pain and disturbance of health arises when the temporo-maxillary articulation is affected, the interference with nutrition and with sleep being very severe, since every movement causes agonizing pain. Happily, however, this joint is but rarely affected.

The above short account of this affection indicates its essentially chronic character and the general tendency to crippling and deform-

ity. Some observers consider that the disease is quite incurable, and, although this is perhaps too sweeping an assertion, it is certainly not much more erroneous than the sanguine claims that have been put forth on behalf of various special modes of treatment. Under judicious management the disease may, in a certain proportion of cases, be arrested, and the patient may gradually become accustomed to the altered anatomical forms, and may lead a useful life, with some impairment of movement.

To attain this result it is above all necessary, if possible, to ascertain and remove the cause; hence it is essential to make very careful inquiry as to the possible connection of the disease with any menstrual irregularity, which may perhaps be corrected, and also to treat the general health by the free use of alterative tonics. With this object various preparations of arsenic are frequently employed, either iron arsenate ($\frac{1}{16}$ to $\frac{1}{4}$ grain) or the sodium arsenate ($\frac{1}{40}$ to $\frac{1}{10}$ grain), these being most conveniently administered as a pill in conjunction with ferrous sulphate, if there is marked tendency to anæmia. This pill should, of course, be administered after meals; if the patient experiences any difficulty in taking it, the sodium arsenate may be given in solution, with iron citrate, or with the syrup of ferrous iodide, or, if the digestion appears to suffer from the use of arsenic, the syrup of ferrous iodide, $\frac{1}{2}$ to 1 drachm, may be given with water three times a day. Although this drug is frequently of very great service, complaint is sometimes made of its somewhat persistent taste, which is due doubtless to the absorption of iodine and its gradual elimination by the salivary glands. I have known instances where this resulted in some impairment of appetite, so that the drug had to be discontinued, even though the more common indications of iodism had not been produced.

When there is evening rise of temperature, together with some slight night-sweats, quinine is often of service. A grain or a grain and a half of quinine may be added to the iron arsenate, or it may be given in solution together with diluted sulphuric acid, or in pill form with extract of *nux vomica*, or strychnine hydrochlorate and extract of belladonna. Ordinarily, under this treatment the appetite improves and temperature falls.

When there are marked indications of debility, cod-liver oil may be of service. Indeed, many observers consider that they obtain better results from the steady employment of this drug than from any other form of medication. It is well to commence the admin-

istration with small doses, given after meals or before bedtime, and gradually to increase the amount as toleration becomes established. Since, however, it is of the first importance not to interfere with digestion, care must be taken not to press the use of cod-liver oil when it excites great repugnance.

During the early stages of the disease it is of considerable importance to counteract the tendency to constipation, and the most serviceable laxative is sulphur, which should be taken in comparatively large doses. The confection of sulphur (the composition of which is as follows: sublimed sulphur, $\mathfrak{z}\text{iv}$; potassium bitartrate, $\mathfrak{z}\text{j}$; powdered tragacanth, gr. xviii; syrup, $\mathfrak{z}\text{ij}$; tincture of orange peel, $\mathfrak{z}\text{ss}$, and glycerin, $\mathfrak{z}\text{jss}$) may be administered night after night; but in general it is found that preference is expressed for the repeated use of the sulphur lozenge (the composition of which is as follows: precipitated sulphur, gr. v; potassium bitartrate, gr. j; sugar, gr. viii; powdered acacia, gr. j; tincture of orange peel, $\mathfrak{m}\text{j}$; tincture of acacia, $\mathfrak{m}\text{j}$), two or three of which should be taken at bedtime. The compound licorice powder is perhaps of less service, since the laxative action is to some extent dependent upon senna, and, therefore, the amount of sulphur that can be taken conveniently is more limited.

The local treatment is perhaps of almost equal importance with the medicinal, but the amount of benefit that results cannot be gauged with any certainty. At the present time reports from different observers are somewhat conflicting. During the last few years much has been said of the value of hot, dry air applied locally, and numerous devices have been provided by which a current of hot air may be made to circulate around the affected limb. This treatment involves the use of a special form of apparatus, such as is employed in the Tallerman treatment, or in the Phillips patent hot-air bath, in which the temperature within the chamber can be raised to 300° or 350° F. The part to which the heat is to be applied is wrapped in lint or towels and placed within the centre of the chamber, supported on straps, so that it shall not come into actual contact with any portion of the walls. The stove then being lighted the temperature of the chamber rises rapidly, and the hot, dry current of air causes no discomfort when the skin perspires freely. Ordinarily during the use of the hot-air bath this result speedily follows, and the patient's temperature may even rise slightly. The bath is usually employed for an hour at a time, and its use is repeated every second or third day.

There is much evidence to show that in early conditions of osteo-arthritis these hot applications will lead to increased mobility ; but in advanced cases, when there is much destruction of tissue or much osteophytic growth, comparatively little benefit ensues.

Massage is another form of treatment that has given rise to conflicting statements. In some instances, when the loss of power has resulted from disuse on account of pain, massage has been of very great service after the stationary stage has been reached—that is, the massage of the degenerated muscles has caused them to resume a more normal tone and strength, and has thus enabled movements once more to be effected. Independently of this, however, massage, if performed with care and moderation, may cause some improvement by promoting the circulation through the affected joints, and this may promote the absorption of inflammatory thickenings, although it is powerless to affect osteophytic growths or degeneration of cartilage.

The combination of massage with the use of hot baths is now carried out at many of the hospitals and balneological establishments, and in some cases with considerable benefit. Many patients go to Aix-les-Bains with this object, and under the combined influence of massage, of baths, and of the somewhat hot and close air of the valley they may experience some relief. At Aix-les-Bains the baths are warm, and the massage is effected by a couple of attendants during the flow of a continuous stream of warm water over the part upon which they are operating ; after the bath the patient is quickly dried, enveloped in blankets, taken back to the hotel, and allowed to sleep for an hour or more.

I have known some few cases of osteo-arthritis in which this form of treatment has given surprisingly beneficial results, but I have also known many who have derived no advantage. Even when it is inconvenient or impossible for the patient to undertake the journey to Aix-les-Bains, some good may be done by daily sponging the affected limbs with warm water, and by subsequently employing gentle friction, so as to promote circulation.

As in many other conditions leading to impaired mobility of the limbs, more violent measures have frequently been adopted, such as the application of the actual cautery or of Paquelin's cautery. These, by promoting counter-irritation, may occasionally reduce the inflammatory thickening and may establish a more healthy normal circulation ; but in the large majority of cases the use of the cautery,

or of iodine, or of blisters, serves no good purpose when the disease has reached an advanced stage.

Similarly, the employment of electric currents has given rise to conflicting statements. The benefit that arises is chiefly seen in the early stages of the disease, while perhaps the improvement is to some extent due to the restoration of muscular tone. But in a disease which is so chronic and, as a rule, so hopeless, these and other forms of stimulation of the affected part will necessarily demand trial.

In the early stages, when the hands and the wrists alone are involved, I have seen much benefit follow the application of iodine, with repeated gentle, passive movement. Similar benefit sometimes follows the application of various stimulating ointments or liniments, particularly those containing iodine. The ointment of cadmium iodide, which was formerly official, has occasionally appeared to give much relief, though sometimes it has caused blistering. Potassium iodide with soap liniment and the ointment of lead iodide are perhaps more frequently used when objection is made to the discoloration produced by the liniments with iodine.

In conclusion, it may once more be emphatically repeated that, notwithstanding the occasional value of any of the above local measures, it is of the highest importance to pay due regard to the constitutional condition and the mental depression from which these patients so commonly suffer. Doubtless a large part of the benefit attributed to residence at Aix-les-Bains, at Gagatz, or at Wildbad is to be ascribed to the cheering influence of foreign residence in bright, sunny surroundings. Any form of treatment that ignores the constitutional condition is foredoomed to failure.

CHAPTER XXV.

CONSTITUTIONAL DISEASES—*Continued.*

Rickets—Scurvy—Purpura—Hæmophilia—Diabetes Insipidus—Diabetes Mellitus.

Rickets. This is essentially a disease of early childhood, the chief symptoms commencing gradually about the time of dentition ; but the results of the disease, apart from actual deformity, may increase the tendency to other diseases or may even give a serious aspect to otherwise simple complaints. The conditions under which the disease arises are probably not the same for every case, though, in my opinion, for the great majority the disease undoubtedly frequently takes its origin in the too early employment of starchy foods combined with deficient use of milk, whether the feeding of the infant is undertaken by the mother or whether the child is being brought up by hand. Even with improper diet, however, the tendency to the disease is increased very greatly by imperfect ventilation and by lack of direct sunlight. Children who live in poor districts are more often the subjects of rickets when they occupy rooms below the level of the ground.

To some extent syphilis appears to promote the liability to this complaint, but, independently of any evidence of hereditary taint, the tendency is increased when the child commences life in an impoverished condition, owing, possibly, to maternal illnesses of any kind during the pregnancy, to attempt to nurse a baby during the existence of pregnancy, to the exhaustion of the maternal strength, due to an abnormally large family or to a too rapid succession of pregnancies.

To some extent, therefore, this disease is to be controlled by what has been aptly termed antenatal therapeutics, which in this instance merely means the adoption of measures concerning the health of the mother which will minimize the tendency to the development of rickets. From what has been said, this would involve the discontinuance of nursing so soon as pregnancy has been recognized, and the other conditions that have been mentioned should entail the employment of tonic remedies, of an increased liberality of diet,

and, if practicable, open-air exercise and modifications of work ; in short, the measures should be those which will, so far as possible, contribute to the health of the mother and thus to the probable health of the child.

It must not be assumed, however, that in every case rickets is dependent upon influences impressed upon the infant prior to its birth, since even when, in the nursing phraseology, it has been "a fine baby born," it may subsequently suffer from rickets if the mother is attempting to nurse it when she herself is in an imperfect condition of health. This is likely to favor too great frequency of nursing, and when the child is still dissatisfied it will almost inevitably lead to the employment of some additional form of food, which is unfortunately too often of a starchy nature, from a dread of the "two milks disagreeing."

Although the well being of the child is largely dependent on the length of time during which the infant can receive its natural maternal nourishment, it is better, when it does not thrive, to employ some form of milk alternately with the maternal nourishment than to resort to any of the patent starchy foods which are so often used with or without milk. If, in spite of this, the child still remains unsatisfied, it may be necessary to discontinue the maternal supply entirely and to have recourse either to a wet-nurse, or, preferably, to feeding the infant entirely upon a suitably prepared milk, deferring the use of any form of starchy food until some teeth have made their appearance. By the adoption of this principle of dietary the liability to this disease may often be warded off, especially if the infant can be kept under hygienic conditions necessarily involving an abundance of fresh air and the utmost regularity and tenderness of treatment.

In spite of warnings, however, and in spite of repeated advice, fundamental errors are often continued until the child is brought up for treatment, the chief cause of complaint usually being undue restlessness or peevishness. On the other hand, complaint is sometimes made that the child's head perspires very freely, or, with older children, who are able to sit up, it may be asserted that the back is growing out, or that the child is unduly late in walking, or that the teeth are very late in appearing, and any of these assertions may furnish an indication for further examination of the child and for the recognition of this disease. The chief characteristics of rickets are enlargements of the wrists and ankles, enlargements at the junctions

of the ribs with the costal cartilages, forming the well-known rosary, an abnormally patent fontanelle, and, in extreme cases, a disproportion between the expanded cranial bones and the small facial development.

In addition to the above characteristics, the tendency to repeated bronchial attacks may be noted and also the liability to attacks of laryngismus stridulus, which may almost be regarded as a complication of this disease. It is perhaps scarcely necessary to say that the maternal theory of the nature of the complaint should never be adopted without very careful examination of the child and inquiry of the way in which it is being nourished; thus, for example, it is frequently of very little use in these cases to treat the bronchial trouble without reference to rickets. With regard to feeding, it will often be found that the use of milk has been discontinued too early, owing to its improper administration, and it must be remembered that non-digestion of milk and impoverished nutrition may result from the employment of milk either in too dilute or in too concentrated a form. When given too diluted, the child ordinarily fails to thrive, and accordingly some additional nourishment is probably employed; on the other hand, if given unduly concentrated, with regard to the age of the child, the milk is extremely apt to be rejected as undigested curd, and again impairment of nutrition must ensue.

For the first few weeks of life the milk may require to be diluted with from two-thirds to half its bulk of boiling water, and to this should be added some sugar of milk, which is to be dissolved in the boiling water previously to its addition to the milk. If the child thrives, the amount of milk should be gradually increased until by the time it is some two or three months old it is taking two parts of milk to one of boiling water, and at the fourth or fifth month the water may still further be reduced to one-quarter of the bulk of the milk.

When using cow's milk it is commonly advisable to add sufficient lime water to render the mixture slightly alkaline. When endeavoring to rear a rachitic child in this way, it is important to feed it at regular intervals of from two and a half to three hours, according to the age of the child, the shorter period being commonly adopted during the first few weeks of life. Too frequent feeding is likely to favor vomiting and perhaps diarrhœa, conditions which may often involve various modifications of diet, such as the employment of

humanized milk or of peptonized milk, or even a discontinuance of milk and the substitution of some form of meat juice. These changes may be required by special symptoms, but they do not essentially belong to a consideration of the treatment of rickets, and, therefore, it is perhaps unnecessary to enter into their detailed consideration here.

The treatment of this disease should include attention to the clothing of the infant, since the tendency to free perspiration will to some extent induce the development of bronchial trouble. The clothing, therefore, should be warm and light, and a broad flannel binder should be wrapped around the abdomen. The liability to chills should be further diminished by the repeated use of a warm bath, which will favor a more healthy condition of the skin.

In addition, the importance of fresh air must be impressed upon those having charge of the infant. Rhachitic children, when warmly clad, do far better with an abundance of fresh air, although the tendency to bronchial troubles naturally leads to some dread of exposure.

The form of medicinal treatment adopted must depend upon the age of the child and upon the more prominent symptoms. If free from diarrhoea, great advantage will be found in the use of cod-liver oil, which is, as a rule, readily taken, and, except in hot weather, does not commonly favor diarrhoea. Although the nourishment improves considerably during the use of cod-liver oil, the formation of bone frequently requires the administration of other remedies. Children from twelve to eighteen months old improve rapidly when, in conjunction with cod-liver oil, syrup of ferrous phosphate (*British Pharmacopœia*) is given twice or thrice daily in $\frac{1}{2}$ -drachm doses; while if there is much tendency to anæmia, or if the child exhibits a marked lack of vitality, great benefit may ensue from the administration of $\frac{1}{2}$ -drachm doses of the vinum ferri in conjunction with the same quantity of cod-liver oil. Although there may be no history and no suspicion of syphilis, greater benefit sometimes results from similar doses of syrup of ferrous iodide; but the employment of this drug demands watchfulness, since it is sometimes liable to interfere with appetite, owing doubtless to the elimination of iodine by the salivary glands. Other forms of phosphates have frequently been used for older children, and the administration of phosphorus dissolved in olive oil has even been recommended. This remedy, however, is somewhat difficult to employ, and it appears to possess no advantages over the phosphates or hypophosphites.

It is extremely difficult in advanced cases of rickets to avoid deformities ; in fact, deformities, such as bending of the tibiæ or of the forearms, have sometimes developed in an exaggerated form even before advice has been sought. The tendency to the production of deformities is frequently favored by injudicious attempts to hasten the use of the limbs when the bones are still in a weak, pliant condition. In extreme cases of rickets it is advisable to keep the child entirely in the recumbent posture, so as to diminish not only these deformities, but also the liability to curvature of the spine, with consequent deformity of the chest wall—a condition which greatly adds to the dangers of any intercurrent pulmonary attack, such as bronchitis, pneumonia, or whooping-cough. Even in milder cases it is not advisable that the child should be encouraged to attempt to walk or be permitted to drag itself about on the floor resting the greater part of its weight on its wrists. This mode of progression frequently precedes walking in healthy children, and then does no harm, but with rhachitic children it will certainly favor the production of deformity.

With regard to special symptoms arising in the course of the disease, the undue perspiration of the head may often be checked by keeping the hair short and by occasionally sponging the head with dilute acid solutions ; but this symptom is one which involves no risk, and merely furnishes an indication of the nature of the affection

Reference has already been made to the digestive complications of rickets. Of these, vomiting and diarrhœa are perhaps the most important, but they constitute indications rather of improper feeding than of the disease, and their appropriate treatment has already been indicated in the foregoing pages. Of the pulmonary complications, bronchitis is perhaps the most common, and although it may call for the employment of expectorants, it is usually largely controlled by the tonic forms of treatment adopted for rickets. When whooping-cough develops in a patient with a markedly rhachitic chest, although some benefit will follow from the use of cod-liver oil and other tonic remedies, the tendency to collapse of the lung and the dangers of pneumonia must be borne in mind. In many of these cases it is necessary to employ oxygen, since the power of oxygenation is greatly reduced by the difficulty of performing efficient movements of the thorax. When symptoms of laryngismus stridulus arise they call for the free use not only of cod-liver oil, but also of potas-

sium bromide, the combined influence of these drugs commonly affording far greater relief than when either of them is used singly, even in comparatively large doses.

Scurvy. Scurvy has been comparatively rarely seen since its dependence upon unsuitable food with the absence of vegetable acids has been recognized. It is marked by great debility and anæmia, and the prominent symptoms consist of a spongy condition of the gums, with a great liability to hemorrhage. Formerly it frequently arose among sailors and others whose diet was defective, and it is even still fairly frequent among children fed upon improper forms of food who are the subjects of rickets. In children the tendency to hemorrhage is well marked, but the disease is mainly characterized by the alteration of the gums and by the well-known deformities of rickets, with perhaps some œdema of the extremities; in addition to hemorrhages from the gums, hæmaturia has been mentioned as a frequent symptom.

The treatment of scurvy consists primarily in the correction of errors of diet, and this indication is readily followed in children; but it is somewhat more difficult among sailors to provide for the use of fresh fruits or vegetables, such as cabbage, potatoes, watercress, and lettuce, which should, when possible, form essential constituents of the diet. To make up for this deficiency, it is customary to employ fairly large doses of lemon juice, and the ships in the merchant service are now compelled to carry lime juice, even when it is possible to obtain fresh lemons. The juice of two or three lemons should be used daily when they can be procured, but, in addition, it is well to insure the use of a varied form of diet.

The above measures may ordinarily be trusted to curtail the duration of scurvy, but special symptoms frequently call for treatment. The tenderness of the gums and the liability to hemorrhage indicate the advisability of employing astringent applications, such as tincture of krameria. This may be used alone or may be combined with tincture of catechu. In the milder forms, if available, the catechu lozenge is of some service; but it is usually desirable to employ stronger preparations, to diminish the pain rapidly and also the liability to hemorrhage.

When the tenderness continues in spite of these remedies the gums may be touched with silver nitrate, especially if ulcers are found on the gums or on the mucous membrane of the mouth. With mild forms of ulceration, however, the astringent action of

lemon juice is often of considerable service for its local as well as for its general action.

The condition of the gums frequently causes considerable fetor, for the relief of which the following measures are indicated. Dilute solutions of potassium chlorate may be employed as gargles and as mouth-washes, and this drug appears to possess some influence to stimulate healing, in addition to its effect in controlling the fetor. The official solution of potassium permanganate is also frequently employed with the same object, and acts, in all probability, by its power of arresting the development of organisms upon the spongy gums. When the fetor is peculiarly unpleasant and resists these milder forms of treatment, it will be desirable to correct it by inhalations of chlorine and by the local application of a solution of chlorine. A solution of iodine is often used instead of chlorine when it is desired to produce the local effects within the mouth, and it has the advantage of being somewhat less distasteful. To some extent also the fetor may be controlled by the use of a solution of alum, which is in addition of considerable service on account of its astringent action.

Another symptom which will frequently cause much discomfort is the reflex salivation resulting from the tenderness of the gums. When this leads to a more profuse flow of saliva, preparations of belladonna or of atropine may be employed internally for their special action on the salivary glands. Gastric symptoms may also frequently be met with in association with this disease; they may result either from the dietary, which has formed the starting-point of the disease, or from the injudicious employment of strong astringents.

The tendency to dyspeptic symptoms or even to vomiting indicates the need for modifications of diet, which are necessitated also by the impossibility of mastication. The diet, therefore, in severe cases should consist largely of liquids, strong forms of soup or broth containing well-boiled vegetable material being frequently of considerable service; unless the boiling, however, has been very efficient, straining will be necessary before administration. Should the gastric symptoms afford distinct evidence of gastritis, this condition must be dealt with on the principles already indicated—that is, by the administration of gastric sedatives, such as compounds of bismuth, together with small quantities of opium or diluted hydrocyanic acid.

Apart from hemorrhage of the gums, it is comparatively rare to meet with hemorrhages from other mucous membranes. Should these arise, however, they will afford indications for the employment of extract of ergot, hypodermatically or by the mouth, and, as in various forms of purpura, the administration of preparations of hamamelis may also be required.

During convalescence the weakened condition of the patient forms the chief cause for anxiety. Various tonics, therefore, more particularly astringent forms of iron, will be of service, and restoration of strength may be further assisted by the use of small repeated doses of quinine. When the weakness is very severe the shrunken condition of the muscles will render a course of massage extremely desirable.

Purpura. Purpura is a convenient name for the appearance of extravasations of blood into the skin. Though these vary greatly in size, they are all when first formed of a bright red color, which subsequently becomes darker and gradually fades. These extravasations are characterized by their persistence under pressure.

Purpura is not really a disease, but a symptom which occurs in the course of numerous diseases, and inasmuch as the treatment must necessarily depend upon the cause, it will be well to enumerate briefly the varieties of purpura. It occurs in three distinct forms—symptomatic, arthritic, and hemorrhagic.

The symptomatic may be divided as follows :

A. Infectious, as, for example, in connection with pyæmia, septicæmia, and malignant endocarditis. The rashes of some specific fevers—such as measles, scarlet fever, and smallpox—may be associated with a purpuric rash.

B. Toxic. This form may result from the use of various medicines, such as iodides, mercury, ergot, belladonna, and, more rarely, quinine. The well-known copaiba rash must also be included in this series. Toxic purpura may also follow after snake-bites and jaundice.

C. Cachectic. This is the most common variety of purpura, and may occur during the course of any prolonged wasting disease, as in advanced cases of carcinoma, tuberculosis, and Bright's disease. It is more frequently developed among patients who are, in addition, weakened by age ; but even in infants the bright purpuric spots may result from malnutrition, especially if associated with severe diarrhœa.

D. Mechanical. In this class the extravasations are merely due

to temporary over-distention of the vessels, as, for example, during the course of whooping-cough or of epilepsy.

E. Neurotic. This form may be associated with different varieties of myelitis, and also with hysteria in some rare but well-marked instances.

The arthritic form of purpura is most commonly believed to be of rheumatic type. Different varieties of arthritic purpura have been described under the names of purpura simplex and peliosis rheumatica, the latter also furnishing occasional examples of purpura urticans and of pemphigoid purpura.

Purpura hemorrhagica is characterized by hemorrhages from the mucous membranes, and includes the most severe type of this condition, since both the cutaneous hemorrhages and those from the mucous membranes may be very extreme, and indeed may cause death.

With regard to the treatment, from what has been said this must differ greatly, both with the cause and with the severity of the affection. In the mildest forms it is not essential that the patient should be kept in bed, unless this is necessitated by the associated disease; but, on the other hand, with hemorrhagic forms, and frequently when the purpuric eruption is largely developed, it will be safer to keep the patient in bed and to see that the clothing is moderately warm.

Similarly, the dietary of the patient will only require special modifications if the condition is characterized by tendency to hemorrhages from mucous membranes, when the diet should be nutritious and readily digested. When hemorrhages have already occurred it will be advisable to employ a liquid diet, but when the purpura arises in connection with extreme weakness the diet must be adapted to meet this indication. In hemorrhagic cases it is advisable that the liquid should be cold, as the tendency to hemorrhage may, to some extent, be diminished by the repeated use of iced drinks. In these cases, also, it will be well to employ opium somewhat freely, unless the age of the patient contraindicates its use. In adults opium serves to quiet the movements of the stomach and intestine, and, therefore, diminishes the risks of further hemorrhage.

The condition of the intestine always demands attention, even in the simpler forms of purpura, since it is essential to avoid both constipation and diarrhœa, and, accordingly, suitable remedies must be employed when specially indicated.

In dealing with purpura it should be remembered that greater benefit results from the adoption of remedies calculated to improve

the general condition of the health than from those special drugs intended to control further hemorrhage. It is frequently recommended that strychnine and quinine should be reserved for convalescence, but they appear to be very beneficial at almost every stage of this condition, and to afford greater prospects of improvement than can be obtained from the use of the various astringents. Exception must perhaps be made in favor of arsenic, which can be administered with advantage in conjunction with some form of iron; but, although the latter remedy certainly possesses astringent properties, the tonic influence of arsenic is probably of greater service under these circumstances.

Various astringents are, however, frequently used, as, for example, diluted sulphuric acid or aromatic sulphuric acid. If desired these may be combined with quinine. Lead acetate is another astringent that is often of especial service in purpura with intestinal hemorrhage; it can conveniently be combined with opium in pill form. Tannic acid and gallic acid are also used in hemorrhage either from the stomach or intestine, but there is some fear lest they should produce considerable troublesome gastritis if employed too liberally.

Ergot and turpentine have both been recommended under similar circumstances. The former may be injected subcutaneously to control gastric or intestinal hemorrhage. The latter may be administered in small doses insufficient to produce purgation. Tincture of hamamelis has recently been strongly recommended under similar conditions, and although it appears to have some power of controlling intestinal or gastric hemorrhage, it possesses very little influence on the cutaneous hemorrhages.

It is obvious that when the origin of the disease can distinctly be traced to the use of some medicinal remedy, this should be discontinued.

In conclusion, it may be well to repeat that the various astringents or hæmostatics are only called for when there is hemorrhage from one or other of the mucous surfaces, and that this class of remedies is of no value in preventing the development of further crops of petechiæ. For the arrest of cutaneous hemorrhages it is far better to trust to the employment of tonic remedies and of hygienic measures.

Hæmophilia. This affection, like the foregoing, is characterized by tendency to hemorrhage, but the loss of blood may occur spontaneously or may result from trifling causes or injuries. It further

differs from purpura in the frequency with which it is associated with arthritic changes, but the principal point of distinction lies in its hereditary character, and it is interesting to note that the disease is most commonly transmitted through the mother.

Since the chief characteristic of hæmophilia is the occurrence of severe, and perhaps uncontrollable, hemorrhage after trifling injuries, the recognition of this tendency to bleeding calls for the utmost protective care and for the avoidance of even the mildest surgical operation, so far as practicable. Even after such mild operations as the extraction of teeth very persistent hemorrhage may occur. I have known a young man to continue to bleed for upward of twenty-four hours after the removal of a bicuspid tooth, the loss of blood being sufficient to cause fainting.

The first essential in treatment, should hemorrhage arise, is the adoption of the recumbent posture and the attempt to control the bleeding either by direct compression or by the application of various styptics. The treatment must to a great extent depend upon the site from which the hemorrhage is proceeding; thus, if it arises from the gums, it may perhaps be controlled by the application of ice, though this is extremely likely to cause considerable pain, or by the use of tannic or gallic acid, with which the cavity may be plugged. Frequently, however, greater advantage results from the employment of some liquid form of astringent; thus the cavity may be plugged with a little pledget of cotton-wool, which has previously been soaked in a solution of ferric subsulphate. The astringent effect of this drug, combined with pressure, may suffice to control the hemorrhage; but I have known the hemorrhage to recur so soon as the plug of cotton-wool was removed, and in one such case, when other astringents had failed, the bleeding was ultimately arrested by the action of brandy, which was held in the mouth over the bleeding site without the intervention of cotton-wool. The value of alcohol in the arrest of hemorrhage should be borne in mind, and this remedy has the further advantage of serving to counteract to some extent the cardiac weakness which may result from much loss of blood.

Epistaxis is another frequent form of hemorrhage in hæmophilia, and it may ensue in children after extremely slight injuries. This condition is sometimes relieved by the application of ice over the forehead, the nose, or the nape of the neck; but it frequently calls for the insufflation of tannic acid, gallic acid, or dried alum; should the hemorrhage continue in spite of these remedies, it may be neces-

sary to plug the anterior nares. It is, however, advisable to defer this operation if possible, since hemorrhage is likely to start afresh as soon as the plug is removed. In epistaxis the value of the recumbent posture is very marked. Indeed, it is often found that epistaxis only recommences when the patient attempts to sit up.

Constitutional treatment is generally required during an attack of hæmophilia. Various forms of iron or of arsenic may be used for their tonic influence, and the former has even been credited with the power of controlling hemorrhage to some extent. Recently, however, calcium chloride has been given internally to increase the coagulability of the blood, and as much as 20 grains have been given every four hours.

Those who suffer from hæmophilia frequently complain of pain connected with the larger joints. These pains generally have their origin in some slight injury, and they are commonly associated with some enlargement of the joint, and apparently with some effusion into the synovial cavity. This effusion, in all probability, is hemorrhagic. The pains of hæmophilia are often ascribed to rheumatism; but the antirheumatic treatment is absolutely powerless to control this form of arthritic pain, and when severe, the best results are to be obtained by checking all movements of the limb with a splint. For the elbow the employment of a splint of angular shape, of which the angle may be changed from time to time, has, in my experience, sufficed to enable a hæmophilic patient to continue his ordinary vocations, even though the joint was considerably enlarged. Occasionally still further relief may be obtained from the use of evaporating lotions, but the first essential is the fixation of the limb.

In conclusion, it may be mentioned that the loss of blood by hemorrhage has sometimes led to the employment of transfusion, but this operation has proved of very little service, and its performance has in some cases led to increased difficulty in controlling the bleeding at the site of operation. Since the hemorrhage of hæmophilia has been found to stop when fainting has been produced, this occurrence has sometimes been hastened intentionally by venesection; but this operation is also not to be recommended, since, although it may cause speedy fainting, it supplies a fresh site from which hemorrhage may recur when the circulation regains power.

Diabetes Insipidus. This curious disease is marked by the passage of immense quantities of urine of very low specific gravity. The urine is generally free from abnormalities, although traces of

sugar are occasionally to be found, and still more rarely albumin may be present. The condition is most frequent in connection with various nervous influences, though, as a rule, it does not appear that any distinct lesion is present, and indeed in the majority of cases no lesion can be found.

The symptoms may ensue after some injury or nerve shock, but in general the onset is gradual. The prominent symptoms are merely increased flow of urine, with thirst, and following this abnormal drainage of fluid from the system the skin is usually dry and harsh, and perspiration is excited with difficulty. This copious drainage of fluid does not appear to influence the general health to any great extent, though symptoms dependent upon a nervous cause may be present. Sometimes there may be considerable wasting, but ordinarily the appetite remains good, though not excessive, and the digestion scarcely suffers at all.

As the thirst and the increased excretion cause discomfort these symptoms call for treatment, which it must be admitted is usually by no means satisfactory, since, although some degree of success has been claimed for various remedies, these remedies are not invariably of service, and some cases appear to be cured spontaneously, independently of any form of treatment. Remembering the probability of the neurotic character of this disease, it is in general well to attempt to treat it through the nervous system. Modifications of diet do not appear to have any influence whatever, and although it is possible to reduce the amount of urine by diminishing the amount of liquid taken, this is ordinarily followed by so much distressing thirst that it is inexpedient to persist in this treatment. The drugs also, such as opium, morphine, and codeine, which in diabetes mellitus are so often found to diminish the urinary secretion, are of no service in this affection, and perhaps the greatest amount of success appears to have followed the administration of preparations of valerian. The ammoniated tincture of valerian may be given, in doses of from $\frac{1}{2}$ to 1 fluidrachm, but, on account of the unpleasant taste and disagreeable odor, many patients prefer to take the zinc valerianate, which can be best prescribed in doses of from 1 to 3 grains in pill form, since this salt is not only sparingly soluble, but is incompatible with many metallic salts and with most vegetable astringents. When the doses above mentioned do not appear to be followed by any beneficial results, the amount of both the tincture of valerian and of the zinc valerianate should be increased gradually. Osler recommends

that the dose of the latter should be raised by degrees to 15 and even to 30 grains three times a day.

With the object of allaying undue sensibility of the nervous system, preparations of belladonna have been recommended, and these may similarly be pushed until distinct physiological symptoms are produced. The range of dose is, however, much more limited with belladonna than with the zinc valerianate, and since this drug will produce dryness of the throat when employed in overdoses it is very liable to increase the patient's discomfort.

Upon somewhat theoretical grounds ergot and ergotin have been recommended, in the hope that they would be able to control the calibre of the renal vessels, and thus diminish the renal excretion. Among other drugs that have been mentioned are the following : turpentine, antipyrine, strychnine, and arsenic. Good results have also been claimed for the administration of potassium or ammonium bromide, and in idiopathic cases marked by an abnormal sensibility of the nervous system these drugs appear to be indicated rather than nervine tonics, such as arsenic or strychnine. Red mercuric iodide and potassium iodide have also been employed with, it is said, some degree of success. The application of a continuous current may often, however, be still more beneficial ; the poles should be placed respectively either over the loins and the nape of the neck, or one over the loins and the other over the front of the abdomen. It is said that the constant current, employed in the latter way, to the right and left kidney on alternate days has been frequently of considerable service. When the constitutional condition appears to be failing, benefit may result from a sea voyage, from residence at the seaside, and from other hygienic measures. On account of the continuous drain of fluid it is commonly advisable to employ warm clothing and to guard against sudden chills, while the general health should be maintained by a liberal diet, and, if necessary, by the administration of cod-liver oil.

Diabetes Mellitus. Diabetes mellitus is marked by an abnormal formation of sugar within the system and by its excretion in the urine. The amount of urine that is passed is very commonly increased with diabetes mellitus, and this increase may sometimes be very considerable, though at other times it is scarcely sufficient to attract attention, and the disease is only recognized by the occurrence of other symptoms. Prominent among the latter are increasing lassitude and sense of fatigue, increasing irritability and nervous-

ness, together with some slight lumbar pain. Frequently, also, there will be excessive appetite, and the excretion of sugar may be associated with irritation about the genital organs or even with eczema. In the course of the disease other symptoms may develop which will be noted hereafter.

The addition of sugar to the urine is invariably associated with a great increase in the specific gravity, though the specific gravity is liable to considerable alterations according to the amount of urine that is passed. Even when the amount of urine is greatly increased the specific gravity is still commonly much above the normal, while in those cases in which there is but little change in the amount of the urine the specific gravity may rise to 1040 or more. The alteration in the specific gravity of the urine is an indication of the amount of sugar that is being passed, but in estimating the results of any course of treatment it is important to measure accurately the daily quantity of water passed as well as to take the specific gravity of a twenty-four-hour specimen. The specific gravity will vary considerably during the day, according to the diet and according to the amount of liquid consumed, and isolated observations are, therefore, liable to lead to erroneous inferences.

Diabetes mellitus occurs in two principal forms: the first is met with among children and young adults, or even during middle life; the second is met with in old age. Of the two forms the first is by far the more important, and its treatment has to be conducted with the most rigid observance of the needful alterations in dietary. In old age, on the contrary, a fairly large amount of sugar may be passed without any very great interference with the general nutrition, and indeed it is often found that nutrition suffers far more from injudicious severity in rules of diet than from allowing the dietary to remain unaltered. In considering the treatment of this disease, therefore, it is necessary to speak of the dietetic and of the medicinal treatment, as well as to indicate modifications necessitated by the special conditions of the individual. Moreover, it will be necessary to add a short consideration of the treatment of special symptoms which may arise in the course of the disease.

With regard to the dietetic treatment of young adults, it is needful to eliminate from the diet all articles which will favor the formation of sugar within the body, and it is, therefore, advisable to supply the patients with a diet table indicating not only the articles which must be avoided, but also those which may be taken. Many patients,

if merely supplied with a list of articles to avoid, are apt to consider that the treatment is intolerable, since so many familiar articles of daily consumption must be eliminated ; on the other hand, if care is taken in the construction of the list of articles which diabetic patients may take—and if, moreover, this list shows also the articles that may be taken at the various meals—the sense of limitation is considerably reduced, and it is usually easy to secure sufficient variety to encourage the patient to persist in the treatment.

The chief difficulty in the construction of the dietary lies in the elimination of bread. Nearly all physicians are agreed that it is desirable to avoid the use of ordinary wheaten bread or of biscuits made with ordinary flour, and, in spite of the numerous substitutes that have been suggested, it is extremely difficult to find anything that will take the place of bread. The object is to find some article which may be eaten with the meals in the same way in which bread is commonly taken. This article must be one which will satisfy the craving for bread and yet will not contribute to the formation of sugar—in other words, it must be composed of some substance devoid of starch or sugar. The substitutes ordinarily employed consist of various forms of gluten or of bran bread and of almond or cocoanut biscuits.

A form of gluten bread has been prepared by Van Abbott, and this is fairly palatable and is readily taken with butter, though it demands some resolution to overcome the difficulty of mastication. Blatchley supplies cakes for diabetics, composed of bran and prepared with eggs, milk, and butter ; while Bonthron also prepares a form of gluten bread which is fairly satisfactory. There is really no difficulty in supplying a substitute for bread for patients of fairly good position ; the difficulty lies in procuring some inexpensive substitute for the poorer classes. Whitla recommends a form of home-made bread which poor people suffering from diabetes may prepare for themselves from the crude gluten obtainable from starch works. He directs them to take four breakfast-cupfuls of the finest bran with a small teacupful of the best white Indian flour or meal, and to rub this up with 6 ounces of butter and a teaspoonful of bicarbonate of soda. This mass is then made into dough with the thick part of the washed gluten, which has been left to settle in a pail of water over night. The mass is to be rolled into cakes and baked in a slow oven for two hours. Many of the poor are, however, unable to prepare this form of gluten bread, and accordingly

it often becomes necessary to ascertain how far their craving for bread may be satisfied by the use of well-dried and browned toasted bread. Except in very extreme forms of diabetes, this will sometimes satisfy the craving, while the elimination of other forms of starch and saccharine food may produce sufficient diminution in the daily formation of sugar.

In the treatment of diabetes it is well to remember that it is not desirable to totally arrest the elimination of sugar if, in so doing, the nutrition is greatly reduced. It is far better to modify the diet so that the nutrition can be maintained, even though small quantities of sugar continue to be excreted. This warning note is of the greatest importance in dealing with diabetics of advanced years, in whom any great alteration in the diet may be followed by symptoms of prostration.

Articles allowed.

Almond, bran, or gluten substitutes for bread, "torrified" or charred bread.
 Beef, mutton, pork, veal, venison, game, poultry, bacon, ham, tongue.
 Fish, fresh, smoked, or salt; crabs, lobsters, caviare.
 Unthickened soups, beef-tea, and broth.
 Eggs, butter, cream, cheese.
 Greens, spinach, turnip-tops, cabbage, cauliflower, artichokes, mushrooms, French beans, Brussels sprouts, broccoli, asparagus (green), seakale, vegetable marrow.
 Lettuce, endive, radishes, spring onions, celery, watercress, mustard and cress, cucumber.
 Oil, vinegar, pickles, olives.
 Blanc-mange, made with cream; jelly, flavored but unsweetened; savory and aspic jelly.
 Nuts (nearly all).
 Tea, coffee, cocoa (from nibs).
 Claret, hock, dry sherry, dry sauterne, chablis, Burgundy.
 Brandy and most spirits unsweetened.
 Burton bitter ale.
 Soda water, salutaris water, vichy water, apollinaris.

Articles forbidden.

Sugar in any form.
 Wheaten bread and ordinary biscuits of all kinds.
 Liver.
 Thickened soups or gravy thickened with flour.
 Potatoes, beans, peas, carrots, parsnips, Spanish onions.
 Beetroot.
 Blanc-mange, made with milk, rice, arrowroot, sago, tapioca, macaroni, vermicelli, and all kinds of pastry and puddings.
 Chestnuts, Brazil nuts.
 Port wine and all sweet and sparkling wines.
 Rum, sweetened gin, liqueurs.
 Sweet ales; stout, porter, cider.
 Lemonade, gingerbeer, sweet effervescent temperance drinks.

There are certain articles of diet upon which very different views have been expressed : Oysters are recommended by Bouchardat and Germain See, while, together with mussels, cockles, and the "pudding" of crabs and lobsters, they are forbidden by Sir William Roberts. Well-cooked turnips are permitted by Pavy and forbidden by Sir William Roberts. Milk is allowed in very small quantity by Pavy, in moderation by Ebstein, while it is forbidden by Germain See, Bouchardat, and Cantani ; the last-named also forbids cheese and even butter, as they contain traces of lactose, and he accordingly advises the substitution of olive oil.

Custard, made without sugar, is frequently permitted, and forms a pleasant variation, but would be excluded by those who fear the use of milk in any form.

Still greater diversity of opinion is, however, shown with regard to fruits. Obviously all jams and candied fruits must be forbidden on account of the sugar employed as preservative, but it is more difficult to lay down rigid rules against all fresh fruits. Pavy and Cantani exclude all fresh fruits ; Roberts and Seegen forbid all *sweet* fruits, as apples, pears, plums, gooseberries, currants, grapes, oranges, cherries, peaches, and apricots. On the other hand, Bouchardat allows peaches and strawberries, Ebstein permits apples, pears, and stone fruits in small quantities, and Seegen makes similar exception in favor of berries, such as strawberries, raspberries, and currants, as well as of oranges. As a rule, no doubt it is safer to exclude all fruits, but at certain seasons oranges as well as some other fruits contain very little sugar, and may perhaps be allowed in selected cases.

It should perhaps be repeated here that in arranging the dietary for a diabetic patient it should be remembered that although it is of primary importance to tabulate what substances are likely to aggravate the malady, the interference with the daily habit may perhaps be exaggerated unless it is clearly shown that among the things allowed sufficient variety can be secured.

The following suggestions for the division of the above dietary into separate meals may be of service :

Breakfast : One or two eggs, bacon, ham, tongue, fish, grilled game or poultry. Tea, coffee, or cocoa, with very little milk. Almond, bran or gluten bread, well buttered.

Lunch or early dinner : Clear soup, fish, meat, game, or poultry. Well-cooked vegetables, selected from the above list. Almond,

bran, or gluten bread. Jelly, blanc-mange, or custard. Cheese, butter, salad.

In the afternoon : Tea, coffee, or cocoa, with very little milk, or tea may be taken in the Russian style, with slices of lemon. One small slice of well-dried buttered toast.

Late dinner or supper : Similar to lunch or early dinner, but in smaller quantity, as the evening meal should always be the lighter of the two principal meals.

In adopting the dietary indicated above, it is desirable not to make an abrupt change, but, after the elimination of sugar from the diet, to remove one article after another of those included in the list to be avoided, so that the prescribed dietary is obtained by degrees. With regard to the exclusion of sugar, this is frequently felt almost as great a privation as that of bread, and it frequently demands considerable resolution to enable the patient to overcome the distaste for tea, coffee, or cocoa without sugar ; but should the craving cause much discomfort, small quantities of saccharine may be given. It is advisable to limit the amount of saccharine thus used, since otherwise it is extremely apt to cause disorder of digestion.

As in diabetes insipidus, it is undesirable to attempt to lessen the quantity of liquid taken. The sense of thirst is a measure of the loss of water through the kidney, and this in turn is to a large extent regulated by the amount of sugar in the urine. As the daily excretion of sugar becomes reduced the sense of thirst speedily subsides, and it is, therefore, preferable to allow the patient to allay thirst rather than to add to his sufferings by unnecessary prohibitions.

Most observers are agreed that the drugs of the greatest value in diabetes mellitus are opium, morphine, and codeine, but it is difficult to explain the mode of action of these remedies. It has been found, however, that during their administration the amount of sugar falls, and this fall is well marked, even when the patients have previously been strictly dieted. One feature in connection with these remedies is of peculiar interest—namely, that the dose can with care be greatly increased until relatively large proportions are being given.

Codeine has had many advocates, and it has been urged in its favor that it produces less drowsiness than morphine, and also that it disturbs the digestion less. I have employed it largely in diabetes, but must confess that in my hands it has not been free from the

production of narcotic symptoms. Many patients, even when taking comparatively small doses of this substance, have complained of drowsiness that interferes with their work. Sometimes this drowsiness has been so marked that I have suspected that morphine might possibly have been substituted for codeine, but even when there was no doubt about the accuracy of the dispensing there has often been complaint of drowsiness.

A leading advocate for the employment of codeine is Dr. Pavy, and he recommends that $\frac{1}{2}$ grain should be given three times a day, and that the amount should be gradually increased until 6 or 8 grains are taken in the twenty-four hours. On the other hand, I have known drowsiness to result when doses of $\frac{1}{3}$ grain were being given, and I have never been able to employ codeine in the larger doses above advocated. In further comparison of codeine and morphine it may be mentioned that Fraser regards codeine as weak morphine, and he rates the theoretical value of a grain of morphine above that of 15 grains of codeine.

In general, where morphine, codeine, or opium is being employed, there is no advantage in pushing the doses of the remedy until no further sugar reaction is obtainable, since it is often found that a continuance of the smaller dose over some weeks may ultimately effect the disappearance of sugar, while an increased dose may be followed by troublesome symptoms, such as constipation or headache.

The number of other drugs that have been used in the treatment of diabetes is almost infinite, but in this disease it is extremely important to avoid erroneous inferences by changing the medicinal treatment and the diet at the same time. It is always advisable to obtain a standard of the amount of sugar that is being passed under the restricted diet before employing any new remedies. Even the treatment with morphine, codeine, or opium is of little service unless the diet has previously been suitably modified. Perhaps the most valuable of the other drugs are nervine sedatives, such as potassium or ammonium bromide. These, even if they produce no direct curative effect, serve to allay much of the distressing irritability of diabetic patients.

The tonic influence of arsenious acid seems frequently to be of some service. It is especially valuable in cases of diabetes marked by much cutaneous irritation. Good results have also been claimed for a combination of arsenious acid with bromine, which has been prepared under the name of *liquor arsenii bromidi*, as follows :

Arsenious acid	.	.	.	.	.	.	.	gr. lxxij.
Potassium bicarbonate	.	.	.	.	.	.	.	gr. lxxij.
Bromine	.	.	.	.	.	.	.	gr. cxvij.
Water	.	.	.	.	.	.	q. s. ad	℥ xvj.

Boil the arsenious acid and potassium bicarbonate in 2 ounces of water till dissolved; when cold, add 10 ounces of water, then the bromine, and make up with water to the given volume. Stir occasionally during a few hours, then filter.

This liquor was originally described by Dr. Clemens as a chemical union of arsenic and bromine, but as the action of bromine on arsenious acid results in the formation of arsenic acid and hydrobromic acid, the above formula has been adjusted (*United States National Formulary*) to yield these products as potassium salts.¹

Of other nervine tonics that have been employed in cases of diabetes mellitus it may be sufficient to mention cocaine, strychnine, and quinine, while salicylic acid and salicylates, lithium, and other alkaline carbonates or acetates, nitroglycerin and lactic acid have been used. Several authorities have obtained good results with sodium salicylate given in large doses (75 to 225 grains in the day); its action, however, is uncertain. The sugar frequently disappears from the urine during the exhibition of the drug, but it has no effect on the progress of the disease, as the glycosuria and its attendant symptoms reappear on the suspension of the remedy. However, it should be borne in mind as suitable for the relief of neuralgia, which is a frequent complication of diabetes. Some of the newer antipyretics—antipyrine, antifebrine, and exalgine—have also been given in diabetes, especially in those forms in which neuralgic troubles predominate. Some observers recommend the employment of comparatively large doses of these remedies; thus Whitla advocates the employment of 13 grains of antipyrine four or five times a day, and he significantly adds that this dose should be suspended as soon as albuminuria appears. There seems to be no advantage in such repeated employment of this dose, and albuminuria is so likely to occur from irritation of the kidney in the course of diabetes that it is injudicious to administer remedies which would favor the onset of this complication.

Recently uranium nitrate has been strongly recommended. This drug is best given in very dilute watery solution; 1 or 2 grains

¹ Squire's Companion to the British Pharmacopœia, 1899, p. 117.

may be administered three times daily after food, and the dose may be gradually increased up to 10 grains or more three times a day. In spite of the strong recommendations that have been published concerning this drug, it is well to employ it with caution, since it has been stated to produce inflammation of the intestines and kidneys, failure of nervous power, and even to promote the appearance of sugar in the urine.¹ It is further noteworthy that in the five cases recorded by Dr. Samuel West,² although beneficial results were obtained in four, the administration had to be abandoned entirely in the fifth case on account of gastric disturbance, this patient being unable to take more than 3 grains twice daily.

The chief complications which may arise during diabetes mellitus are those connected with (1) the skin, (2) the lungs, (3) the kidneys, and (4) the nervous system.

Some of the skin affections are distinctly the result of interference with nutrition, as, for example, gangrene, perforating ulcer of the foot, boils, and carbuncles; and although palliative measures must be adopted, these conditions must be met by tonic remedies and by an increased liberality of diet, since they are most likely to arise when the diabetic dietary has been too rigidly enforced. On the other hand, eczema and pruritus or balanitis are frequently due to constant irritation and moisture from the excess of saccharine urine. The value of the internal administration of arsenious acid has already been indicated, but local treatment must also be adopted. Osler recommends cooling lotions of boric acid or hyposulphite of sodium (1 ounce, water 1 quart), but a solution of lead subacetate with a little tincture of opium and rose water is often more soothing. Bran baths with eucalyptus oil or alkaline baths may be used once or twice a week; frequently greater relief is afforded by the application of zinc ointment rendered thin enough by the addition of liquid petroleum to be painted over the irritated surface.

Although the pulmonary complications are extremely dangerous, since they include acute pneumonia, gangrene of the lung, and tuberculosis, which often assume a pneumonic type, these affections can only be treated upon the general principles which have already been described.

The complications connected with the kidney and bladder include

¹ Therapeutic Gazette, October, 1888.

² British Medical Journal, August 24, 1895.

albuminuria, and occasionally renal cirrhosis and cystitis. The albuminuria, when not associated with organic renal changes, is of comparatively little importance; it is generally slight, though the amount may vary greatly from day to day. Usually, however, this symptom occurs late in the course of the disease, and it sometimes forms a prelude to diabetic coma. As a rule, however, the renal complications afford no indication for special treatment on account of their association with diabetes.

Diabetic coma is the most serious of the nervous complications, since it appears invariably to cause a fatal termination either within a few hours or within from one to five days. It is apparently due to toxæmia, which has been variously attributed to acetonæmia (the breath smelling strongly of acetone and the urine giving the acetone reaction), to uræmia (owing to the frequent existence of albuminuria before or during the attack), and to lipæmia (the capillaries in the lungs having occasionally been found to be obstructed with fatty emboli). Diabetic coma may be preceded by weakness, fainting, and somnolence, which gradually deepens until complete unconsciousness ensues, or there may be premonitory dyspeptic symptoms and great dyspnœa, or the coma may develop rapidly without any more marked premonitory symptoms than headache. The treatment of diabetic coma is very disappointing, very few successes having been recorded, although in some instances consciousness has been partly or wholly regained for a few days. It has been maintained¹ that the inhalation of oxygen diminishes the production of sugar in diabetes, and that it has proved capable of averting diabetic coma by the oxidation of products that would otherwise form diacetic and oxybutyric acids; increased oxidation has also been attempted² by ozone dissolved in water with the addition of 2.5 per cent. of sodium hypophosphite, or in various vegetable and ethereal oils, or in cod-liver oil. Solution of hydrogen peroxide may be given in doses of $\frac{1}{2}$ to 2 drachms, or ozonic ether may be employed in doses of $\frac{1}{2}$ to 1 drachm. All of these, however, must be regarded as means of averting threatened coma rather than as being of any particular value after its development.

Intravenous injection of saline solution is more hopeful, since it serves to dilute the toxic agent in the blood. In the normal blood serum sodium chloride is present in the proportion of 0.6 per cent.,

¹ Foster, *Therapeutics*, vol. ii. p. 51.

² *Ibid.*, vol. ii. p. 58.

and the blood being alkaline, it has often been thought that the saline solution intended for intravenous injection should also be made alkaline. Accordingly Hayem¹ proposed an artificial serum containing :

Sodium hydrate	15½ gr.
Sodium chloride	80 gr.
Sodium sulphate	39 gr.
Boiled water	3 fl.oz.

Little proposed a solution composed as follows :

Sodium chloride	50 gr.
Potassium chloride	2 gr.
Water	1 pint.

The following solution has also found considerable favor :

Sodium chloride	93 gr.
Liquor sodæ	20 drops.
Water	2 pints.

Dr. Samuel M. Brickner maintains, however, that clinical experience has shown that a solution containing the normal proportion of sodium chloride fulfils every demand. It is customary to employ a solution containing a drachm of sodium chloride in a quart of hot water. This is ordinarily allowed to cool to the temperature of the body ; Brickner, however, recommends that it should be infused at a temperature between 116° and 118° F. It is unnecessary to describe the operation of transfusion in detail. The median cephalic or the median basilic is the vein usually selected, and after the insertion of the canula from 20 to 40 ounces are slowly transfused by fluid pressure, the vessel containing the saline solution being raised from three to four feet above the canula. Before the insertion of the canula great care must be taken to avoid the entrance of air by first allowing some of the solution to flow freely through the India-rubber tube and the canula.

Greater attenuation of the toxic matter in the blood may also be secured by the method suggested by Landois, and termed by him "depletory transfusion." This consists in the transfusion of normal defibrinated blood into a vein, while an artery is opened to permit the escape of the poisoned blood. The use of defibrinated blood, however, presents so many difficulties that this method is now rarely employed.

¹ Foster, Therapeutics, vol. ii. p. 321.

It should be added that the chances of success in this treatment are materially increased by the early transfusion of saline solution, so soon indeed as warnings of diabetic coma are apparent.

The other nervous complications of diabetes mellitus vary greatly in importance. Reference has already been made to the tendency to hypochondriasis, but many forms of neuritis are fairly frequent, such as neuralgia, lightning pains in the legs, loss of the knee-jerk, and paraplegia. These, together with diabetic retinitis, must be treated upon general principles.

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