

THE ELEMENTS OF MEDICAL TREATMENT

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P R E F A C E

FOR several years it was my duty at the London Hospital to give an annual course of lectures on elementary therapeutics in which the principles of treatment were discussed and their practical application illustrated by the example of certain typical diseases. I have often been asked by former pupils to publish these lectures, but never thought it worth while. Experience in examining, however, has made me come to think that there might perhaps be room for such a book as this after all, and accordingly I have recast the lectures into the form in which they now appear. It need hardly be said that this is no complete treatise on medical treatment; the book merely aims at setting out principles and their application to the commoner forms of disease met with in practice, special attention being given to the prescription of drugs. I am indebted to my friend Dr. T. A. Ross for the chapter on Psychotherapy—a mode of treatment of which every student should know something—and to my First Assistant, Dr. Devereux Forrest, for the sections on ‘Diabetes and the Use of Insulin’, and ‘Some Minor Medical Operations’. Mr. Hocking, Chief

Dispenser to the London Hospital, has kindly revised the prescriptions.

I have not attempted to deal with the various methods of physical treatment, for, important though they are, they hardly fall within the cognizance of the elementary student.

It is hoped that students may find this book useful when working in the wards (where the teaching of treatment is apt to be neglected), or preparing for examinations, and also as an introduction to more complete and detailed treatises on the subject.

R. H.

November, 1926.

ELEMENTS OF MEDICAL TREATMENT

CHAPTER I

SOME GENERAL PRINCIPLES

ALL treatment should proceed on a *plan* which is founded on the indications in the particular case. By 'indications' is meant the things which it is desirable—and possible—to do, and the plan, once formed, should not be changed unless fresh indications arise. The plan should be as simple as possible, and should be directed to the most important points in the case, side-issues being avoided. All over-elaboration and fussiness in treatment are bad, for they are apt to make the cure worse than the disease. Further, one must not ask of the patient impossibilities or prescribe methods of treatment which are beyond his means. One must cut one's therapeutic coat according to one's cloth.

In laying down the plan it must always be remembered that one is treating a patient and not a disease, which means that one must be prepared to 'individualize'. For this reason 'systems' and 'routine treatments' are usually to be avoided.

Faddery should be shunned at all costs, and new

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and 'up-to-date' methods adopted with caution. It is best to err on the side of conservatism, but yet keeping an open mind.

"Be not the first by whom the new is tried,
Nor yet the last to cast the old aside."

But whilst conservative, treatment should also be eclectic; one should not hesitate to adopt any method, no matter its origin, provided it has been proved useful.

The plan of treatment may in its nature be :
(1) Radical; (2) Symptomatic; (3) Expectant.

By *radical treatment* is meant the use of means which go to the root or cause of the disease and, by removing it, effect a cure. An example is the use of quinine in malaria, or of thyroid in myxœdema. A radical plan is always to be adopted if our resources permit, but unfortunately it is often impossible.

In *symptomatic treatment*, symptoms are merely dealt with as they arise. It is a plan which is easily abused, as it demands for its correct use a knowledge of those symptoms in the case which may legitimately be suppressed. Pain may nearly always be treated symptomatically, but cough, for example, may be either harmful (as in pleurisy) or useful (as in bronchitis). In the one case it may legitimately be treated; in the other it is best left alone.

Expectant treatment is the only plan required in a great many circumstances. It consists in putting the patient in the best position to fight the disease,

whilst refraining from active interference. It is not really, as some cynic said, "standing by and patting Nature on the back whilst she does the work"; it is much more what the lawyers call 'holding a watching brief' for the patient, giving him confidence that all is going well and that the doctor is quite ready to meet any emergency that may arise. It is, in a word, the very antithesis of fussiness.

Just as the plan may be radical or symptomatic, so the agents used in carrying it out—especially the medicinal agents—may be either *rational* or *empiric*. By the former are meant those means which can be justified rationally, as, for example, the use of thyroid in myxœdema referred to above. Empirical remedies, on the other hand, are those whose use is only justified because experience has shown that they do, in fact, do good. The use of the salicylates in acute rheumatism is an example. As knowledge increases, the tendency is for remedies at first used empirically to become rational, as has happened, for instance, in the case of quinine and malaria.

The means at our disposal or the 'lines of attack' in forming the plan of treatment may be classified as follows: (1) *General management*; (2) *Diet*; (3) *Drugs*; (4) *Specific treatment (bacteriotherapeutics)*; (5) *Physical treatment*; (6) *Psychotherapy*; (7) *Operation*.

1. The **General Management** is concerned with such questions as whether the patient must be

treated in bed, and, if so, whether skilled nursing is required; the amount and kind of exercise to be recommended, and so on. It is mainly directed to putting the patient in the best possible conditions to enable him to combat his disease, and should always be decided first.

2. Diet comes next. In a great many cases diet is of no real importance, and may safely be left to the patient's own choice. The fault to be avoided in prescribing diet in disease is arbitrariness. One should never forbid any article of food without being able to give a good reason for doing so. In subsequent chapters the principles of dietetic treatment in various diseases will be set forth, but a few general rules may be given here. First, and most important, one must remember to diet the patient and not only his disease, and must always allow for idiosyncrasies. It is therefore wise, before recommending any article of food, to inquire first how the patient has found it suit him and how he likes it. As a corollary to this it follows that, unless there is some strong reason to the contrary, attention should always be paid to the sick man's likes and wishes in the matter of food.

In acute disease it is best to give a list of foods which may be taken; in chronic diseases of those which are forbidden. All such lists should be written out.

If any article of food disagrees with a patient, it is better to reduce the amount of it in the diet rather than to eliminate it altogether, and any

radical alterations in the diet are best made gradually. Finally, it is well to remember the weakness of human nature and not make the diet any stricter than is necessary. As the great gourmet, Brillat-Savarin, said, "No one was ever cured by a strict régime, for no one ever observed it".

The following rough classification of foods according to their most important constituents may be of use in drawing up rules of diet :—

1. NITROGENOUS.—
 - a. *Protein* : meat, fish, eggs, milk ; peas, beans, nuts.
 - b. *Nucleoprotein* : sweetbreads, kidneys, liver.
 - c. *Gelatin* : jellies.
 - d. *Extractives* : meat extracts, soups made from meat, gravies.
2. FATTY.—Butter, cream, yolk of egg, bacon fat ; olive oil ; nuts.
3. CARBOHYDRATE.—
 - a. *Starchy* : cereals (flour, rice, etc.), Italian pastes (macaroni, etc.) ; arrow-root, corn-flour ; potatoes ; many patent foods (e.g., Benger's, etc.).
 - b. *Saccharine* :—
 - Sucrose : cane sugar.
 - Glucose : commercial glucose ; honey ; sweet fruits.
 - Lactose : 'milk-sugar' ; milk.
 - Dextrins and Maltose : 'dextri-maltose' ; malt extracts ; some patent foods (e.g., Mellin's).
4. CELLULOSE.—Green vegetables ; fruits ; nuts ; whole-meal flour, bran, etc.
5. MINERAL.—
 - Calcium* : milk, eggs, cereals, green vegetables.
 - Phosphorus* : yolk of egg, milk, sweetbreads, brains.
 - Iron* : red meats ; yolk of egg ; spinach.
6. VITAMIN.—
 - Growth Vitamin (A)* : animal fats ; green vegetables ; cod-liver oil.
 - Anti-neuritic Vitamin (B)* : whole-wheat meal ; peas, beans ; yolk of egg ; nuts ; yeast.
 - Anti-scorbutic (C)* : fresh fruits and green vegetables ; swedes ; tomatoes.

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It is sometimes necessary to supply nutriment by the bowel, but the use of complicated mixtures for this purpose has now been given up, and it is usual to give simply 1 pint of normal saline containing 1 oz. of glucose. This may be repeated every six hours if necessary. So-called nutrient suppositories are practically worthless.

3. *Drugs.*—It has been said of drugs that “they sometimes cure, often relieve, and always console”, and certainly it is only in few plans of treatment that their use can be dispensed with altogether. Even then it is often advisable to give what is called a *placebo* for the sake of its ‘consolatory’ effect. The number of drugs in the Pharmacopœia is very great, but by far the greater number are superfluous. It is wise therefore to use only a few drugs, but to know them and their effects intimately, and to give them in sufficient doses. Some of the discredit into which drug treatment has fallen in this generation is no doubt due to the fact that we use medicines more timidly than our forefathers.

Drugs should be prescribed in the simplest and most palatable form possible, but sometimes a combination acts better than any single drug given alone. Few prescriptions, however, should contain more than four ingredients; anything above this smacks of polypharmacy. Further, a prescription should not be a merely fortuitous assemblage of drugs: it should be an example of ‘team work’ directed to one end, and every ingredient should

be able to justify its inclusion in the team. A model prescription consists of:—

The '*basis*', or drug which does most of the work.

An '*adjuvant*', or drug which helps to do the work.

A '*corrective*', to modify any ill-effects of the effective drug or drugs or to cover their flavour.

A '*vehicle*' (or 'excipient') which keeps all in solution, or gives the prescription a 'takable' form.

According to the well-known saying of Asclepiades it is the function of a prescription '*curare cito, tuto, et jucunde*'—to cure quickly, safely, and pleasantly. From this point of view the *basis* does the 'cure', the *adjuvant* helps to make it 'quick', the *corrective* 'safe', and the *vehicle* 'pleasant'.

The prescription is usually written in Latin with abbreviations, but there is no reason why it should be written illegibly, as it too often is. It begins with the 'superscription'—*Recipe*—usually contracted to **R***; then comes the 'inscription' or list of ingredients; this is followed by the 'subscriptio' or directions to the chemist, still usually written in Latin, though there is no real reason why they should be; and finally the 'signature' (*Sig.*), or directions to the patient, which are written in English. The name of the patient and the initials of the doctor are added. Numerous

* The tail to the **R** of recipe is variously said to represent the sign of the Cross or an invocation to Jupiter, the idea being to make the prescription more efficacious.

examples of prescriptions will be found in the following pages.

It is more convenient to prescribe the amount of each ingredient in the dose and to direct the chemist how many doses to send, leaving it to him to calculate how much of each ingredient goes into the whole mixture. It should be remembered that medicine bottles are made to hold an even number of ounces (2, 4, 6, 8, etc.), and that only such a number should be prescribed, as it is desirable that the bottle should be sent out full. The dose is often measured in spoonfuls; but as these vary greatly in size, it is more accurate to order a definite quantity—say half an ounce—and let it be measured off by a scale ruled on the bottle or by means of a medicine glass.

A knowledge of dosage and of the chief incompatibles is, of course, very necessary for accurate and artistic prescribing. Dosage cannot be considered here, but the question of incompatibles may be briefly dealt with.

There are three kinds of incompatibility: (1) Therapeutical; (2) Chemical; (3) Pharmaceutical.

Therapeutical incompatibility consists in the putting into one prescription of drugs which have a contrary therapeutic effect, such as a combination of stimulants and sedatives, of vasoconstrictors and vasodilators, and so forth.

Chemical incompatibility is the prescription of drugs which act upon one another so as to produce decomposition or a new compound.

Drugs are *pharmaceutically incompatible* which are incapable of being mixed, or the mixture produced by which is inelegant or dangerous. There is no sharp line between chemical and pharmaceutical incompatibility.

A knowledge of pharmacology should safeguard one against prescribing therapeutical incompatibles, and an acquaintance with chemistry and the elements of pharmacy should make the perpetration of other mistakes unlikely. The student is apt, indeed, to make too much of a bogey of 'incompatibles', but the following short list covers those which are most likely to occur :—

- Acids and alkalis (decomposition occurs).
- " " iodides (iodine is liberated).
- Alkalis and alkaloids (the alkaloid is precipitated).
- " " chloral (chloroform is liberated).
- " " metallic salts (an insoluble salt is thrown down).
- Tannic acid and iron (tannate of iron—ink—is formed).
- " " " alkaloids (the alkaloid is precipitated).
- Resinous tinctures and aqueous solutions (the resin is thrown down).
- Digitalis and per-salts of iron (a muddy mixture results).

It will further help to obviate mistakes if the following drugs are as far as possible prescribed by themselves :—

Acids	Perchloride of iron
Arsenic	Salts of mercury
Antipyrin	Morphia
Iodine and iodides	Quinine.

Finally, it should be remembered that some patients have an idiosyncrasy to drugs, just as others have to certain foods, and it may be wise

to inquire about this before prescribing such drugs as iron, arsenic, belladonna, opium, and the iodides and bromides.

4. Specific Treatment or Bacteriotherapeutics.—The term ‘specific’ originally meant an agent possessing a special power against some particular disease. In this sense mercury was a ‘specific’ for syphilis, quinine for malaria, and so on. In modern times, however, the term has become confined in its use to bacteriological methods of treatment, and these may have to form one line of attack in acute or chronic infections. The principles of such treatment are further considered in Chapter XX.

5. Physical Treatment (Physiotherapy).— This embraces the use of all purely physical modes of treatment (massage, baths, electricity, various kinds of rays, etc.). Such treatment is often very useful, and may sometimes, in forming the plan, be made the main line of attack; but it is for the most part, and necessarily, in the hands of specialists, and will not be considered here.

6. Psychotherapy.—In all treatment psychical means play a large part, and the main duty of the doctor is to act on the patient’s body through his mind by inspiring confidence. The ability to do this is one of the chief factors of success in the practice of medicine. Most medicines, too, act largely by suggestion—placebos solely so. Whilst, however, this kind of psychotherapy by which ‘virtue goes out of the doctor’ must enter uncon-

sciously—and it must always be more or less unconscious—into every plan of treatment, psychological means are now largely used in a conscious and systematic way in the treatment of that large class of functional diseases known as the psychoneuroses. The principles of such treatment are described in Chapter XXI.

7. Operation.—As we are dealing here with purely medical diseases, the question of operative treatment need not be considered, though in many borderland cases between medicine and surgery the question whether or not to include it in the plan is often an anxious one. It is a question, however, which can only be settled by experience and by a consideration of the facts of the particular case; general rules are not of much help in deciding it.

Finally, it must always be remembered that there is in every mortal illness a point beyond which any further attempt at *curative* treatment is not only useless but cruel. A painful deathbed is always a reproach to the doctor, and there is no sense in tormenting a dying man with the injection of stimulants. In these circumstances our duty is to change the direction of the plan, and, if we cannot hope to cure, at least to aim at relief and at promoting the euthanasia. We should therefore use morphia and use it freely, remembering, with Clough, that

“Thou shalt not kill; but need'st not strive
Officiously to keep alive.”

CHAPTER II

FEVER: DIAPHORETICS AND
ANTIPYRETICS

To what extent is the treatment of fever considered as a symptom justified? Does the mere rise of body temperature do the patient any harm? If, for example, in a case of pneumonia, one could abolish the temperature but leave everything else exactly as it was, would the situation be much improved? To answer those questions would require a full consideration of the nature of fever, and more knowledge than we as yet possess. Of course, if we can abolish fever by removing its cause—as the surgeon does when he opens an abscess, or the physician when he cures malaria with quinine—the matter is simple enough; but if one cannot remove the cause of the fever, that is to say, deal with the disease *radically*, most clinicians are agreed that it is best only to try to keep the temperature within bounds, and not to treat it unless it is excessive or is causing trouble by producing insomnia or delirium. To attempt to force down a temperature too zealously may easily do more harm than good.

With these preliminary observations we may pass on to consider the principles of treatment in any

case in which fever is a prominent symptom. The *indications* are obvious : (1) As always, to remove the cause if one can ; (2) To maintain the patient's strength and resistance pending a natural resolution of the disease ; and (3) To use such means as may modify the fever in those cases where it is excessive or is incommoding the patient.

1. **Removal of the Cause** is only rarely possible, but an example of it is found as already mentioned in the treatment of malaria by quinine. The disappearance of fever in acute rheumatism under the use of salicylates is another instance of such treatment.

2. **Maintenance of the Patient's Strength** until the disease has run its course must be the chief object in most cases of fever. This is mainly a question of general management and diet. The patient should always be treated in bed ; no person with a temperature should be up and about. Whether trained nursing will be required depends upon the nature of the fever and its probable duration. The room should be kept at a temperature of 60° to 65° F., and be adequately ventilated. See that the patient is not over-clothed, and that he has not too many blankets. There is still a tendency amongst the laity to think that fever patients must be kept very warm, so that one often finds them almost suffocated with bedclothes.

Medical opinion about diet in fever has undergone a great change since the middle of last century. Up till then it was considered that febrile patients

should be virtually starved, the idea being that food acted as fuel to the fever. Graves, of Dublin, was one of the first to depart from this practice, and said that he wished it to be his epitaph that 'He fed fevers'. We now know, of course, that the giving of food does *not* increase fever, and the modern custom is to feed fever patients up to the limit of their digestive capacity. Not all kinds of food are equally suitable, however. To use a phrase dear to students, the diet should be 'light but nourishing'. Fatty and rich articles are naturally repugnant to a man with a temperature, and it is a mistake to give much protein, as it is impossible to build up tissue whilst the fever is in progress, whilst the waste products of nitrogenous foods, added to those produced by the increased metabolism of the disease, throw a strain on the kidneys. This means that animal foods such as meat should be given with caution. On the other hand, carbohydrates have every advantage. The products of their combustion give the kidneys no work, and they can be presented in varied, attractive, and digestible forms. In acute fevers, when appetite is greatly impaired, the patient may only care for food in a fluid form; but whether and when solids should be given may safely be left to his own choice. If the patient desires solids, it is usually safe to let him have them.

In this country milk is usually the chief article of a liquid diet, though on the Continent broths are more largely used. Perhaps we overdo milk.

At all events 2 or at most 3 pints a day should be the maximum allowance, given in 6 to 8 oz. feeds at a time. The milk may be flavoured in various ways (with coffee, cocoa, etc.) to avoid monotony, or some of it may be given in the form of milk jelly or junket. The milk in a liquid diet may be supplemented by broths, fruit juices, and lemon drinks sweetened with sugar. Tea is usually grateful to the patient, and may be actually beneficial in fever, for it must be remembered that in this country tea was used as a medicine before it became a beverage. The febrile patient should always be allowed plenty of water. Ignorant people have a curious prejudice against giving cold water in fever which is quite unfounded. Ordinary cold—not iced—water may be given *ad lib.*, nor is there any need to boil it first (provided you are sure of your water-supply), as the patient's friends often want to do.

If the patient is able to take solids, the range of choice in diet is much widened. Foods rich in starch and sugar are, as we have seen, to be preferred. These include all the cereal foods (bread, rice, cornflour, arrowroot, etc.), and fruits, and from combinations of these, with the addition of milk, a varied diet can easily be constructed. Jellies are often given in fever, but though agreeable to the patient it must be remembered that their food value is very small. The same is true in even a greater degree of meat juices. In cases of chronic and prolonged fever the patient is often quite able to take the lighter forms of meat and

fish, and if he expresses a desire for them it is usually a sign that he is capable of digesting them.

And now a word or two as to the use of *alcohol* in fever. In the days when fever patients were starved, they were all given alcohol freely; now that we feed them we have largely cut off alcohol. We have swung, in fact, from a regimen of starvation mitigated by tipping to one of mild stuffing modified by total abstinence. There can be no doubt that the change is, on the whole, wise, though it has perhaps gone too far. Alcohol is certainly a food, and may be used as such with advantage in cases of prolonged fevers, but it is a delusion to suppose that it sustains the heart. It is, however, of use because of its sedative effects (it is not really a stimulant) in cases showing signs of nervous exhaustion, such as sleeplessness, delirium, or a disinclination for food. The vast majority of febrile patients nevertheless do quite well without it, and it should never be given as a routine. If it is decided to give it, the form of administration becomes of importance. The common practice in this country is to use Brandy, or more rarely Whisky, but there is a great deal to be said for the Continental practice of using a light wine or beer instead. The patient's choice in the matter will often be a guide. As to quantity, 4 oz. of brandy or its equivalent in twenty-four hours should usually be enough. A persistent smell of alcohol in the breath is always a sign of over-dosage.

3. To Modify the Fever.—Having done all we

can to maintain the patient's strength pending a natural cure, by putting him at rest under suitable conditions and on an appropriate diet, we have next to consider how we can modify the fever, assuming that we are unable to attack its cause directly. There are three ways in which this *might* be done :—

a. By Lessening Heat Production.—Quinine, apart from its specific action in malaria, is said to lower temperature in this way, but its power is only slight. We have, indeed, no means of materially lessening the production of heat, and if we had such it might prove to be a two-edged weapon.

b. By Acting on the Heat-regulating Centres.—The antipyretics of the coal-tar group (antifebrin, antipyrin, phenacetin, pyramidon, etc., and to some extent aspirin) act in this way. These agents certainly lower temperature very effectually, but their routine use for that purpose has rightly been given up, for the fall of temperature is apt to be accompanied by a dangerous degree of collapse. I have, indeed, seen patients with enteric fever very nearly killed by such a comparatively mild antipyretic as phenacetin.

c. By Increasing Heat Loss.—This is the only legitimate way of reducing the temperature in cases of fever. By seeing that the patient is not kept too hot, one is already doing something to increase heat loss ; but this may be effected more actively either (i) by promoting perspiration and so increasing the loss of heat by evaporation, or

(ii) by the direct removal of heat from the body by the use of some form of hydrotherapy.

i. The production of sweating by *diaphoretic drugs* has long been one of the main objects of the doctor treating a case of acute fever, and there can be no doubt that it is both useful and legitimate. The drugs usually used for the purpose are the vegetable salts of potash or ammonium, along with vasodilators. Pilocarpine, though a more effective sudorific, is too depressing, and too apt to cause pulmonary oedema, for routine use.

The following is a typical prescription for a diaphoretic mixture :—

R	Pot. Acet.	gr. xv
	Liq. Ammon. Acet.	ʒij
	Spt. Æth. Nit.	ʒxv
	Syr. Limonis	ʒj
	Aq. Camph.	ad ʒss

Mitte ʒvj.

Sig. : One-twelfth part in water every four hours.

(The *basis* of the prescription here is Acetate of Potash, which acts as a diaphoretic and diuretic, and also tends to neutralize the high acidity of the febrile urine. The Acetate of Ammonium and Spirits of Nitre are the *adjuvants* which contribute to the same result, though the efficacy of the Spirits of Nitre is doubtful. Syrup of Lemon is an agreeable *flavourer* or *corrective*, and Camphor Water is a mildly stimulating *vehicle*. Such a mixture should be given at short intervals until the skin is moist.)

ii. The direct removal of heat by some form of

hydrotherapy is undoubtedly the most effective and rapid way of lowering temperature, and is more and more replacing the use of sweating. Different modes of it, varying in severity, may be used according to the case. The simplest and most generally applicable is to sponge the patient all over, bit by bit, with warm, tepid, or even cold water. The addition of a little toilet-vinegar makes the application more refreshing. More effective is the wet pack at a temperature of 75° to 80°, the pack lasting a quarter to half an hour; and most effective of all, though practically used only in cases of hyperpyrexia, is the bath, begun at a temperature of 90° and cooled by the addition of cold water or ice, the patient's temperature being observed meanwhile. The details of the application of these methods are an affair of nursing technique, but every student should make himself familiar with them.

The treatment of special complications of fever such as heart failure, insomnia, and constipation is considered under those headings.

The general principles already described are applicable in all cases where fever is a prominent symptom, but we may now consider their more detailed application and modification in two typical fevers—typhoid and acute rheumatism.

TYPHOID FEVER.

The *General Management* in typhoid fever is more important than anything else, for the fever

is a prolonged one. To deal with it radically is at present beyond our power, and the maintenance of the patient's strength is therefore essential. As typhoid patients stand moving badly, it is usually advisable to treat the patient where he is taken ill. Skilled nursing and the use of the bed-pan are imperative. Special care will have to be taken in the disinfection of the excreta.

The Diet should be on the lines already laid down for fever in general, and the adoption of an entirely liquid diet—formerly the rule—has now been abandoned. If therefore the patient wants light solids he may have them. Care, however, should be taken to keep out of the diet indigestible things (e.g., the seeds or pips of fruit), as there is just a chance that they might injure an ulcer. It is probably wise also to forbid the use of meat and fish until ten days after the temperature is normal. If, as shown by the stools, milk is ill digested, it should be citrated or peptonized or replaced by whey. Alcohol should not be given as a routine.

Drugs should not be used to reduce the temperature; that is best done by sponging. Aperients also are better avoided, and the bowels (if constipated) opened by enema every other day. If there is diarrhoea it need not be interfered with unless the stools exceed four in the twenty-four hours. In that case a Starch and Opium enema may be given daily, or one of the following prescriptions used:—

R Bismuthi Salicyl. gr. xv

Fiat pulv. Mitte tales xxiv.

Sig.: One powder in a little milk every six hours.

(This powder has an astringent and, to some extent, an antiseptic action in the bowel.)

Sometimes an acid mixture succeeds better:—

R Acid. Sulphurici Aromat. ℥x
 Tinct. Catechu ℥xv
 Syr. Zingib. ℥ss
 Aq. Ment. Pip. ad ℥ss

Mitte ℥vj.

Sig.: One-twelfth part, well diluted with water, every six hours.

(The basis of this prescription is the Sulphuric Acid, the aromatic form being selected as more agreeable. Catechu is the adjuvant, which 'helps' the acid by its own astringent action; Syrup of Ginger is chosen as the corrective on account of its carminative property, and for the same reason Peppermint Water is used as the vehicle.)

Or one may use the time-honoured 'chalk and catechu' combination:—

R Tinct. Catechu ℥xx
 Mist. Cretæ ad ℥ss

Mitte ℥vj.

Sig.: One-twelfth part in water every four to six hours.

(The Catechu is here the basis, being chosen for its astringent action, whilst the Chalk Mixture is adjuvant, corrective, and vehicle all in one.)

Certain *complications* may have to be met.

Tympanites.—The diet should be reduced, or food even stopped altogether for a time, water

only being given. If opium is being used for diarrhœa, it also should be stopped. Turpentine may be applied externally in the form of stupes, and also administered internally for its carminative effects :—

R	Ol. Terebinth.	℥ x
	Mist. Amygd.	ad ℥ ss

Mitte ℥ iv.

Sig. : Half an ounce every four hours.

(Turpentine must, of course, be emulsified, and the Almond Mixture is one of the pleasantest ways of doing this.)

Hæmorrhage.—Food should be stopped, and opium given by the mouth, or morphia hypodermically. Astringents such as acetate of lead are also useful :—

R	Plumbi Acet.	gr. iij
	Liq. Morph. Acet.	℥ xxx
	Acid. Acet. Dil.	℥ xx
	Aq. Dest.	ad ℥ j

Mitte ℥ iv.

Sig. : One ounce every six hours.

(The basis, Acetate of Lead, is a powerful astringent, and is intended to act directly on the bleeding point ; Morphia is the adjuvant, and is used for its sedative action, the same salt (Acetate) being chosen as the salt of lead ; the Acetic Acid is an excipient to promote solution of the ingredients, and to some extent also is an adjuvant, as, like all acids, it is astringent. The vehicle chosen is the simple one of Distilled Water, as sulphates or carbonates in ordinary water would throw down some of the lead.)

The further treatment is that of melæna (p. 109).

Perforation, of course, demands immediate operation.

ACUTE RHEUMATISM (RHEUMATIC FEVER).

The therapeutic indications in this form of fever are, first, and always, to maintain the strength; second, to relieve pain; and third, to guard against complications, particularly carditis.

The General Management is that of any acute fever, but owing to the tendency to sweating, and in order to avoid chill, the patient should be clothed in wool and may even with advantage lie in blankets. The affected joints should be wrapped in cotton-wool. Care should be taken to protect the patient from draughts.

Diet.—This differs in no way from that of other acute fevers, and the practice of keeping the patient on milk only has been given up. After all, acute rheumatism is an infective disease, not a metabolic one, and there is no reason why the diet should not be the same as in other fever cases.

Drugs.—We possess in the salicylates a specific remedy for acute rheumatism, so far, at least, as the fever and joint pains are concerned. Drugs therefore take a prominent place in the treatment. Salicylate of soda may be prescribed thus :—

R	Sod. Salicyl.	
	Sod. Bicarb.	āā gr. xx
	Syr. Aurant.	ʒj
	Inf. Aurant.	ad ʒss

Mitte ʒviiij.

Sig.: Half an ounce in water every two to six hours.

(The basis of the prescription is the Salicylate, which is used for its specific effect—though why it has this effect we do not know. The dose is that for an adult. Bicarbonate of Sodium is used partly as an adjuvant—for there is reason to believe that alkalis are useful in acute rheumatism—and partly as a corrective to counteract the tendency of the salicylate to cause acidosis. The flavouring agent chosen is Syrup of Orange, which covers the mawkish flavour of the salicylate better than anything, whilst the Infusion of Orange makes a pleasant, clean, bitter vehicle.)

The salicylate mixture should be continued, although in a reduced dose, for a fortnight after the temperature has become normal, and if there is any anæmia, as there is apt to be—seeing that acute rheumatism is a notable blood-destroyer—some iron may be given along with it :—

R	Ferri et Ammon. Cit.	gr. v
	Sod. Salicyl.	gr. x
	Inf. Calumbæ	℥ss

Mitte ℥vj.

Sig.: One-twelfth part in water t.d.s. p.c.

(The Iron and the Salicylate are both the basis of this prescription. A 'scale preparation' of iron has been chosen, as it goes well with the salicylate. Infusion of Calumba is used as the vehicle because it is one of the bitter infusions (quassia being the other) which can be prescribed with iron preparations without an unsightly mixture resulting, and a bitter helps appetite during convalescence. The

mixture is given 't.d.s. p.c.', that is to say, three times daily after food (*ter die sumenda post cibum*), as iron should not be taken on an empty stomach.)

In the great majority of cases no other treatment than this is necessary, and applications to the joints are superfluous. Where the pain is excessive and not relieved by salicylates, blistering the joints with *Liquor Epispasticus* is the most effective way of giving relief.

The third indication for treatment in acute rheumatism—to guard against heart complications—can only be met by keeping the patient completely at rest during the fever and for a fortnight after it has ceased, and by watching him carefully during convalescence.

CHAPTER III

PAIN AND THE USE OF
ANALGESICS

THE chief *indication* in any case of pain is to relieve it, for, apart from the suffering, pain exhausts a patient's strength more than anything.

In the general management much can often be done by position, by counter-irritation, and by local applications and other means, to relieve the pain at its site. It should be remembered, however, that, while some agents like aconite and belladonna act on the nerve terminals, opium acts only on the nerve centres. The local application of such a Liniment as that of Aconite, Belladonna, and Chloroform is therefore rational, but it is useless so to use preparations of opium.

In most cases, however, the use of drugs will be required, and there are two main groups to choose from: (1) *The synthetic (coal-tar) preparations*; and (2) *Opium* or one of its derivatives.

1. **Synthetic Preparations.**—In all the less severe forms of pain, such as headache and neuralgia, one of this group is usually sufficient, and even in cases of chronic severe pain, as for example that due to inoperable cancer, should be tried first.

The synthetic analgesics may be classified thus:—

a. *Acetanilide* group (derived from aniline), e.g., Antifebrin (dose 1 to 3 gr.).

b. *Phenacetin* group (derived from para-amidophenol), e.g., Phenacetin (dose 5 to 10 gr.).

c. *Antipyrin* group (derived from pyrazolon), e.g., Antipyrin or Phenazonum (dose 5 to 20 gr.), and Pyramidon (amido-pyrin) (dose 5 to 10 gr.).

Of these, the Acetanilide group is the most powerful, but is depressing to the heart and circulation, and may also act upon the blood, producing methæmoglobinæmia. The Phenacetin group is perhaps the least depressing. Phenazonum (antipyrin) has the advantage of being soluble, and can be given in mixture, but Pyramidon is in many ways the best of all of them, being efficient as an analgesic and at the same time having little toxic effect.

All of these drugs are usually given in powder, tablet, or cachet form, and Caffeine Citrate 2 to 10 gr. is often given with them to counteract any depressing tendency. They act more quickly if some hot liquid is taken at the same time. Faivre's 'oxy-quinotheine' (cachets) is a proprietary preparation, and is a powerful and popular analgesic remedy.

Acetylsalicylic Acid (aspirin) is an extremely popular synthetic analgesic, and does not tend to be toxic in moderate doses. It is usually given in tablets, which, however, should be crushed before being swallowed, and as the drug causes 'acidity' in some people it should be taken on a full stomach. A little bicarbonate of soda, if taken at the same time, will also prevent this effect.

2. **Opium and its Derivatives.**—In all severe cases of pain, opium or one of its derivatives will be called for. There are many preparations to choose from. By the mouth one can give Pil. Saponis Co. (1 to 4 gr.), Pulv. Ipecac. Co. (5 to 10 gr.), Tinct. Opii (5 to 15 mm.), Liq. Morphinae (10 to 60 min.). Nepenthe and Battley's Liquor Sedativus are unofficial preparations which are pleasanter than the tincture and are given in rather larger doses.

For hypodermic use, Morphia ($\frac{1}{8}$ to $\frac{1}{2}$ gr.) is the usual preparation to employ. Heroin ('Diacetylmorphine'), dose $\frac{1}{16}$ to $\frac{1}{8}$ gr., which is sometimes used instead, has probably no advantage over it. Omnopon and Alopon are preparations, containing all the alkaloids of opium, which can be given either by the mouth or subcutaneously, and are said to disturb digestion less than morphia.

In chronic cases of pain requiring opium it is best to begin administration by the mouth, and the dose required may be lessened by giving along with it one of the synthetic group of analgesics. A combination of Pulv. Ipecac. Co. and Aspirin is often so employed. Veramon (5 to 10 gr.)—which rejoices in the formula dimethylaminophenyl-dimethylpyrazolondiethylmalonylurea!—is a recently introduced analgesic that is said in many cases to relieve pain as well as morphia without the disadvantages of the latter. Allonal, a combination of a barbituric acid derivative with Amidopyrin, is an agent of the same class.

CHAPTER IV
INSOMNIA AND THE USE OF
HYPNOTICS

FOR purposes of treatment, cases of insomnia may be divided into two groups: (1) the secondary, (2) the primary. In the secondary group the insomnia is the result of some physical discomfort, such as pain, fever, cough, flatulence, toxæmia, and so forth. The primary or intrinsic cases, on the other hand, either arise from some psychical discomfort (worry, anxiety), or they were originally secondary cases in which, although the physical cause has disappeared, the insomnia has persisted, largely as the result of auto-suggestion. The main *indication* for treatment in both groups is to remove the cause. This is often done with comparative ease in the secondary group; but in the intrinsic cases the removal of the psychical cause may be difficult or impossible, and in any event often takes time. The following plan of treatment therefore relates specially to the primary cases, or to those cases of the secondary group in which removal of the cause and the general treatment of the associated disease have failed to restore sleep.

General Management.—Our first task should be to try to get the patient to adopt the right mental

attitude to the symptom. There is no use in telling him that it does not matter whether he sleeps or not. He knows better than that. He has probably, however, been exaggerating in his own mind the results of not sleeping, and one may certainly explain to him that there is no fear of his either dying of insomnia or of going mad as a result of it—both of which dreads have doubtless been preying on his mind. One may also point out that health can be maintained on a much smaller allowance of sleep than most people habitually take, and that complete rest and muscular relaxation are to a large extent a substitute for it. If the patient can only be got to take up this mental attitude to his trouble it is a big step towards curing the insomnia, for the latter is often being kept up through auto-suggestion; the patient does not sleep because he goes to bed dreading that he will not. If he can be got to snap his fingers at the insomnia it will often disappear.

At an early stage in the management of all severe cases the question of the relative advantages of home or institutional treatment will arise. Unless the insomnia has resulted from mental over-work (and this, in the absence of coexisting worry, is a rare cause), in which case going off for a holiday may rapidly remove it, it is best to cure the insomnia, if possible, in the environment in which it arose, though there are advantages in institutional treatment in cases requiring prolonged psychotherapy, and, of course, in all the psychoses.

Meanwhile, if the patient is to be treated at home, and especially without drugs, he must be taught to manage his insomnia pending its cure. He should have a bedroom to himself, and should be provided with food to take during the night, and some not too exciting mental pabulum as well (the novels of Anthony Trollope are very suitable), while jig-saw puzzles and 'patience' may also help to fill up the wakeful hours. By day he must cut down his activities, both mental and physical, to the minimum; he must keep warm and feed well, but eschew cerebral excitants such as tea, coffee, and tobacco in excess.

Diet.—Diet plays no special part in the treatment of primary insomnia; but tea and coffee should always be taken sparingly, especially in the later period of the day.

Drugs.—The use of an hypnotic at some period or another is indispensable in most cases of insomnia, and it is cant to say that they should only be used as a last resort. On the contrary, they should be used early and in efficient doses to prevent the insomnia becoming 'a bad habit of the brain', which is a much greater risk than that of establishing a drug habit.

Hypnotics are best administered in powder or liquid form, and are absorbed more quickly if some hot fluid is taken at the same time. Throughout the period of their administration, care should be taken to keep the bowels and kidneys active in order to favour elimination.

There are now a large number of hypnotics, which we may arrange in an ascending order of potency somewhat as follows :—

Alcohol.—A nightcap of hot whisky and water will often prove sufficient, especially in the insomnia of old people ; but there are objections to its use in younger subjects.

Bromides.—These are only effective in the milder cases, and even then must be given in full doses ($\frac{1}{2}$ to 1 drachm well diluted). The Ammonium salt is perhaps the best to use.

The Urea-bromine Compounds (Bromural and Adalin) are about ten times as potent as the ordinary bromides, and in doses of 5 to 10 gr. are very effective in the less severe cases. They are absorbed quickly and give about four hours' sound sleep, after which natural sleep may supervene, and produce no ill effects the next day. They are quite free from danger, and may be given even to children.

Trional and Sulphonal.—These are given in doses of 10 to 30 gr. Trional is the safer, and as it acts slowly is very useful in those cases in which the patient falls asleep naturally but wakes two or three hours later and is unable to sleep again.

Chloral has perhaps gone too much out of fashion. It is an effective hypnotic, but should be avoided in cases of myocardial degeneration. It is best given in the form of the Syrup in a dose of 1 to 2 drachms, which should be well diluted with an aromatic water, as the drug has an irritating effect on the stomach.

Chloralamide (chloral formamidum) is a slow but safe hypnotic in doses of $\frac{1}{2}$ to 1 drachm. It acts more rapidly if some alcohol is taken with it.

The Barbituric Acid Group includes Barbitone or Veronal, Dial (diallyl-barbituric acid), and Sodium-veronal or Medinal. These are all effective hypnotics and are now very largely used. The dose of veronal or medinal is from 5 to 10 gr., that of dial $1\frac{1}{2}$ gr. Medinal has the advantage of being easily soluble, and is therefore more rapidly absorbed than the others.

Luminal and Luminal-sodium are derivatives of barbituric acid, and are more powerful than Barbitone. The dose of each is 1 to 5 gr.

Paraldehyde is a fairly powerful hypnotic in sufficient doses, but has an unpleasant taste, besides advertising for several hours afterwards, by the odour in the patient's breath, that it has been taken. The special indications for its use, and the modes of administering it, have been considered elsewhere (p. 52).

Opium, though a powerful hypnotic, should only be used in the secondary cases where pain is keeping the patient awake (see p. 28); and *Hyoscine*, $\frac{1}{100}$ to $\frac{1}{100}$ gr. of the hydrobromide hypodermically, is reserved for cases of acute delirium or mania.

CHAPTER V

CONSTIPATION : PURGATIVES,
APERIENTS, AND ENEMATA

THE *indication* in the treatment of constipation is to remove the cause. The possible causes, however, are very numerous, and may be roughly classified thus :—

1. Mechanical, e.g., fæcal impaction, growth in the colon, etc.

2. Weakness of the abdominal muscles.

3. Deficiency of mechanical stimulus, e.g., eating too little, or diet containing too little 'roughage'.

4. Dryness of contents from excess of absorption ('greedy colon'), or too small a consumption of fluids, or defective secretion by the bowel.

5. Diminished reflex excitability, as in nervous depression.

6. Feebleness of muscle of bowel ('atonic colon').

7. Reflex inhibition of peristalsis (e.g., from an inflamed ovary or appendix).

8. Spasm of bowel wall ('spastic constipation').

There is also, undoubtedly, a psychological element in many cases of constipation, for the bowel is extraordinarily responsive to mental states and is easily thrown out of its stride—as often happens, for example, when one goes away from home.

Unfortunately it is usually quite impossible to say which, or how many, of these causes, except the mechanical, is at work in any given case, and so the plan of treatment must if necessary be so directed as to deal with all of them. Further, it is important at the outset to make sure that the patient is really constipated at all, for many patients have so lost confidence in their bowels that they go on taking a regular aperient even although they do not really need it. Before beginning treatment, then, it is advisable to stop all medicines for three days or so and see what happens ; in quite a number of cases it will be found that the bowels act well enough. If this does not occur, one proceeds as follows :—

GENERAL MANAGEMENT.

Insist on the patient making a regular daily attempt at evacuation and giving enough time to the act. See also that the seat is not too low and the closet not too cold.

Exercise certainly favours regularity of the bowels, and if the patient takes too little this should be pointed out to him, but one must not expect too much from it. As a matter of fact, of the two worst cases of chronic constipation that I have had to deal with, one was in a professional bicyclist and the other in a professional cricketer—both occupations involving a large amount of exercise. Exercises designed to strengthen the abdominal muscles are of special use, and may be taken in the form of the Muller or Sandow systems. These do not

consume much time, but are dull, and the patient is apt to tire of them, so some game, such as golf, is preferable though more time-consuming.

The abdominal muscles may also be developed and the colon stimulated by abdominal massage, and in atonic cases this is often useful. It is, however, troublesome and expensive, and the effects are rarely permanent. It is really better therefore for the patient to do it himself (auto-massage), as he can do whilst lying on his back in bed night and morning, the course of the colon being followed by deep rotary movements from right to left. Or a rubber ball filled with swan-shot and the aperture closed like a tyre puncture can be rolled round and round the relaxed abdomen instead—the use of the ‘Corporation roller’ as a wag has called it.

DIET.

In spite of the general belief, not very much can be done by diet in the treatment of constipation—at least in cases bad enough to come to a doctor at all; and indeed the principles of diet are so well understood by the laity that the patient has probably already applied them himself. The main principle is to see that the food contains a sufficiency of insoluble residue (cellulose), of water, and of the laxative principles contained in fruits. Green vegetables and fruits, especially cooked fruits, should therefore be taken freely, and whole-meal bread substituted for white. If the motions are dry, the consumption of water should be increased; and if

the local water is very hard, a distilled (*Salutaris*) or natural water (e.g., *Malvern*) substituted for it. Beer has a decidedly laxative effect apart from the water it contains. ('Who', as someone has said, 'ever saw a costive brewer?') Fats also are helpful when the motions are small and dry, and may be taken in the form of bacon-fat, butter, and salad-oil.

On the other hand, all foods which have a constipating effect, either from their leaving a small residue or from their containing an excess of such astringents as lime or tannic acid, should be avoided. Milk, egg, strong tea, and red wines come under this head.

It is only in the slighter case of constipation that the dietetic part of the plan is likely to be successful by itself, and it must be remembered that, if such a diet as that sketched out above fails to cure, it may really aggravate the trouble by producing a large and bulky residue which the enfeebled bowel has difficulty in propelling.

DRUGS.

In the great majority of cases drugs cannot be dispensed with, and the patient's mind should be disabused of the idea that there is any particular harm in taking a regular aperient provided it is of the right kind. After all, constipation is not a very serious malady, and it is not worth the patient's while to submit to big alterations in his habits or to take much trouble over diet, massage, and exercises in order to overcome it. It is simpler, less

expensive, and less troublesome to take a regular laxative and have done with it.

The number of drugs of the aperient class is legion, and there is a fashion in them just as much as there is in clothes, but they may be roughly classified as follows :—

1. **Salines.**—These include the *Sulphates of Sodium* and *Magnesium*; the *Tartrates of Potassium*; the *Citrate of Magnesium*; and the *Phosphate of Sodium*. They act directly, without being absorbed, by causing a flow of fluid into the colon which stimulates it.

2. **The Anthracene Group.**—This includes such well-known aperients as *Aloe*, *Cascara*, *Senna*, and *Rhubarb*. They act in virtue of their containing a derivative of anthraquinone which stimulates peristalsis. *Phenolphthalein* is a synthetic anthracene body which also belongs to this group.

3. **Cathartics or Drastic Hydragogues.**—This group causes an irritation of the mucous membrane of the bowel which results in the pouring out of fluid, and in large doses the irritation may be so great as almost to set up inflammation. It comprises *Jalap*, *Colocynth*, and *Croton Oil*.

4. **The Cholagogues.**—Aperients of this group produce an increased flow and discharge of bile. It includes all mercurials, as well as such vegetable substances as *Euonymin*, *Podophyllin*, and *Iridin*.

5. **The Mechanical Aperients.**—These are so called because they owe their effects to mechanical action. *Petroleum*, for instance, acts as a lubricant,

and *Agar-agar* stimulates the bowel mechanically by increasing the volume of its contents.

Common aperients which do not fall into any of the above groups are *Castor Oil*, which owes its aperient properties to ricinoleic acid ; and *Sulphur*, which acts mainly by its leading to the liberation of sulphuretted hydrogen.

As *adjuvant* to aperients, *Strychnine* is of value owing to its property of increasing the nervous excitability and tone of the intestine, whilst as *correctives* or *excipients* those agents are of special use which act as intestinal carminatives or prevent griping. *Ginger*, *Gingerine*, *Pepper*, *Hyoscyamus*, and *Belladonna* are examples.

INDICATIONS.

The indications for the use of each group of aperients may now be considered.

1. **The Salines.**—These may be used either to empty the colon rapidly in emergency, or as habitual laxatives. The Seidlitz Powder, which owes its action to the tartrate and bitartrate of potassium, is an example of the former. For habitual use the Sulphates are chiefly employed, either in the form of one of the natural sulphate waters (Hunyadi, Rubinat, Aquaperia, etc.), in the effervescing form, or as one of the numerous proprietary preparations. The sulphates are very suitable for plethoric subjects or where there is a tendency to portal congestion. They are too 'depressing' for old, debilitated, or nervous subjects.

The salines are best given before breakfast and well diluted; otherwise they tend to stay long in the stomach pending their dilution by osmosis. In the following prescription the sulphate is given in divided doses throughout the day:—

R	Mag. Sulph.	gr. xxx
	Acid. Sulph. Dil.	℥v
	Liq. Strych.	℥ij
	Syr. Zingib.	ʒss
	Aq. Ment. Pip.	ad ʒss

Mitte ʒvj.

Sig.: One tablespoonful in water three times a day after meals.

(Here the Sulphate is the basis; Sulphuric Acid is added to make a better solution; Strychnine is used as a tonic adjuvant; Ginger as the corrective; and Peppermint Water as a carminative vehicle.)

2. The Anthracene Group.—Aperients of this group are the best for regular daily use, as they have a 'tonic' effect on the bowel, are comparatively unirritating, and do not tend to lose their effect. *Aloe* is one of the oldest members of this group. It acts slowly, and is therefore often given as a 'dinner pill', e.g. :—

R	Ext. Aloes	
	Ext. Nucis Vom.	
	Ext. Hyoscyami	āā gr. ss
	Ext. Gent.	q.s.

Fiat pil. Mitte tales xxiv.

Sig.: One at dinner-time.

(Aloe is here the basis; Nux Vomica is the tonic adjuvant, Hyoscyamus the corrective to obviate

gripping, and Extract of Gentian the excipient or vehicle to form the pill mass.)

Aloe should be avoided by patients with piles, as it increases rectal congestion. It is also unsuitable in pregnancy, as it has some stimulating effect on the uterus.

Cascara is now a very favourite aperient, and is given either in Tablet form, or as the Liquid Extract made up with carminatives and flavouring agents. Like wine it improves with keeping, and a well-matured specimen is the best to use. It acts quickly enough if given at bedtime.

R	Ext. Cascar. Liq.	℥ xxx
	Tinct. Card. Co.	℥ xx
	Tinct. Bellad.	℥ v
	Ext. Glycyrrhiz. Liq.	℥ xxx
	Aq. Chlorof.	ad ℥ j

Mitte ℥ viij.

Sig.: Two tablespoonfuls in a wineglassful of water at bed-time.

(*Cascara* is the aperient basis; Cardamoms, Belladonna, and Liquorice are correctives, the first being used for its carminative action, the second to prevent gripping, and the third as a flavourer. Chloroform water is a flavouring vehicle.)

Senna may be used either as a decoction of the leaves (*sennæ folia*) as in *Mist. Sennæ Co.* (the old black draught), or, better, as an infusion of the pods (*sennæ legumina*). There are few better regular laxatives, especially for women, than senna pods. They should be soaked in cold water—not hot, for that extracts a gripping principle—and for

not longer than three hours. If put in to soak when the patient is dressing for dinner they are ready to drink by bedtime. A few drops of essence of ginger may be added by those who find them 'cold'.

Rhubarb enters into various official preparations such as the old 'peristaltic persuader', Pil. Rhei Co., and Gregory's Powder (Pulv. Rhei Co.). It is also often given as an alkaline carminative and aperient draught :—

R Pulv. Rhei	gr. xxx
Sod. Bicarb.	gr. xv
Spt. Myristicæ	℥ xv
Syr. Zingib.	℥ ss
Aq. Menth. Pip.	ad ℥ j

Mitte ℥iv.

Sig.: Two tablespoonfuls in water as required.

(The Powdered Rhubarb is the aperient basis, and Sod. Bicarb. the alkaline one; the Spirit of Nutmeg and the Syrup of Ginger are carminative correctives, and Peppermint Water a carminative vehicle.)

3. The Cathartics and Hydragogues are not suitable for habitual use, but should be reserved for those cases in which a smart purge is required, along with the removal of fluid from the body, as in dropsy. Pulv. Jalap. Co. and Pil. Colocynth. Co. are the usual form in which they are prescribed. *Scammony* and *Elaterium*, also members of the group, are now little used.

4. The Cholagogues are useful in cases in which, in addition to an aperient effect, the stimulation of the liver and the removal of bile are called for.

They are therefore often used in conditions of 'biliousness'. *Mercury* is the great example, and is used either as Pil. Hydrarg. (blue pill) or as Calomel. If blue pill is chosen, it is usual to give 4 or 5 gr. at night and follow it up with a saline, e.g., a small Seidlitz powder, in the morning. Calomel has more of an aperient action of its own, but in large doses is apt to irritate the colon. It is therefore best to give either a small daily dose ($\frac{1}{10}$ to $\frac{1}{8}$ gr.) or a dose of $\frac{1}{4}$ to $\frac{1}{2}$ gr. at longer intervals. If the smaller dose is given, it should be followed by a saline next day.

Podophyllin is the best of the vegetable cholagogues, but is rather apt to gripe. It is an ingredient of many 'liver pills', e.g., Carter's, in a dose of about $\frac{1}{8}$ gr. of the resin.

5. The Mechanical Aperients.—*Petroleum Oil* in recent years has become very popular as a laxative, as it acts purely as a lubricant and is quite unirritating; it has also the advantage of keeping the fæces soft. On the other hand, it is only effective in the slighter cases of constipation, and sometimes 'runs through' the patient without exerting any aperient effect. Some patients also find it 'bilious'. It may be given plain ($\frac{1}{2}$ oz. once or twice daily), soda water being a very suitable vehicle, as the 'prickliness' masks the oiliness, or emulsified in various ways, or incorporated with malt preparations (Cristolax, Virolax, etc.), the latter being specially suitable for children.

Agar-agar also is quite unirritating and acts as a mechanical stimulus. It is, however, rather

inconvenient to take. It is combined with petroleum in the preparation known as Petrol-agar.

Castor Oil is specially suitable as an occasional purge or for emergency use. It acts both on the small and large intestine, and is unirritating, but has a 'constipating' after-effect.

Sulphur is a very mild laxative, and has the special property of keeping the motions soft. It is therefore often prescribed (e.g., as the Confection) in cases of hæmorrhoids. It imparts, however, an unpleasant odour to the motions and intestinal gases.

In some cases of chronic constipation the difficulty is entirely one of emptying the pelvic colon (so-called *dyschezia*). This may be the result of weakness of the abdominal muscles (as after childbirth), of a feeble rectal reflex (as in disease of the nervous system and in young infants), or of mechanical causes such as retroflexion of the uterus or an enlarged prostate. In such circumstances it may not be possible for the patient to get the bowels to act unless so large a dose of an aperient is taken that the stools become fluid. Rather than do this it is better to 'appeal to the bowels from below' as an old physician used to say, by the use of enemata or stimulating suppositories.

Enemata act (*a*) mechanically by distending the bowel and inducing reflex contractions of it; (*b*) thermally in virtue of their temperature, whether hot or cold; (*c*) chemically, if they contain stimulating ingredients such as soap or glycerin. They may be divided into three classes :—

1. *High Enemata*, consisting of three pints or more, which are intended to act upon the whole colon. These are best administered from a douche can raised not more than two feet above the level of the couch, and through a tube introduced about four inches into the rectum. (There is no use in trying to push the tube higher—it simply coils up.) Enemata of this size are not often used unless for lavage of the whole colon.

2. *Ordinary Enemata*, designed to act on the pelvic colon and rectum, of a volume of about one pint, and best administered by means of a Higginson syringe. This is the enema in general use. For occasional clearance of the bowel, soap may be added, but for habitual use plain water—hot or cold—is preferable.

3. *Rectal Enemata*, which act on the rectum only and are of about 4 oz. volume. They are usually made more stimulating by the addition of glycerin (half and half or more), and are best given by means of a pear-shaped rectal syringe.

Glycerin Suppositories act similarly.

CHAPTER VI

DIARRHŒA

AND THE USE OF ASTRINGENTS

THE *indications* for treatment in a case of acute diarrhœa are : (1) To remove any source of irritation in the bowel ; (2) To arrest secretion ; (3) To lessen peristalsis.

General Management.—In all severe cases the patient should be kept in bed. If there is much colicky pain, hot applications may be made to the abdomen.

Diet.—The diet should be such as will leave only a small residue in the bowel, and may consist of water or barley-water only, sugar drinks, broths, milk freely diluted with barley-water, and farinaceous preparations (arrowroot, cornflour, etc.).

Drugs.—Any source of irritation in the bowel should, if the case is seen at the outset, be removed by giving a full dose of Castor Oil, to which a few drops of Tinct. Opii may be added with advantage :

R	Ol. Ricini	℥ss
	Tinct. Opii	℥v
	Syr. Zingib.	℥ss
	Mucilag.	q.s.
	Aq. Ment. Pip.	ad ℥j

Fiat haustus.

Sig. : To be taken at once.

(The basis is Castor Oil ; Tincture of Opium acts as an adjuvant by lessening griping ; Syrup of Ginger is used as a carminative corrective. Mucilage is added in quantity sufficient to make an emulsion, and Peppermint Water is used as a carminative vehicle.)

In order to fulfil the other indications—arrest of secretion in the bowel and lessening of peristalsis—various drugs are available :—

1. As *sedatives, protectors of the mucous membrane, and neutralizers of acids*, the lime salts (Chalk and Calcium Phosphate) are useful.

2. *Astringents* are of three classes :—

a. Vegetable astringents which act in virtue of their containing tannic acid or allied substances. Catechu and Logwood are examples.

b. Mineral astringents such as the Acetate of Lead and the Sulphates of Zinc and Copper.

c. Mineral Acids such as Dilute Sulphuric.

3. To *lessen peristalsis* some preparation of *Opium* is most suitable.

These remedies are usually employed in combination, as exemplified in the following prescriptions :—

R	Tinet. Opii	℥ iij
	Tinct. Catechu	℥ xx
	Mist. Cretæ	ad ℥ ss

Mitte ℥vj.

Sig. : One-twelfth part in a little water every six hours.

(This time-honoured prescription for diarrhœa is a good example of medicinal 'team-work'. The

Opium lessens peristalsis, the Catechu acts as a vegetable astringent, and the Chalk Mixture as a neutralizer of acids and as a carminative.)

R Acid. Sulphurici Aromat.
 Glycerini āā ℥_{xv}
 Inf. Krameriaë ad ℥_j

Mitte ℥_{viiij}.

Sig. : Two tablespoonfuls in water three times
 daily after food.

(This represents a combination of a mineral acid astringent with a vegetable one. Like all mixtures containing mineral acid it is given *after* food.)

CHAPTER VII

HEART FAILURE AND THE USE OF
HEART STIMULANTS, HEART TONICS
AND DIURETICS

WE may consider as types: (1) *Rapid or sudden heart failure* as it may occur, for instance, in any acute infective disease, using pneumonia as our illustration; (2) *Gradual heart failure* such as is apt to supervene in a case of old-standing valvular or myocardial disease.

1. TREATMENT OF PNEUMONIA.

As we have as yet no specific for pneumonia, the chief *indication* for treatment is to maintain the patient's strength, and especially to obviate exhaustion of the heart and nervous system. The factors leading to exhaustion are several, and comprise pain, cough, insomnia, obstruction to the pulmonary circulation, and, most important of all, toxæmia. The first three of these we can to some extent deal with, but the two last are scarcely within our control. The prevention of heart failure and the promotion of sufficient sleep are the two cardinal objects to be kept in view.

General Management.—Skilled nursing is of

great help. The general scheme is the same as in any fever, but good ventilation is very important. The patient should wear a 'Gamgee jacket' under a flannel garment, preferably one opening down the back. It is the custom in most hospitals to have the patient well propped up, but unless he wishes it this is unnecessary, and the more nearly recumbent he is the less the work of the heart. The patient, in order to conserve his strength, must be spared every effort, however slight; he should not even feed himself, should not be encouraged to talk, and the less he is examined after the diagnosis has been made the better.

The Diet should be a fluid one (*see* FEVER, p. 14), but particular care should be taken not to over-feed. As the disease is one of short duration, the patient can get on with very little. Sugar, however, should always be given in some form, as it is a valuable heart food besides counteracting any tendency to starvation acidosis. Alcohol is unnecessary as a routine. The indications for its use are the same as in any other fever (p. 16).

Drugs.—In many cases of pneumonia, especially in children, drugs can be done without altogether, but if one must give a 'placebo' a simple diaphoretic mixture (p. 18) will be the best. In all cases, however, in which one has any reason to fear that heart failure may set in—and this will comprise most cases of patients in middle life or beyond it, and all those in which blood-pressure is very low, the heart quick or irregular, or the toxæmia

profound—the use of a *heart tonic* should be begun early and without waiting for the early signs of failure. There are two to choose from—Digitalis and Strophanthus. Digitalis is not so quick in its action, but is more reliable than strophanthus, although if a really trustworthy preparation of the latter is obtainable there is nothing better.

Digitalis may be given in 10-min. doses of the Tincture every four hours. It may be added to a diaphoretic mixture, or given simply in $\frac{1}{2}$ oz. of Aqua Chloroformi.

If the Tincture of Strophanthus is used, it should not be added to a mixture, as it is then apt to decompose, but should be measured out from the pure tincture as required, and given immediately with a little water; 5 min. four-hourly should be sufficient.

One or other of these drugs so used should prevent heart failure *if it can be prevented at all*; but it must be remembered that in many cases of acute infective disease the poisoned heart seems to be incapable of responding to remedies. If heart failure comes on suddenly in a patient not taking Digitalis or Strophanthus, the most rapid and efficient agent is $\frac{1}{200}$ gr. Strophanthin injected into a vein. The Hypodermic Injection of Strychnine ($\frac{1}{80}$ to $\frac{1}{40}$ gr.) has long been popular in this country, whilst Camphor ($1\frac{1}{2}$ to 3 gr. in sterile olive oil intramuscularly) has been more favoured on the Continent. There is very little evidence, however, that either of these has any real effect on the heart.

There is perhaps more to be said for Caffeine ($\frac{1}{2}$ gr. of the Sodio-salicylate hypodermically). Alcohol, as has already been pointed out, is useless as a heart *stimulant*, though it may help to spare the heart indirectly by calming the patient.

The other chief use of drugs in pneumonia is to promote sleep, and it is often difficult to do this both effectively and safely. In the early stages Morphia ($\frac{1}{4}$ gr. hypodermically) is much the best drug to use, and one should not hesitate to employ it if there is any insomnia in order that the patient may have some 'sleep in hand' when the later days of the illness are reached. It is rarely safe to use morphia after the fifth day, though to this, as to most rules of treatment, there are many exceptions. The question of what substitute to use for morphia in the later stages of an attack is often a difficult one. Chloral has gone rather out of fashion, but should perhaps be more often used than it is; 15 to 20 gr. should be an efficient dose. The late Dr. G. W. Balfour used as his 'routine' treatment for pneumonia a mixture containing 10 gr. of Chloral and 10 min. of Tincture of Digitalis given every four hours, which he found enabled most of his patients to 'sleep through their pneumonia'. Paraldehyde is probably the safest hypnotic, but its smell and taste are objectionable. It is commonly used in too small a dose. At least 2 drachms should be given by the mouth, and it may be administered either in milk or in iced water or flavoured with an equal quantity of Syrup of

Orange, the dose being made up to an ounce with the Infusion of Orange. It may also be administered per rectum—3 to 4 drachms being given as an enema in 6 oz. of Starch Mucilage. In order to prevent pain and smarting, some vaseline should be smeared round the anal orifice.

Of the special symptoms which arise in pneumonia and which help in producing exhaustion, pain is only likely to be felt at the outset. It may then, however, be very severe, and is best relieved by morphia. Local applications such as the linseed and mustard poultice are also helpful, the modern Kaolin poultices (antiphlogistine, etc.) being less effective. Constipation is best left alone, and aperients avoided as far as possible except perhaps at the very beginning of the disease. To have to use the bed-pan is very exhausting to the patient, and if he is taking, as he should be, very little nourishment, his bowels need not be called upon to act unless the abdomen is distended, in which case an enema is the best means of giving relief.

Obstruction to the pulmonary circulation cannot be dealt with directly ; but if there are signs of great engorgement of the right side of the heart, *venesection*, to the extent of 15 or 20 oz., is always worth doing. The blood may be withdrawn either from the jugular vein or from the arm. Cough is rarely troublesome enough to require treatment, but if the sputum is very sticky and brought up with difficulty, 2 or 3 gr. of Iodide of Potassium may be added to each dose of the digitalis mixture.

We have no certain means of combating the toxæmia, but the injection of Antipneumococcal Serum is sometimes helpful (see SPECIFIC THERAPY, p. 135). If the patient is much cyanosed, the *continuous* inhalation of Oxygen should never be omitted. It is best administered through a fine catheter passed into the nose.

2. TREATMENT OF GRADUAL HEART FAILURE IN VALVULAR OR MYOCARDIAL DISEASE.

In the management of a case of valvular or myocardial disease the chief *indication* is to prevent or delay by all possible means the onset of failure. In order to prevent breakdown of compensation and heart failure the patient's whole life must be regulated. Over-exertion is particularly to be avoided, and the patient should not do more than he can do without getting out of breath; for the myocardial cases particularly ('senile heart') it may be said that he should never "walk when he can ride, never stand when he can sit, and never sit when he can lie"; but quiet walking on the level, if it can be done without breathlessness, may be helpful. Stairs should be avoided, and a lift (when available) used instead. At least nine hours in the twenty-four should be spent in bed.

The *diet* should be one designed (*a*) to keep down body fat and fluids to a minimum, (*b*) to prevent flatulence as far as possible. It should therefore be a dry, spare diet from which articles rich in cellulose

(vegetables and raw fruits) are eliminated,* and in which starchy foods are restricted. Crisp toast and rusks should be substituted for bread, potatoes taken very sparingly, and bulky puddings avoided altogether. As little fluid as possible should be taken at meals, and not very much between them. The chief meal should be in the middle of the day.

The most useful *drug* to obviate failure is *Digitalis*. It should not, of course, be used as a routine in all cases of valvular disease, but is indicated (*a*) in many cases of myocardial degeneration with threatened failure in elderly persons (senile heart), and (*b*) in cases of mitral disease with auricular fibrillation.

Digitalis is a cumulative drug, and it is important therefore to be careful in dosage. Ten minims of the Tincture night and morning is quite safe and—in the senile cases especially—often effective. Valvular cases with fibrillation may take 10 min. three times a day. It is often more convenient to use Nativelle's digitalin, of which one of the weaker (pink) granules may be taken night and morning, or one of the stronger (white) granules† once in the twenty-four hours. A patient soon gets to know the dose that suits him. In patients with high blood-pressure it is sometimes recommended

* A squeeze of lemon-juice may be used as a substitute for green vegetables.

† The pink granules contain $\frac{1}{30}$ gr., the white $\frac{1}{15}$ gr. One of the white granules is about equal to 15 min. of the tincture.

that a few grains of Iodide of Potash should be given with the digitalis, and, although there is no clear evidence that iodides lower blood-pressure, their administration with the digitalis does seem sometimes to answer in practice.

When compensation has actually broken down and failure supervened, the *indications* for treatment are: (a) To rest the heart by lessening its work; (b) To remove peripheral obstructions to the circulation such as dropsy; (c) To increase the force of the systoles and to prolong the diastoles, thus improving the efficiency of the contractions and lengthening the resting time of the heart.

General Management.—Complete rest in bed is now imperative; but if there is much dropsy the patient may be more comfortable sitting in a chair, well propped up, and with a firm table in front of him on which he may lean forward at times.

Diet.—In severe cases of failure, and especially if there is much dropsy, the diet must be greatly restricted. If the patient can take small dry meals, good and well, but in many cases fluids only can be borne. In such circumstances 2 pints of milk in small feeds may be allowed, but the total quantity of liquid taken should not exceed this quantity.

Drugs.—Digitalis should be given in efficient doses, and if there is much dropsy may be combined with *diuretics*.

Diuretics may be divided into three classes:—

a. *Saline*, which act by increasing the osmotic

pressure in the blood, and by so doing attract fluid to it from the tissues. The vegetable salts of Potash are the best example of this class.

b. Stimulating, which act by dilating the renal blood-vessels. Caffeine and its allies and Scoparium are examples.

c. The Cardiovascular, which increase the flow of blood through the kidney by raising the efficiency of the heart. Digitalis and Squill act in this way.

Diuretics, like so many other therapeutic agents, act best in combination or as a 'team', and the following may be taken as a standard prescription in cardiac dropsy :—

R	Pot. Acet.	gr. xx
	Tinct. Digitalis	℥xv
	Syr. Limonis	ʒj
	Inf. Scoparii	ad ʒj

Mitte ʒvj.

Sig.: One-twelfth part in a little water every four hours.

(The Acetate of Potash and Digitalis may both be regarded here as the basis of the prescription. The Syrup of Lemon is a flavourer, and the Infusion of Scoparium is both a vehicle and an adjuvant, as it contributes to the diuretic effect of the whole mixture. The Acid Tartrate sometimes acts better than the Acetate of Potash.)

Under the influence of such a diuretic combination a flow of urine should be established in about forty-eight hours, and should continue for some days. It is important, however, to be able to recognize the signs that too much digitalis is being

given. They are these : (a) Disturbance of digestion (nausea or vomiting, and perhaps diarrhoea). (b) The pulse-rate falling below 60, with a tendency to coupling of the beats. This results in the 'bigeminal' pulse, which is due to the interposition of an extra systole after each normal beat. (c) A falling off in the quantity of urine. If these signs appear, the frequency of administration of the mixture should be reduced to three times in the twenty-four hours. So long, however, as diuresis is maintained, it may be assumed that the medicine is doing good.

In some cases, especially I think where there is much congestion of the liver, a combination of Mercury with Digitalis gives the best results, as in the time-honoured Guy's or Baillie's pill :—

R Pulv. Digitalis
 Pulv. Scillæ
 Pil. Hydrarg. āā gr. j
 Fiat pil. Mitte tales xxiv.
 Sig.: One every four to six hours.

(The Digitalis and Squill in this prescription act as cardiovascular diuretics, 1 gr. of powdered digitalis being equal to 10 min. of the tincture. The Mercury (Blue Pill) probably acts by lessening portal congestion. Grey Powder (Hydrarg. c. Cret.) is sometimes used instead in the same dose.)

The other main indications for the use of drugs in chronic heart failure are (a) to allay irritability of the stomach, (b) to promote sleep, and (c) to relieve the bowels.

Vomiting may be a troublesome symptom, and, when not set up by digitalis, is due to a gastric catarrh the consequence of chronic portal congestion. A Bismuth Mixture will usually alleviate it (p. 89). If it is persistent, it may necessitate the giving of the digitalis either in the form of a pill or as digitalin (p. 55).

For the promotion of sleep there is nothing better than Morphia. Fortunately heart patients stand morphia well, and it often acts like a charm, and after a night or two's good sleep from its use the efficiency of the heart will be found to be greatly improved. If there is much congestion of the lungs, morphia may be dangerous, and in that case one should use Paraldehyde, as in pneumonia (p. 52).

To promote the action of the bowels, a morning Saline may be given (p. 39), and some preparation of Mercury should be used as well if there is much portal congestion (p. 43). The production of fluid actions helps to some extent to remove dropsy.

If diuretics fail, the dropsy should be removed mechanically, and indeed this method is so successful that it should be used oftener and earlier than it is. In order to carry it out, the patient should either be sat in a chair for some hours to let the fluid accumulate in the legs, or, if he is unable to get up, the head of the bed should be raised so that he lies on an inclined plane. The skin of the legs is sterilized with a weak solution of iodine, and the fluid evacuated either through a Southey's tube

inserted into the subcutaneous tissue in each leg and leading into a vessel below the bed ; or by means of a number of parallel incisions through the skin with a tenotomy knife, the fluid being either allowed to run down the legs into a tin basin or, if the patient is in bed, received into a mass of wool.

The abdomen may also be tapped with advantage, and so may a hydrothorax if it exists (pp. 153 and 154).

The indications for the use of oxygen and for venesection are the same as in the rapid heart failure of pneumonia.

CHAPTER VIII

BRONCHITIS: EXPECTORANTS AND
ANTISPASMODICS

ACUTE BRONCHITIS.

THE *indications* for treatment in acute bronchitis are to maintain the strength of the patient, and especially the strength of his heart, and to deplete the tubes and relieve cough by promoting free expectoration.

1. **General Management.**—As acute bronchitis is a febrile complaint, the patient must be confined to bed and nursed as in any other fever. Particular care should be taken to maintain the temperature of the room at a uniform level of 65°, and especially not to let it fall during the night. In the early stages the air of the room should be kept moist by a bronchitis kettle, but the addition of any medicament to the steam is of doubtful utility. The patient should be clothed as in pneumonia (p. 50). Counter-irritation of the chest is certainly of value, and a word or two may be said about the method here, as it has rather tended to fall into disuse in modern medicine.

The practice of counter-irritation is based upon the belief that it is possible to affect the circulation

in an underlying organ by causing a dilatation of the superficial vessels in the skin over it. The older writers believed that it acted simply by 'determining' blood to the surface and so depleting the organ below. When the mechanism of referred and reflected pain became understood, the theory gained ground that counter-irritation might act, not through the vascular system, but by affecting the blood-supply or nutrition of an organ through the medium of a reflex nerve mechanism. Whatever its mode of action, however, experience shows that counter-irritation often does good, and it certainly does so in the early stage of an acute bronchitis. It is best employed in the form of linseed and mustard poultices. These should be applied to the back, where they are nearest to the main bronchi and where they do not hamper respiration by their weight, and should be changed every three hours.

The Diet in the early stages of an acute bronchitis may be summed up in the words 'hot slops', for hot liquids tend to promote bronchial secretion; once this is established, the diet is the same as in any fever.

Drugs.—The drugs used belong to the class of *expectorants*. These may be divided into two groups according to their influence on the circulation: (*a*) the depressant, (*b*) the stimulant. The chief depressant expectorants are Ipecacuanha, Antimony, Iodide of Potassium, and the soluble alkalis; the chief stimulant expectorants are

Carbonate of Ammonium, Squill, and the Volatile Oils.

The iodide, alkalis, and oils act directly upon the mucous membrane of the bronchi; the others act reflexly through the stomach. Ammonium Carbonate acts partly by increasing the excitability of the respiratory centre, an action which is also possessed by Strychnine, and in virtue of which strychnine too may be classed as an expectorant. In acute bronchitis the 'sedative' expectorants should alone be used.

The following are typical prescriptions:—

1.—	R	Pot. Iod.	gr. iiss
		Pot. Bicarb.	gr. xv
		Syr. Tolu	ʒj
		Aq. Anisi	ad ʒss

Mitte ʒvj.

Sig.: One-twelfth part in a little water every two or three hours.

(The basis of this prescription is the Iodide of Potassium, which is given in a small dose, as small doses stimulate secretion more than large ones; the adjuvant is the soluble alkali, Bicarbonate of Potash. The corrective is Syrup of Tolu, which acts as a flavouring agent and local demulcent on the throat. Other favourite flavourers which might have been used are the Syrup of Virginian Prune, Glycerin, and Liquid Extract of Liquorice. The vehicle is Aniseed Water, which is also a flavourer, besides containing a small amount of volatile oil. The mixture is given at frequent intervals in order to produce the greatest effect.)

2.—	B	Vin. Ipecac.	℥ xv
		Liq. Ammon. Acet.	ʒ ij
		Syr. Prun. Virgin.	ʒ j
		Aq. Camph.	ad ʒ ss
		Mitte	ʒ vj.

Sig. : One-twelfth part in water every three hours.

(Here Ipecacuanha is taken as the basis ; Vinum Antimoniale might have been used instead of it. Liq. Ammon. Acet. is employed as an adjuvant to reduce fever by diaphoresis ; Virginian Prune is used as the flavourer ; and Camphor as a mildly stimulating vehicle.)

If the *cough* is very distressing, $\frac{1}{2}$ drachm Tinct. Camph. Co. might be added with advantage to either of these prescriptions. The drug treatment of threatened *heart failure* is the same as in pneumonia (p. 49).

Insomnia in acute bronchitis is difficult to treat unless it can be overcome by such mild measures as a little whisky and hot water in the evening. Morphia can rarely be used with safety, and indeed sound sleep, however produced, is not without danger, as it involves retention of the bronchial secretion. As far as possible, therefore, hypnotics should be dispensed with. Paraldehyde used as in pneumonia is perhaps safest ; but sometimes 10 gr. of Dover's Powder, with the addition of $\frac{1}{2}$ gr. of Calomel to prevent constipation, acts well.

Where *spasm* of the tubes coexists with the bronchitis, as in so-called 'bronchitic asthma', the 'antispasmodics' are of service. Some of these, such as Belladonna, Stramonium, Lobelia, and

(Fowler's Solution) to the prescription for its sedative action on the respiratory centre. It may also tend to lessen the risk of an iodide rash.)

Adrenalin, Atropine, and Morphia are only given in an actual paroxysm of asthma, and are administered hypodermically. The dose of Adrenalin is 3 to 5 min. of the 1-1000 solution; that of Atropine $\frac{1}{100}$ gr.; that of Morphia $\frac{1}{4}$ gr.

CHRONIC BRONCHITIS.

The indications for treatment here are much the same as in acute bronchitis, but prevention must always enter into the plan. Preventive measures involve residence in a warm dry climate where possible, or, failing that, the avoidance, as far as the patient's circumstances permit, of cold, damp, fog, and dust. The patient's house, and especially his bedroom, must be properly warmed, and open windows avoided in the winter. He must be warmly but lightly clothed, and if he has to go out of doors in inclement weather may with advantage wear a respirator. The diet must depend on the patient's general condition. In fat bronchitics the carbohydrates should be restricted so as to bring about some loss of weight; in thin subjects the amount of fat in the diet should be increased. If flatulence is troublesome, meals should be taken dry, and greenstuffs and raw fruits left out. Alcohol is often harmful, and should be forbidden altogether or strictly rationed; nor should the patient smoke.

Drugs.—In chronic bronchitis the ‘stimulating’ expectorants are most suitable :—

R	Ammonii Carb.	gr. iv
	Tinct. Scillæ	
	Tinct. Nucis Vom.	āā ℥x
	Spt. Chlorof.	℥xx
	Inf. Senegæ	ad ℥ss

Mitte ℥vj.

Sig. : One-twelfth part in water three times daily after food.

(The basis of this prescription is the stimulating expectorant Carbonate of Ammonium ; the Tincture of Squill and Tincture of Nux Vomica are adjuvants, the former being both an expectorant and a cardiac tonic, whilst nux vomica increases the excitability of the respiratory centre ; Spirits of Chloroform has been taken as the corrective, acting both as a flavourer and a carminative, whilst the Infusion of Senega is used as an expectorant vehicle.)

If the expectoration is very profuse, one may use turpentine :—

R	Terebeni Pur.	℥x
	Syr. Simplicis	℥j
	Mist. Amygdalæ	ad ℥j

Mitte ℥xij.

Sig. : Two tablespoonfuls three times daily after food.

(The basis here is the Terebene ; no adjuvant is used, but Simple Syrup is added as a flavourer, and the Almond Emulsion as a vehicle to keep the terebene in suspension. Terebene can also be administered conveniently in capsules.)

Counter-irritation is useful in chronic bronchitis, and *Linimentum Terebinth. Acet.* may be well rubbed into the front and back of the chest night and morning as a 'rubefacient'.

CHAPTER IX
ANÆMIA AND THE USE OF
HÆMATINICS

THE chief *indication* for treatment in anæmia is to do everything that will arrest blood destruction and promote blood formation.

General Management.—In all severe cases the patient should be kept in bed, because rest obviates some of the consequences of anæmia (such as dyspnœa), and because it lessens blood destruction. The benefits of open air and sunshine should be secured as far as is possible. Attention should be given to stopping all losses of blood (e.g., recurring epistaxis, bleeding from piles, from the uterus, etc.), and to the removal of all foci of sepsis.

Diet.—There are no special dietetic indications in anæmia, as much must depend upon the patient's digestive power. It is scarcely necessary to trouble about giving foods rich in iron, as it is much easier to give the metal in the form of medicine.

Drugs which improve the quality of the blood are spoken of as *Hæmatinics*. In all cases of *secondary anæmia* in which the percentage of hæmoglobin is much reduced, *iron* is indicated. There are a great many preparations of it, which may be classified as follows :—

1. INORGANIC PREPARATIONS.—

a. Ferrous Compounds.—The sulphate, carbonate, iodide, and phosphate. The sulphate is contained in the Pil. Ferri (1 gr. in a 5-gr. pill); the carbonate in Ferri Carb. Sacch. (dose 10 to 30 gr.) and Mist. Ferri Co. ($\frac{1}{2}$ to 1 oz.); the iodide in Syr. Ferri Iod. ($\frac{1}{2}$ to 1 drachm); the phosphate in Syr. Ferri Phos. and in Syr. Ferri Phos. c. Quin. et Strych., the dose of either being $\frac{1}{2}$ to 1 drachm.

b. The Scale Preparations.—These comprise: Ferrum Tartaratum, Ferri et Ammonii Citras, Ferri et Quininæ Citras. The dose of each is 5 to 10 gr.

c. Ferric Compounds.—Tinct. Ferri Perchlor.; Liq. Ferri Acetatis. The dose of these is 5 to 15 min. (The Liq. Ferri Perchlor. and Liq. Ferri Pernitratis are not often used internally.)

2. ORGANIC PREPARATIONS.—In these the iron is contained in an organic molecule—such as an albuminate, peptonate, nucleinate, etc. There are many proprietary preparations of the sort to choose from.

Some general rules are to be observed in the administration of iron whatever preparation is employed. First, it should be given in full doses; secondly, it should always be given after meals so as to avoid gastric irritation; thirdly, as iron is constipating, special attention should always be given to the bowels whilst it is being taken.

As to the choice of a preparation: the ferrous compounds are the least irritating and answer

most requirements; the 'scale' preparations are 'elegant' and mix well with other medicines, but are rather more irritating than the ferrous compounds. The ferric compounds are the most irritating. The organic preparations are said to affect the stomach and bowels less than the inorganic, and are therefore believed to suit those who cannot 'digest' the inorganic salts. It is doubtful, however, whether there is much in this contention, as both are probably absorbed in the same form, and whether there is any real advantage in the organic preparations to compensate for their greater cost.

PRESCRIPTIONS.—

An Effervescing Mixture :—

℞	Ferri. et Ammon. Cit.	gr. x
	Acid. Citric.	gr. xv
	Syr. Limonis	ʒj
	Aq.	ad ʒj

Sig. : No. 1.

℞	Pot. Bicarb.	gr. xx
	Aq.	ʒj

Sig. : No. 2.

Mix equal parts of (1) and (2) and take during effervescence.

(Drugs given in effervescent mixture are often better borne than when administered in the usual way. In this prescription the scale preparation Iron and Ammonium Citrate is the basis, the Citric Acid and Pot. Bicarb. produce the effervescence by their mixture, whilst the Syrup of Lemon is used as a flavourer.)

An Aperient Iron Mixture:—

R	Ferri Sulph.	gr. iv
	Mag. Sulph.	ʒss
	Acid. Sulph. Dil.	℥v
	Tinct. Zingib.	℥xx
	Inf. Quassia	ad ʒj

Mitte ʒxij.

Sig.: Two tablespoonfuls in a wineglassful of water three times daily after food.

(Sulphate of Iron is the basis; Sulphate of Magnesium is added as an aperient to counteract the constipating tendency of the iron; the Sulphuric Acid is to ensure a clear solution; the Tincture of Ginger is to prevent griping; and Infusion of Quassia is one of the bitter infusions which is compatible with iron as it contains no tannin. In the days when chlorosis was a common disease, this mixture was very often prescribed.)

There is such a large choice both of official and of proprietary preparations of iron that it is rarely necessary in practice to write a special prescription for it. The above, however, will serve as examples.

In the *primary anæmias* (Addisonian anæmia, the leukæmias, etc.) there is little to be done except to treat symptoms. The general management, etc., are the same as in a severe secondary anæmia.

Drugs are of little use, but Arsenic is usually prescribed, and, in the case of Addisonian anæmia especially, often seems to bring about a temporary improvement; but whether it acts by stimulating the bone-marrow or by interfering with some hæmolytic agent is undetermined.

Arsenic may be prescribed either as the *Liquor Arsenicalis* (Fowler's Solution), which is alkaline, or as the *Liquor Arsenici Hydrochloricus*, which is acid. The dose of each is from 2 to 8 min. Arsenious Acid may be prescribed as such in pill form ($\frac{1}{8}$ to $\frac{1}{4}$ gr.). The Arseniate of Iron is of little practical use, for if one prescribes enough of it for the iron to have any effect one will be giving too much arsenic. If it is desired to give iron and arsenic together, one may use some such prescription as this :—

℞	Tinct. Ferri. Perchlor.	℥x
	Liq. Arsenici Hydrochlor.	℥ij
	Glycerini	℥xv
	Aq. Ment. Pip.	ad ℥ss

Mitte ℥vj.

Sig. : One-twelfth part in water three times daily after food.

(The Acid Preparation of Arsenic is used here because *Tinct. Ferri Perchlor.* is acid; Glycerin is used to cover the roughness and astringency of the iron; and Peppermint is an agreeable flavouring vehicle. This mixture, as always with iron and arsenic, is taken after meals.)

℞	Acidi Arseniosi	gr. $\frac{1}{16}$
	Pil. Ferri	gr. iv

Fiat pil. Mitte xij.

Sig. : One pill three times daily after food.

The *Liquor Sodii Arsenatis* can be used hypodermically (5 min.), and acts rapidly and powerfully. It may be employed with advantage where there is much gastric irritability.

There are also many *organic* preparations of arsenic. In these, the metal, being in combination with a carbon molecule, is less toxic. Examples of such preparations are Sodium Cacodylate and the various modifications of Salvarsan. They are administered hypodermically or intravenously, but are more employed for the destruction of protozoa than in the treatment of anæmia.

Transfusion of whole blood (p. 149) is of great temporary value in all cases of severe anæmia, and, where there has been a sudden loss of blood, may save life. It has no *curative* effect, however, in the primary anæmias.

CHAPTER X

HIGH BLOOD-PRESSURE, AND THE
USE OF VASODILATORS

HIGH blood-pressure secondary to renal disease is probably compensatory and is best left alone. Primary high blood-pressure (hyperpiesia), on the other hand, may be a legitimate object of treatment, though it is easy to treat it too zealously, and most physicians are now content if the pressure can be kept within reasonable limits.

We are handicapped in the treatment of primary high pressure by our ignorance of its cause. It is believed on the whole to be due to a metabolic fault, possibly arising in the liver, but how to correct this we do not know. The *indications* for treatment therefore can only be: (1) To avoid anything which, by suddenly raising the pressure, may expose the patient to the risk of bursting a blood-vessel, as well as those conditions which we believe tend to maintain high tension; (2) To promote excretion by the liver, bowels, skin, and kidneys, in the hope that the hypothetical pressor poison may be eliminated.

General Management.—A quiet vegetable sort of existence is the ideal one for a high-pressure subject; but this is not always feasible, and the

patient might think prolongation of his life not worth the price. At all events he should try to go only half steam ahead in his work, avoiding all unnecessary strain and (so far as is possible in this world) worry. Sudden physical efforts, especially if associated with stooping, should be avoided, as they are apt to cause apoplexy, and for the same reason the high-pressure patient cannot afford to lose his temper. Quiet walking on the level is the best form of exercise. At least nine hours should be spent in bed, and an occasional entire day in bed if tired. During acute exacerbations of pressure the patient may be kept in bed for several days with advantage. Cold baths are to be avoided, the skin should be kept active by a daily warm bath, and the clothing must be light but warm.

Diet.—We really know very little of the effects of diet on blood-pressure, but the usual advice is that the patient should eat sparingly and be as nearly as possible a vegetarian. The extractives of meat are believed to be specially harmful, and therefore soups, sauces, and gravies are best avoided, and such meat as is taken is safer boiled than roast. This is really about all that can be said as regards diet, and even that little is doubtfully grounded, and care must be taken not to over-diet the patient. One may, indeed, reduce the pressure by semi-starvation, but the general health and vitality are reduced by it too.

Alcohol is usually forbidden to high-pressure

subjects—again on very doubtful grounds. After all, alcohol is a vasodilator, and if it raises pressure it can only be indirectly by interfering with metabolism or by damaging the kidneys. The introduction of large quantities of fluid into the circulation in a short time will, of course, raise pressure, and this is an argument against ‘long drinks’ for the hyperpietic; but it applies just as much to ‘soft’ drinks as to alcoholic ones. On the whole, the use of alcohol in moderation, if the patient is accustomed to it, probably does no harm; and the same applies to tobacco.

In the sudden crises of high pressure during which the patient is kept in bed, a diet of milk only is the most pressure-reducing.

Drugs.—Drugs lower pressure either by dilating the peripheral arterioles by acting upon their muscular coats *directly*, or by causing vasodilatation *indirectly* by removing a hypothetical poison which is causing vasoconstriction.

The *direct vasodilators* are chiefly reserved for emergencies and temporary use. The most rapid in its action is Amyl Nitrite, which is given by inhalation, especially in paroxysms of angina. Nitroglycerin ($\frac{1}{100}$ to $\frac{1}{50}$ gr.) may be given in Tabellæ, and acts fairly rapidly. Erythrol Tetranitrate ($\frac{1}{2}$ to 1 gr. in tablet) has a more gradual and prolonged effect. Liq. Trinitrini (a 1 per cent solution of Trinitroglycerin) is rapid but rather evanescent in action. All the nitrite preparations are unstable, and should therefore be freshly prepared and used

by themselves—not introduced into mixtures—and, as their action is evanescent, they are best given in small doses at short intervals.

Whether Iodide of Potassium lowers pressure or not is uncertain. There is no pharmacological evidence that it does so, but there is a general belief amongst clinicians that it is sometimes helpful.

It is to the *indirect vasodilators* that one must chiefly trust in the regular management of cases of primary high tension. The chief are Mercurial Compounds and the Sulphates of Sodium and Magnesium. Mercury may be given in the form of Calomel, Blue Pill, or Grey Powder, the first mentioned being that most often employed. Calomel is often used in needlessly large doses: $\frac{1}{2}$ to 1 gr. is quite sufficient, and may be given once a week regularly. Others prefer to give it in smaller doses more frequently—say $\frac{1}{8}$ gr. daily—and there is a good deal to be said for this plan. Sulphate of Magnesium may be given in hot water on rising, in quantity sufficient to produce a rather liquid action of the bowels. It acts somewhat like a daily blood-letting by reducing the volume of the blood. A vegetable existence, then, and a mainly vegetarian diet, with the regular use of Epsom Salts and Calomel—these must be the means to which the high-pressure subject looks for safety. Other methods, however, help.

Physical Treatment, by baths, regulated exercises, and massage, lowers pressure by dilating the

peripheral circulation. Climate also helps, the most suitable being a relaxing low-altitude one. Bracing places and high elevations should be avoided—they drive up pressure. High-pressure patients do well also at suitable spas, for there the regimen combines rest, regulation of diet, the use of aperient waters, and various forms of physical treatment, all of which together have a powerful though often only temporary effect in lowering vascular tension.

CHAPTER XI

GOUT AND GRAVEL: URIC ACID
SOLVENTS AND LITHONTRIPTICS

WE are still very ignorant of the true pathology of gout; but the essence of it appears to be an inability on the part of the gouty patient to deal in the normal way with the purins and the products of their disintegration, such as uric acid. The *indications* for treatment in the gouty state therefore would appear to be: (1) To restrict the intake of purins; (2) To favour their destruction; (3) To increase their elimination.

General Management.—In acute gout the patient must be kept at rest—indeed, if the foot is affected, as it most commonly is, he will not be able to move. The foot should be raised and wrapped in cotton-wool. The local application of an evaporating lotion is sometimes comforting, but no stimulating application should be employed. In chronic gout, on the other hand, exercise is beneficial, as it favours the destruction of purins by increasing oxidation.

Diet.—Theoretically the best diet in gout is one from which purins are eliminated as far as possible. The purins are contained in all flesh foods, but especially in the internal organs which are rich

in nucleoproteins (sweetbread, liver, kidney, etc.), and in the extractives of meat (soups, gravies, etc.). Amongst the vegetable foods, peas and beans, oatmeal, asparagus, and onion contain them, and amongst common beverages tea and coffee and malt liquors (beer and stout).

In practice it is often impossible to persuade a gouty patient to adhere permanently to a diet from which all the above foods are abolished, and as a rule one has to be content with enjoining strict moderation in eating and drinking, with special adaptations to meet the patient's own peculiarities and digestive capacity, for in no condition is the 'individualizing' of treatment more necessary than in gout.

Drugs.—In *acute* gout, Colchicum seems to exert a specific effect, though its mode of action is not understood. It is usually given along with Alkalis :

R	Pot. Bicarb.	
	Pot. Cit.	āā gr. xv
	Vin. Colchici	℥ xv
	Spt. Chlorof.	℥ x
	Aq. Ment. Pip.	ad ℥ ss
	Mitte	℥ vj.

Sig.: One-twelfth part in water every four hours.

(The Colchicum is here the basis, and is used for its specific effect; the Bicarbonate and Citrate of Potash are used to correct excessive acidity of the urine, and the other ingredients are flavourers.)

If it is desired to act more powerfully on the bowels—and Colchicum is itself an aperient—80 gr. of Sulphate of Magnesium and 10 gr. of Magnesium

Carbonate may be substituted for the potash compounds in the above prescription. Colchicum is of no benefit in chronic gout, but in that condition Resin of Guaiacum sometimes does good. It is best given in 10-gr. doses in capsule or cachet.

The elimination of uric acid seems to be favoured by the use of *cholagogues* (p. 42), and a mercurial purge is therefore in place at the outset of an acute attack, and also from time to time in all chronic gouty states.

Uric Acid Solvents are drugs designed to dissolve uric acid by combining with it in a soluble form. An immense number of such drugs have been introduced. Lithium salts were amongst the first, but although lithium urate is very soluble in a test tube, it is impossible to introduce enough of the base into the tissues to prevail over the mass influence of the natural sodium salts of the plasma. Practically, therefore, lithium is useless. There followed a long succession of compounds, such as Piperazin, Sidonal, Lycetol, Colchisal, Uricedin, Quinic Acid, Citarin, Lysidin, and Urodonal (a compound of Sidonal and Lysidin). It would serve no useful purpose to attempt to remember these—and still less their immensely complicated chemical formulæ—as they are all of very doubtful value. Agotan, also known as Atophan (phenyl-cinchonic acid), and its derivative Atoquinol, on the other hand, seem to be of real worth as eliminators of uric acid, and in 10- to 15-gr. doses three times daily cause the output of the acid to rise threefold.

If any 'uric acid solvent' is to be used, they are probably the best to employ, but if there is any evidence of defective hepatic function they should be avoided, as toxic jaundice may result. Liquids and alkalis should be taken freely during their administration to prevent a rise in the acidity of the urine. Solurool (thyminic acid) is also useful.

Physical Treatment, in the form of massage and hydrotherapy, is of value in getting rid of the inflammatory deposits in gouty joints, and as practised at a spa, along with regulation of the diet and the use of aperient or diuretic waters, is of great help in the treatment of the gouty state.

URIC ACID GRAVEL.

The general management and dietetic rules in cases of uric-acid gravel are the same as in chronic gout. The drugs used go by the cumbrous name of *lithontriptics* (stone-breakers), and are those which lessen the acidity of the urine; the vegetable salts of potash, such as the citrate, being most employed.

The Citrate of Potash, without being neutralized by the acid of the stomach as a soluble alkali like the bicarbonate would be, is converted into bicarbonate by oxidation in the tissues and excreted in that form, powerfully lessening the acidity of the urine or even rendering it alkaline. But in an alkaline urine free uric acid cannot exist, and so 'gravel' consisting of it disappears. Natural alkaline waters such as those of Vichy and Contrexéville act in a similar way, besides increasing the

solubility of uric acid compounds by greatly diluting the urine.

OXALURIA.

In cases of oxaluria, Magnesium Salts act as 'lithontriptics' by replacing some of the calcium oxalate by the corresponding magnesium compound, which is much more soluble. Sodium Acid Phosphate (p. 85) also, by increasing the acidity of the urine, promotes the solution of calcium oxalate.

CHAPTER XII

DRUGS THAT ACT UPON THE URINE ;
URINARY ANTISEPTICS

DRUGS may act upon the urine either : (1) *By altering its reaction* ; (2) *By rendering it antiseptic* ; or (3) *By increasing its volume*.

1. Altering the Reaction.—

a. Drugs which Reduce Urinary Acidity.—The soluble alkalis (Bicarbonates) and the vegetable salts of potash (especially Potassium Citrate). The action of these has been described under ‘lithontriptics’ (p. 88). They are also used in the *acute* stage of infection with the *Bacillus coli* : not that an alkaline urine is hostile to the latter, but because alkalis have, in some way not clearly understood, the power of neutralizing the toxins of the bacillus and abolishing their constitutional effects (fever, etc.). Very large doses of alkalis are sometimes required for this purpose.

b. Drugs which Increase Urinary Acidity.—Acid Sodium Phosphate and Ammonium Benzoate.

Acid Sodium Phosphate is the natural acid of the urine, and the best agent for raising the acidity artificially. It is easily soluble in water, and is given in doses of 10 to 30 gr. three times daily

after meals. In large doses it is apt to cause slight diarrhœa.

Ammonium Benzoate increases acidity by the liberation of hippuric acid. It is rather unpleasant to take, but may be administered as follows :—

R	Ammon. Benzoat.	gr. xv
	Tinct. Lavand. Co.	℥xx
	Aq. Dest.	ad ℥j

Mitte ℥viij.

Sig.: Two tablespoonfuls three times daily
after meals.

2. Urinary Antiseptics.—

a. Actively Antiseptic in Acid Urine.—The *formaldehyde* group, the best example of which is Hexamine (hexamethylenetetramine), a condensation product of ammonia and formaldehyde. In the presence of acid it decomposes and liberates the antiseptic formaldehyde, 10 gr. of Hexamine given thrice daily being sufficient to convert the urine into a 1-5000 formaldehyde solution. Hexamine is given in Tablet form (5 gr. t.d.s., rapidly increased to 15 or 20 gr.) on an empty stomach so as not to be decomposed by the gastric juice. It should never be prescribed in an acid mixture, as it would decompose in the bottle, and is useless if the urine is alkaline. In the latter event, Acid Sodium Phosphate should be given after meals to render the urine acid, and the Hexamine separately from it before meals.

Hexamine is specially useful as an antiseptic against those organisms which thrive in an acid

urine (*B. coli* and the bacilli of typhoid and tuberculosis). In large doses it may irritate the kidneys and bladder and cause skin rashes.

b. Active even in an Alkaline Urine.—These include such drugs as Boric Acid, Salol, Acriflavine, and the volatile oils contained in Buchu, Uva Ursi, Sandal Wood, Cubebs, and Copaiba.

Boric Acid is an efficient antiseptic, especially when the urine is ammoniacal, but in large doses is apt to cause dyspepsia. It should be given well diluted and after meals.

R	Acid. Borici	gr. x-xv
	Tinct. Hyoscyami	℥xx
	Glycerini	ʒj
	Inf. Buchu	ad ʒj

Sig. : Two tablespoonfuls in water three times daily after food.

(The basis here is Boric Acid used as an antiseptic; Hyoscyamus is given as a sedative to the urinary passages; Glycerin as a flavoure; and Infusion of Buchu (or of Uva Ursi) as an adjuvant vehicle.)

Sandal Wood Oil is the volatile oil most often used. It is given in capsules (5 to 10 min.) after food, and is specially useful in coccal infections.

3. **The Volume of the Urine is Increased**, and it is rendered more dilute, by 'forced diuresis', which is best brought about by the drinking of large quantities of one of the natural diuretic waters (Vittel, Contrexéville, Vichy); but any bland fluid in sufficient quantity has a very similar effect, especially if an alkali is given at the same time.

CHAPTER XIII

DYSPEPSIA AND STOMACH MIXTURES

THE principles of treatment in diseases of the stomach may be best illustrated by taking first the example of gastritis.

GASTRITIS.

The *indications* for treatment in gastritis are to avoid irritation of the organ, and to promote recovery of the mucous membrane by the use of sedatives, antacids, and astringents.

General Management.—In all acute cases the patient should be confined to bed. In chronic cases he may go about and carry on his work, but should avoid chill and wear a warm abdominal belt. Change of air, especially to a milder and drier climate, is often as useful in chronic gastritis as it is in chronic bronchitis.

Diet.—The principles of diet are to avoid irritating the stomach mechanically, chemically, or thermally. In acute cases these principles are best carried out by complete starvation, and, indeed, constant vomiting may make the taking of food impossible. In less acute cases, well-diluted milk and other bland fluids will be sufficient. In the chronic cases, mechanical irritation should be

avoided by seeing that the food contains no coarse particles and is well chewed, and 'thermal' irritation by its being neither very hot nor very cold. To avoid chemical irritation, spices, fatty acids (fried fats), alcohol (at all events in concentrated form), and cane sugar should be forbidden ; but in many cases the patient's gastric mucous membrane has a specific sensitiveness to special articles which, of course, he must learn to avoid.

Drugs.—Those useful in gastritis act as :—

1. *Mechanical sedatives* protecting the mucous membrane, e.g., Bismuth ;
2. *Chemical sedatives* acting on nerve terminals, e.g., Hydrocyanic Acid and Chloroform ;
3. *Astringents* lessening mucous secretion, e.g., Rhubarb ;
4. *Depletors of congestion*, e.g., Mercury ;
5. *Replacers of secretion*, e.g., Hydrochloric Acid and Pepsin.

Various combinations of these are usually employed :—

1.— R	Bismuth. Carb.	
	Sod. Bicarb.	āā gr. xv
	Acid. Hydrocyan. Dil.	℥ iij
	Aq. Chlorof.	ad ℥ ss
	Mitte ℥vj.	

Sig. : One-twelfth part in water before food. Shake.

(The Bismuth is here the basis of the prescription as a 'mechanical sedative' ; the Bicarbonate of Sodium and Hydrocyanic Acid are adjuvants, and act as an antacid and chemical sedative respectively ; whilst the Chloroform Water as a vehicle

is both a chemical sedative and a flavourer. The mixture is taken before meals, so that the ingredients may come into direct contact with the mucous membrane.)

If it is wished to improve appetite, a few drops of Tincture of Nux Vomica may be substituted for the Hydrocyanic Acid, and a bitter Infusion (Gentian, Orange, Calumba, etc.) for the Chloroform Water. If a more astringent effect is desired, 20 min. of Tinct. Rhei Co. may be added.

2.— R	Pulv. Rhei	gr. j
	Pulv. Sod. Bicarb.	gr. iv
	Pulv. Zingib.	gr. j
	Ol. Ment. Pip.	℥ $\frac{1}{4}$

Fiat pulv. Mitte tales in cachetam xxiv.

Sig.: One three times daily between meals.

(This is an example of a powder in which an astringent (Rhubarb), antacid (Sod. Bicarb.), and Carminative (Peppermint) are combined.)

3.— R	Acid. Nitrohydrochlor. Dil.	℥x
	Tinct. Nucis Vom.	℥v
	Tinct. Aurantii	
	Spt. Chlorof.	āā ℥xv
	Aq.	ad ℥ss

Mitte ℥viiij.

Sig.: One tablespoonful in a wineglassful of water three times daily after food.

(The basis here is a Mineral Acid which acts to some extent as a replacer of secretion; the adjuncts are Bitters (Nux and Orange) and a carminative and sedative (Spirit of Chloroform). It is given, like all acid mixtures, *after* food.)

FUNCTIONAL DYSPEPSIAS.

Some of the principles of gastric treatment may be further illustrated by a consideration of functional dyspepsia. Of this there are two great types: (1) *The hypersthenic*, which is characterized by a tendency to excess of acidity (hyperchlorhydria) and exaggeration of muscular tone and peristalsis; and (2) *The asthenic*, in which acidity tends to be low and muscular tone poor. Both types are essentially of nervous origin, the hypersthenic being the consequence of nervous irritability, and the asthenic of nervous exhaustion. This must be borne in mind in the *general management*, which must chiefly be directed to removing causes of nervous irritation or exhaustion. In severe cases it may involve sending the patient for a holiday—choosing a bracing place for an asthenic case and a relaxing one for a hypersthenic—or even to bed; in less severe cases he may have to give up part of his work, and avoid as far as possible all causes of worry or emotional distress. Physical fatigue must be guarded against, and meals taken regularly and at leisure. These considerations apply to both types of functional dyspepsia, but the dietetic and medicinal treatment of the two must be dealt with separately.

1. The Hypersthenic Type.—

Diet.—In this type the diet must be planned to meet the excess of acidity. There are two views as to how this may best be done. Some believe in

giving foods which 'fix' the free acid by combining with it and so rendering it harmless. Proteins do this, and so the supporters of this line of treatment allow meat and other animal foods freely. Others take the view that the protein foods stimulate the production of gastric juice, and so confine the diet largely to carbohydrates. The writer is an adherent of the first view, and allows meat and other animal foods, but limits starches and sugars. Fats are given freely, seeing that they tend to restrain secretion; but all direct stimulants of secretion should be forbidden, chief of these being salt, spices, pickles, and the extractives contained in soups and gravies. Alcohol is also a stimulant of secretion. Sour things should naturally be interdicted where the acidity is high, and tea (except China) comes under the same ban because of its tannic acid.

Drugs may be used either to restrain secretion or to neutralize it. Belladonna is sometimes employed with the first object, but if given in sufficient doses is apt to cause dryness of the mouth and interference with vision. It is better therefore to content oneself with simply neutralizing the excess of acid, and the best agents for the purpose are the earthy carbonates (Carbonate of Magnesium and Carbonate of Bismuth) or Magnesium Oxide. The soluble alkalis are not so suitable as sole neutralizers, for if one gives more than is required to combine with the acid present, the excess calls out a fresh secretion. If possible the antacid should be given about

two hours after a meal, when acidity is at its height.

R Mag. Carb.
 Bismuth. Carb. aa partes æquales
 Mitte ℥iv. Dispense in wide-necked bottle.
 Sig.: One level teaspoonful in a little water
 two hours after each meal.

It is often more convenient for the patient to take the antacid in the form of a lozenge (e.g., Troch. Bismuth. Co.), as these can be carried in the pocket.

2. The Asthenic Type.—

Diet.—The diet in this type should be arranged *not* with a view to the state of the gastric secretion, but in order to suit the impaired motor power. Meals should therefore be small, frequent, and dry, for a large meal and the weight of fluid tend to over-distend an atonic stomach. Bulky foods such as vegetables (with a few exceptions like spinach, asparagus, and the white part of cauliflower) should be avoided, and so should raw fruits. Crisp toast and rusks should be substituted for bread, and potatoes taken sparingly, and only if mashed. Articles which stimulate secretion (condiments, etc.) are now of use, and alcohol—in not too dilute a form—may often be taken with advantage at meals.

Drugs.—These are of use to stimulate secretion and to increase tone. Small doses of the Soluble Alkalis along with bitters do the former; Strychnine to some extent does the latter. The prescription containing Soda, Nux Vomica, and Gentian

described on page 115 is therefore very commonly employed in cases of the asthenic type.

The use of acids after meals to replace secretion is rarely necessary, whilst ferments (pepsin) are still less likely to be of use; in any case, many of the preparations on the market are inert.

If flatulence is a troublesome symptom, as it often is in asthenic cases, a carminative mixture is indicated:—

R	Sod. Bicarb.	gr. x
	Tinct. Card. Co.	℥ xv
	Spt. Chlorof.	℥ x
	Aq. Ment. Pip.	ad ℥ ss

Mitte ℥vj.

Sig.: One tablespoonful in a little water as required.

(The Bicarbonate of Sodium neutralizes acid with the liberation of carbonic acid, which stimulates the expulsion of 'wind'; Cardamoms and Chloroform are adjuvant carminatives; and Peppermint Water a carminative vehicle. There are, of course, a great many other carminative agents and combinations which may be used.)

We may also consider:—

THE MEDICAL TREATMENT OF GASTRIC AND DUODENAL ULCER.

The *indications* here are to promote healing of the ulcer by (1) rest, (2) a suitable diet, (3) neutralization of gastric acidity.

General Management.—Complete rest in bed for at least four weeks is essential. An ice-bag is

sometimes applied over the epigastrium for the first week or two. Capable nursing is highly important. All septic foci must be eradicated.

Diet.—The diet must fulfil the following conditions. It must be (1) unstimulating so as not to call out gastric secretion, (2) poor in protein and rich in carbohydrates and fat, (3) of sufficient caloric value, and (4) given in small feeds so as not to over-distend the stomach.

Two 'types' of diet are mainly used, which are called, after their introducers, (1) the Lenhartz, and (2) the Sippy.

1. The Lenhartz diet consists mainly of eggs, milk and sugar. These two foods are taken in small quantities at frequent intervals from a teaspoon, the quantity prescribed being spread over the day, and not given at definite meal-times. The first day 7 to 10 oz. of milk are given and one egg. The quantity is increased daily by $3\frac{1}{2}$ oz. of milk and one egg until $1\frac{3}{4}$ pints of milk and six eggs, or in some cases eight eggs, are reached. From about the third to the eighth day raw or almost raw mince is added, starting with 1 oz. in divided doses, either beaten up with the egg or alone; the next day, if the mince is well borne, 2 oz. are given; minced beef may be used. Food is given at first at hourly intervals from 7.0 a.m. to 9.0 p.m., but complete rest is allowed at night. Both the eggs and milk are iced and the eggs beaten up whole. Granulated sugar is added to the eggs on the third day. Some soluble casein preparation (Plasmon, Casumen,

Sanatogen, etc.) may be used instead of the raw mince.

From the seventh to the eighth day boiled rice is added, followed by softened bread, and later by a small quantity of bread and butter. One or more eggs may now be lightly boiled. The diet is then gradually increased by the addition of mince or pounded fish, with a corresponding reduction of eggs, until by the end of the fourth week the patient is on an ordinary mixed diet containing the common foodstuffs, with the exception of indigestible solids, such as peas or other seeds. The patient is instructed to masticate very slowly. On the twenty-eighth day the patient is allowed to get up, and discharged from the sixth to the tenth week.

2. The Sippy diet consists mainly of milk and cream. Three oz. of a mixture of equal parts of milk and cream are given every hour from 7.0 a.m. to 7.0 p.m. After one or two days, a soft egg with biscuit or bread and butter may be added to one of the forenoon feedings; 3 oz. of a cereal, such as well-cooked rice, oatmeal, or farina, may be added to one of the afternoon feedings. The cereal is measured after it is prepared. Gradually egg and cereal are added until at the end of the first week the patient usually is taking each day 3 oz. of the milk-and-cream mixture every hour from 7.0 a.m. until 7.0 p.m., and in addition two or three soft eggs, one at a time, and 6 to 9 oz. of a cereal, 3 oz. at one feeding. The cereal and egg are given alternately, and at the time of, and in addition to, the

3 oz. of mixture of milk and cream. Custards, cream, soups, vegetable *purées*, and other soft palatable foods may be substituted now and then for the milk-and-cream feedings. Jellies and marmalades may be gradually added if desired. The patient should be weighed. If desired, a sufficient quantity of food may be given to cause a gain of two or three pounds each week.

At the end of three weeks of the treatment, three small meals, none of which exceeds 10 to 15 oz. in total bulk, are substituted for three of the feeds, the remainder of which are continued as before. These meals are made up of vegetable *purées*, potatoes, and cooked fruits. Bacon and meat broths are added.

Upon resuming normal activity or work, the patient continues the same management. He eats the three small meals at home, or wherever it may be convenient. Milk and cream mixed, equal parts, is taken with him to his place of business. A thermos bottle is a desirable container. From this supply a flat flask may be filled and carried in the pocket.

Drugs.—The drugs which are of use are those which either *restrain* or *neutralize* secretion. Belladonna does the former, and may be given in a dose of 10 to 15 drops of the tincture in a tumblerful of water each morning of the treatment whilst the stomach is empty. The best neutralizers of secretion are the earthy carbonates, as already described (see Hypersthenic Dyspepsia, p. 92). An antacid

powder of equal parts of bismuth and magnesium carbonate should be given in a dose of half a teaspoonful every hour between the feeds. If the bowels become loose part of the Magnesium may be replaced by Calcium Carbonate.

The treatment of *hæmatemesis* and *melæna* from ulcer is described in Chapter XVI (p. 111). The indications for the surgical treatment of ulcer do not fall within the scope of this book.

CHAPTER XIV

DISEASE OF THE GALL-BLADDER:
CHOLAGOGUES AND BILIARY
ANTISEPTICS

THE main *indications* in the treatment of chronic inflammation of the gall-bladder, and its complications, such as gall-stones, are to increase the fluidity and flow of bile so as to prevent stagnation of it, and to disinfect the biliary passages, whilst using all means to allay active inflammation.

General Management.—During acute exacerbations the patient should be kept in bed, and hot poultices applied over the liver region. In the chronic stage he is allowed to go about and may take gentle exercise, but should avoid jolting movements, and stooping or sitting in a cramped position, which may compress the gall-bladder. Chill should be guarded against by wearing a Jaeger belt outside the undergarment, but there must be no constriction by corsets or tight bands round the waist.

Diet.—The foods to be forbidden are those which are rich in cholesterol, viz., milk, cream, yolk of egg, butter (the dairy products in fact), and fatty things generally, the internal organs of animals (liver, sweetbread, kidney, brains), and

green peas. In addition, the patient must avoid any article which in his particular case brings on pain. The meals should be small and frequent, as the entry of food into the stomach stimulates the discharge of bile, and if flatulence is troublesome they should be taken dry. Alcohol is best avoided, but a glass of hot water may be drunk night and morning.

Drugs.—The drugs to be used are: (1) *Cholagogues*; (2) *Biliary antiseptics*.

1. *Cholagogues* are drugs which increase the flow and secretion of bile (direct cholagogues), or which favour its expulsion from the body (indirect cholagogues).

The *direct cholagogues* are not numerous, the chief being the salts of the Bile Acids themselves, the Salicylates, and, to a less degree, Podophyllin and Euonymin.

The chief *indirect cholagogues* are Mercurials and the Sulphates of Magnesium and Sodium. The mercurials appear to hasten peristalsis in the duodenum and small intestine, so hurrying bile out of the body, whilst the sulphates—especially magnesium sulphate—if given in concentrated form cause a contraction of the gall-bladder and expulsion of retained bile.

2. *Biliary Antiseptics* include the Salicylates and Hexamine. In virtue of the presence of the bile salts hexamine appears to be able to exert an antiseptic effect in bile, in spite of the fact that bile has a neutral or slightly alkaline reaction.

The cholagogues and antiseptics are given either separately or in various combinations. The salts of bile acids are contained in the *Fel Bovinum Purificatum*, which may be given in 5-gr. doses in keratin capsule after meals; but the purified salts are more often used in the form of one of the proprietary preparations. *Tablogestin*, for example, contains sodium glycocholate along with sodium salicylate; *Colalin* tablets, cholalic acid; *Felamine*, bile salts and hexamine.

Hexamine may be given by itself in tablet form in doses of 10 gr. three times a day, or in one large dose at bedtime. If it tends to irritate the bladder by liberation of formaldehyde, the urine should be kept alkaline by full doses of citrate of potash.

The indirect cholagogues may be used simultaneously with these agents, a mercurial being administered once a week (p. 78), or in smaller doses daily, or sulphate of magnesium given in concentrated solution before breakfast.

In other cases a vegetable cholagogue pill may be preferred :—

R	Podoph. Resin.	
	Ext. Nucis Vom.	āā gr. ss
	Ext. Bellad.	gr. $\frac{1}{4}$
	Gingerini	gr. $\frac{1}{16}$
	Pil. Colocynth. Co.	ad gr. iv
	Fiat pil. Mitte tales xij.	
	<i>Sig.</i> : One as required.	

(The Podophyllin is here the basis, acting as a cholagogue; the Belladonna and Gingerin are correctives to prevent griping; and the Compound

Colocynth Pill is a purgative excipient which serves to hurry bile out of the intestine.)

All the above 'lines of attack' by diet, exercise, local applications such as liver packs, and cholagogues (sulphate waters) may be carried out simultaneously at a spa, and gall-bladder patients therefore often derive great benefit from a visit to Harrogate, Carlsbad, or Vichy.

The indications for surgical treatment of disease of the gall-bladder do not fall within the scope of this book.

CHAPTER XV

NEPHRITIS

LITTLE, unfortunately, can be done in the *active* treatment of nephritis. It is a disease which affords an example of the advantages of an 'expectant' attitude, and illustrates also the important rule of all therapeutics, that the first consideration is not to do any harm. Certain things one should *not* do: (1) Don't give diuretics—they are useless; (2) Don't try to 'wash out' the kidneys—it can't be done; (3) Don't try to lower blood-pressure—it would do more harm than good; (4) Don't pay any attention to the amount of albumin in the urine as a guide to treatment—it has no therapeutic significance; (5) Don't over-diet the patient—it impairs his general condition without benefiting the disease.

The *indications* for treatment in nephritis are, of course, clear enough—the difficulty is to carry them out. They are as follows: (1) To lessen the work of the diseased organs; (2) To promote their recovery by sparing them from irritation, relieving congestion, and improving the quality of the blood; (3) To favour elimination by other channels. These still remain, however, to a large extent, counsels of perfection.

ACUTE NEPHRITIS.

General Management.—The patient must be in bed, and must be kept *warm*. He should therefore be clothed in flannel. In the early stage, hot poultices over the loins are helpful as a means of ‘counter-irritation’. On the other hand, hot-air baths, packs, etc., are of doubtful utility, and in some cases are attended by a danger of collapse.

Diet.—Little food is required at the outset, and should be of the same nature as in fever (p. 14), but the total amount of fluid should not exceed 2 pints. It may consist mainly of milk, but later on cereals, fruit, and cream may be added. Animal foods, other than milk, or things derived from them (soups, etc.), are best avoided.

Drugs can do little. It is the custom to give a mild Saline Diaphoretic (p. 18), which at all events can do no harm. Salines are useful to keep the bowels active.

If uræmia supervenes in an acute case it usually takes the form of convulsions, and is best treated by blood-letting (16 to 20 oz.), followed by saline transfusion. Morphia may be given with safety; it is not dangerous in nephritis as was once supposed, for it is mostly excreted by the bowel and not by the kidney.

When recovery has taken place, or even if it is delayed, sources of sepsis (e.g., in the tonsils) should be looked for and removed, as continued absorption from them may maintain the renal inflammation.

SUBACUTE NEPHRITIS.

(Large Pale Kidney; Hydræmic Nephritis.)

The great *indication* in this form of the disease is to get rid of the dropsy, which is usually a prominent feature. The general management is the same as in an acute case.

Diet.—Two types of diet are useful :—

1. The *Salt-free*, in which sodium chloride is eliminated so far as possible because of the difficulty the kidney has in excreting it. Such a diet is composed of eggs, fresh-water fish, chicken, bread made without salt, cereals (rice, etc.), fruit, and jellies.

2. The so-called *Epstein Diet*, the object of which is to raise the osmotic pressure in the blood by increasing the amount of protein in it, and by lessening the proportion of lipoids. It is therefore a diet rich in protein and poor in fat, and is composed of the white of egg, fish, lean meat and ham, pulses, rice, oatmeal, skimmed milk, tea, coffee, and cocoa. The total fluid allowed is from 1½ to 2 pints daily.

Drugs.—Most diuretics are useless in getting rid of the dropsy in this form of nephritis, but Urea (10 to 15 gr. three times daily for a week at a time) is sometimes successful. If the patient becomes anæmic, as he is apt to do, iron is helpful :—

R Pot. Acet.	gr. xv
Liq. Ferri Acet.	℥xv
Liq. Ammon. Acet.	ʒij
Syr. Limonis	ʒj
Aq.	ad ʒss
Mitte ʒvj.	

Sig. : One-twelfth part in water three times daily after food.

(The basis is here the Iron, Liq. Ferri Acet. being chosen as it combines well with the Acetates of Potash and Ammonium, which are used as mild diaphoretics. Syrup of Lemon makes a suitable corrective, and, as with all iron mixtures, the medicine is administered after food.)

'Hydragogue' cathartics (p. 42) are of some use in carrying off fluid, and may be used with advantage.

If the dropsy persists and the patient is becoming water-logged, the fluid should be drawn off in the same way as in cardiac dropsy (p. 59). The risks of septic infection thereby are probably exaggerated, and the curative effect of the proceeding is often most striking. It is a method which should not be too long delayed if other means have failed.

CHRONIC NEPHRITIS.

(Cirrhotic Kidney. Azotæmic Nephritis.)

Treatment can do even less in chronic nephritis than in the acute and subacute forms of the disease. To a large extent one can only deal with symptoms empirically, anything like radical therapeutics being out of the question.

General Management.—The most important point is to guard against chill. A warm dry climate should therefore be sought if means permit, and care should be taken about clothing. If the patient is carrying on his work, he must take things as easily as possible, living like a high-pressure subject (p. 75).

Diet.—It is important to individualize and not to over-diet. If there is urea retention—as there will be sooner or later—proteins should be restricted and the diet should be largely vegetarian. The ‘white’ meats, however, have no special advantage over the ‘red’, except that they are relatively less rich in protein. Meats are best taken boiled, as boiling removes the extractives. Soups and gravies should be forbidden. Eggs are no worse for the patient—despite an impression to the contrary—than any other form of nitrogenous food. In the main, therefore, the diet is much the same as in primary high tension.

Drugs.—Regular medication can usually be restricted to the daily administration of a mild Aperient. Other drugs will be required from time to time as symptoms indicate. Thus Bismuth may be given for gastritis (p. 89), some Analgesic for headache (p. 27), and so on. If symptoms of heart failure come on, Digitalis will be required (p. 57).

The supervention of symptoms of uræmia in chronic nephritis is a sign that the end is near and that little more can be done. It is not worth while to trouble the patient with baths, packs, etc.; and Pilocarpine, sometimes recommended for its diaphoretic property, is not free from the danger of producing pulmonary œdema. Convulsions may be treated by Morphia and Blood-letting, and, if there is delirium and restlessness, Hyoscine Hydrobromide ($\frac{1}{100}$ gr. hypodermically) is of value. On

the whole, however, one's main duty in chronic uræmia is to make the patient comfortable and smooth the downward path. Cure is out of the question.

CHAPTER XVI

HÆMORRHAGE AND THE USE OF
HÆMOSTATICS

THE *indications* in the medical treatment of hæmorrhage are: (1) To stop the escape of blood by producing local constriction of blood-vessels and by promoting the formation of clot; (2) To lower the blood-pressure; (3) To combat the effects of loss of blood (circulatory failure, etc.)

General Management.—Rest—physical and mental—is the chief object. The patient should be in bed, kept rather cool, and with the head low (except in cerebral hæmorrhage). The use of an ice-bag applied over the organ from which the hæmorrhage is coming is of doubtful value, but it may help to keep the patient quiet, and it impresses the friends. If syncope threatens, the end of the bed should be raised and the limbs bandaged.

Diet.—In cases of acute hæmorrhage the diet should be small in amount, and all foods should be cold. In bleeding from the stomach or bowel, starvation should be carried out for forty-eight hours, only sips of water—*not* iced—being allowed. Thirst may be relieved in all cases of hæmorrhage by the introduction of normal saline (one pint night and morning) per rectum.

Drugs.—Morphia is of use in most cases of hæmorrhage to quiet the patient physically and mentally. It is given hypodermically, but is best avoided in hæmatemesis the result of cirrhosis of the liver (for in that disease morphia is badly borne), and in cases of hæmoptysis, where, if used at all, it should only be in a small dose for fear of causing retention of blood in the air-passages by lessening reflex excitability. Morphia may be regarded as an *indirect* hæmostatic. The *direct* hæmostatics may be classified as follows:—

a. Metallic Astringents—e.g., Salts of Lead, Silver, and Copper, and the Ferric Compounds. Lead Acetate is sometimes given by the mouth in cases of intestinal hæmorrhage (p. 22), but most metallic astringents are only used locally as *styptics*, e.g., in hæmorrhage from the gums.

b. Vegetable Astringents.—These include Tannic and Gallic Acids and substances containing them (Catechu, Logwood, Hamamelis, etc.). These also are chiefly of local use, but Gallic Acid is said to be of value in hæmaturia.

c. Vasoconstrictors—e.g., Adrenalin, which acts only locally; and Ergot, which has some effect as a general vasoconstrictor if injected intramuscularly, but is chiefly of use in uterine hæmorrhage in virtue of its specific effect on the musculè of the womb.

d. Vasodilators—e.g., Amyl Nitrite, which acts by lowering pressure in the vessels and so lessening the tendency for blood to escape. It is sometimes

of value in cases of profuse hæmoptysis associated with high pressure.

e. Agents which Favour Clot-formation.—These consist of the inorganic coagulants (Calcium Salts), and the organic coagulants contained either in Whole Blood or Blood-serum or in special preparations derived from blood (Coagulose, Hæmoplastin, etc.).

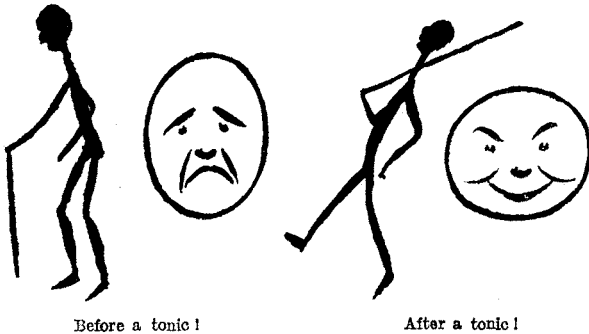
Calcium is of little use in acute hæmorrhage, but, if given, acts most rapidly when injected into a muscle (1 gr. of Calcium Chloride). It is of use in chronic hæmorrhagic conditions (e.g., hæmophilia) where blood coagulability is defective, and is then best given as the Lactate in Tablet form (5 to 15 gr.).

The best of the organic coagulants is Whole Blood withdrawn from a donor's vein and injected intramuscularly to the amount of 5 to 10 c.c. If this is not available, 10 c.c. of Horse Serum may be given subcutaneously and repeated every six hours, or one of the proprietary preparations derived from serum (e.g., Hæmoplastin) may be used instead. To combat the collapse which follows a large hæmorrhage, Pituitrin may be injected subcutaneously as a temporary measure, but transfusion of whole blood is the best remedy.

CHAPTER XVII

TONICS

It is difficult to define exactly what is meant by a 'tonic', but roughly it may be used to signify anything which improves the general sense of well-being. Sir Lauder Brunton used to represent the effect of agents of this class by the following diagram, which is more descriptive than a great deal of writing:—



It should be noted, however, that many conditions of general debility are really due to an accumulation of waste products in the body—a form

of auto-intoxication—and require treatment by eliminants rather than by ‘tonics’. Calomel is often of use for this purpose, and as it makes the patient feel brighter and better—gives him, in short, the ‘Kruschen feeling’—it may be in some circumstances fairly regarded as a tonic.

Tonics are usually best avoided in the case of gouty people, in high-pressure subjects, in those with nervous excitability as shown by exaggerated reflexes, and in those who suffer from sleeplessness or constipation.

The drugs chiefly used as tonics are Strychnine and Nux Vomica, Iron, Quinine and Cinchona, Bitters, and Phosphorus.

Strychnine is perhaps, strictly speaking, the only true tonic, for it does increase the ‘tone’ both of striped and unstriped muscle. Being also a bitter it improves appetite and the power of taking food. It is best given in small doses and before meals, but should not be prescribed if the knee-jerks are very brisk or if there is a tendency to insomnia. Nux Vomica, which depends for its effect on strychnine, is perhaps the most frequently prescribed drug in the Pharmacopœia.

Iron acts as a tonic in virtue of its improving the quality of the blood. It disagrees with the gouty, and is apt to produce constipation. It is therefore often combined with an aperient.

Quinine is said to lessen metabolism, and might, by putting a brake on tissue waste, make a patient feel better; but it probably acts more like other

bitters, by improving appetite and digestion. *Cinchona* acts similarly.

All the *bitters* (Gentian, Orange, Calumba, Quassia, etc.) have a tonic action, apparently by increasing the desire for food. It has been denied by pharmacologists that they have any particular action on the stomach, but clinical experience is in their favour.

Phosphorus has been largely used as a tonic, especially in the form of the Hypophosphites and the Glycerophosphates. The preparation known as Sanatogen is a glycerophosphate of casein. Other organic phosphorus 'tonics' are Lecithin and Phytin. There is grave doubt, however, whether phosphorus compounds are really of any use. After all, the body only requires about 2 grm. of phosphorus daily, and any ordinary mixed diet contains at least 3 grm. Nor can we recognize any condition clinically as being due to a deficiency of phosphorus. To say that a patient feels 'better' after taking a phosphorus preparation does not prove that phosphorus is really a 'tonic', for the effect may be a purely mental one, and due to faith in the remedy.

Alcohol is undoubtedly a tonic in certain circumstances, especially by enabling the patient to take and digest more food. It is best given in the form of wine at meals—preferably a red wine. The various medicinal wines depend for their effects partly on alcohol, partly on cinchona and other bitters dissolved in them.

Cod-liver Oil and Malt Extracts are often spoken of as tonics, and, inasmuch as they may improve nutrition and make the patient feel better, perhaps they are, but so, of course, is any other food.

The following are some prescriptions for tonics :—

℞	Sod. Bicarb.	gr. v
	Tinct. Nucis Vom.	℥v
	Inf. Gent. Co.	ad ℥ss
Mitte ℥vj.		

Sig. : One-twelfth part in a little water before meals.

(This is one of the commonest of all tonic mixtures, and acts chiefly by improving appetite. Small doses of soluble alkali such as Sod. Bicarb. increase the secretion of gastric juice, an effect which is reinforced by the bitterness of *Nux Vomica* and *Gentian*, whilst the strychnine in *nux vomica* acts as a true 'tonic'. The mixture, as always when it is desired to promote appetite, is given before food.)

℞	Syr. Ferri Phos. c. Quin. et Strych.	℥iv
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Sig. : One teaspoonful in a wineglassful of water three times daily after meals.

(This is the well-known *Easton's Syrup*, and consists of a combination of 'tonics'—Iron, Phosphorus, Quinine, and Strychnine. It is given after meals because of the iron.)

℞	Ferri et Quin. Cit.	gr. v
	Liq. Strych.	℥ijj
	Inf. Calumb.	ad ℥ss
Mitte ℥vj.		

Sig. : One tablespoonful in water three times daily after meals.

(This is another example of 'team work', Iron, Quinine, Strychnine, and Bitters all playing a part in producing the tonic effect. Infusion of Calumba is chosen as the vehicle because it is free from tannic acid and so not incompatible with iron.)

R	Liq. Strych.	℥ iij
	Acid. Phos. Dil.	℥ x
	Inf. Cinchonæ Acid.	ad ʒ ss

Mitte ʒvj.

Sig. : One-twelfth part in a wineglassful of water
after meals.

(Another combination of tonics, but without iron, which like all acid mixtures is given after food. Many similar combinations may be devised.)

In addition to the official preparations there are many proprietary articles which contain the same sort of drugs in various combinations. Thus Phospherine contains Quinine and Phosphoric Acid ; Guy's Tonic, Phosphoric Acid and Gentian ; Invigoroids, Phosphate of Zinc, Nux Vomica, and Saccharated Carbonate of Iron ; and so on.

Drugs, of course, are not the only tonics. Change of air—especially to a 'bracing place'—has a powerful tonic effect, and so have certain baths and various forms of physical treatment, such as massage, exercises, electricity, and light. Psychotherapy also may certainly claim to be tonic. We all know the 'bracing' effect of certain personalities which radiate confidence and optimism ; and indeed a large part of the benefit derived

from all tonic remedies depends on the patient's faith in their efficacy. They help the body through the mind, and do good because the patient believes they will.

CHAPTER XVIII

DIABETES AND THE USE OF
INSULIN

BEFORE starting to treat a case of diabetes, the total amount of sugar passed daily should be estimated, and the urine tested for diacetic acid by means of ferric chloride. It is also an advantage to estimate the blood-sugar whilst the patient is fasting. If there is any doubt as to the case being one of true diabetes, a *blood-sugar curve* should be taken before treatment is begun.

The *indications* in the treatment of diabetes are to restore the patient's metabolism to normal, i.e., to abolish the glycosuria and ketonuria, to keep his blood-sugar within the limits of health, and to enable him to take sufficient food to meet the demands of his work.

The main 'line of attack' is by diet, but we now possess in Insulin a drug—or rather endocrine—which has a specific influence on the disease.

General Management.—In severe cases, and especially where there is ketosis, it is best to begin treatment with the patient in bed, and preferably in a home or institution. In the less severe cases will be able to lead his ordinary life during

treatment, but all unnecessary stress and strain, over-fatigue and chill, should be avoided. On the other hand, exercise short of fatigue is usually beneficial. Every effort should be made to maintain the general health at as high a level as possible, and depressing influences, mental and physical, avoided as far as may be. All septic foci should be eradicated.

Diet.—Dietetic treatment is of the first importance in *all* cases. In elderly subjects, and in the milder cases amongst the young, it is alone sufficient to control the disease, but in the severer cases it must be supplemented by the use of Insulin.

In carrying out dietetic treatment one begins by gradually reducing the food intake until the urine is sugar-free, and then raising it gradually again until sugar returns. This will be at a point just above the patient's maximum 'tolerance'. The diet is again reduced till sugar disappears, and is then stabilized at two-thirds of the highest amount reached.

In practice one may proceed thus: The fat is reduced to about 20 gm. and the carbohydrate to 100 gm. on the first day. The protein is then reduced to 20 gm. in two days, and the carbohydrate is reduced similarly in three days. By reducing the diet in this manner, the danger of ketosis is avoided.

The diet is maintained at this level for not more than two days, and, if the patient is not sugar-free by this time, Insulin is necessary.

The following are specimen diets for the first six days :—*

	C	P	F
	gram.	gram.	gram.
FIRST DAY.—			
<i>Breakfast.</i> —Bread, 1 oz.	- 20		
1 egg	- -	5	5
Greens, 6 oz.	- 5		
Milk, 1 oz.	- 2	2	2
<i>Lunch.</i> —Meat, 2 oz.	- -	20	5
Greens, 6 oz.	- 5		
<i>Tea.</i> —Bread, 2 oz.	- 40		
1 egg	- -	5	5
Greens, 6 oz.	- 5		
Milk, 1 oz.	- 2	2	2
<i>Dinner.</i> —Bread, 1 oz.	- 20		
Meat, 3 oz., or			
Fish, 5 oz.	- -	30	7
Greens, 6 oz.	- 5		
	—	—	—
	104	64	26

Greens include cabbage, celery, cress, lettuce, turnip tops, sprouts, endive, French or runner beans, asparagus, marrow, and rhubarb.

Tea, coffee, bovril, or other similar extracts may be allowed *ad lib.*

2ND DAY.—The meat is reduced to 1 oz. for lunch and 2 oz. for dinner.

3RD DAY.—No meat for lunch, and 1 oz. for dinner.

4TH DAY.—Bread is reduced to $\frac{1}{2}$ oz. for breakfast and dinner, and 1 oz. for tea.

5TH DAY.—No bread for breakfast or dinner, and $\frac{1}{2}$ oz. for tea.

6TH DAY.—No bread at all.

When the urine is sugar-free, a blood-sugar estimation is done fasting, and if this is under 0.18

* The Food Tables of Harrison and Lawrence (H. B. Skinner & Co., Denmark Hill, S.E.5) make the construction of diets easy.

per cent the diet is raised again but much more slowly, a good average increase being C 5, P 10, F 10* for the first three days, and then on alternate days. This is carried on until the protein is found to be sufficient for the patient's needs—i.e., 1 gm. per kilo. of the body weight. If glycosuria has not appeared, the increase of carbohydrate and fat is continued until it *does* appear, when the patient's diet is immediately reduced to the 6th day diet. When glycosuria has again disappeared, the diet is raised at twice the rate up to two-thirds of the carbohydrate, and the full amount of protein and fat. The fat is then rapidly increased to a sufficient amount to give the patient between 30 and 40 calories per kilo. of body weight, with the proviso that the ratio of C : F must not exceed 1 : 3, as higher proportions cause a definite risk of acidosis. The patient is then kept under observation for a few days further, and is taught to test his urine for sugar and instructed in the various alternatives to the diet prescribed. He is then usually able to look after himself.

Many patients complain of a feeling of emptiness in spite of the large amount of green vegetables which is usually prescribed. This can be obviated by bran biscuits, which are made from washed bran and agar-agar and thus have no food value ; baked really hard they are not unpalatable.

* The abbreviations stand for 5 gm. carbohydrate, 10 gm. protein, and 10 gm. fat.

The fallacy that toast contains less carbohydrate than bread is still widespread. The fact is that toast, by simple loss of water, contains anything up to 20 per cent more carbohydrate than bread. Similarly, brown bread is only very little inferior to white in its carbohydrate capacity, and hence is of little use, other than as a weight-for-weight alternative to white bread.

'Diabetic foods' are on the whole unsatisfactory. Many of them contain as much carbohydrate as the food they are intended to replace. Others that have less are usually unpalatable or indigestible, and may contain large quantities of animal and vegetable protein. The belief that because these are labelled 'diabetic' foods they may be taken with impunity, dies hard, and it is better to avoid them. Alcohol is usually unnecessary, but if the patient is in the habit of taking it, whisky, brandy, or hock is permissible; due account must be taken of the energy thus supplied.

Lastly, no patient should be allowed to gain weight unduly, as it is almost inevitable that extra Insulin will be required to deal with the increase of body tissue, and in some cases, unless carefully watched, a vicious circle may be started.

If the patient develops glycosuria again when treatment has been completed, it is due to dietetic errors or to some complication having supervened. In the milder cases suitable for the above treatment, glycosuria should not recur. For all others, Insulin will have to be given.

USE OF INSULIN.

Insulin is the internal secretion of the islet cells of the pancreas. It is prepared by finely mincing the pancreas of the ox or pig into 95 per cent alcohol, as trypsin rapidly destroys insulin in aqueous solution. The resulting mixture is filtered, and more alcohol is added to the filtrate to precipitate dissolved proteins. The solution is again filtered, and the filtrate reduced to small bulk by evaporation in vacuo. Absolute alcohol is then added, and more protein is filtered off. The filtrate is then made up to 93 per cent by the addition of more alcohol, and insulin with a small amount of protein is precipitated. This is made up in dilute solution, and treated with picric acid, which precipitates the insulin as a picrate. Hydrochloric acid is then added, and the Insulin Hydrochloride in general use is obtained.

The best method of administering insulin is to begin by calculating the total requirements of the patient in the way of food. This is done as follows : The patient's weight is ascertained, and we decide how many calories per kilo. he will require to perform his work—a general allowance of 30 to 35 calories per kilo. is sufficient for those doing sedentary work, and 35 to 40 for those doing manual labour. We next allow him 1 grm. of protein per kilo. of body weight. This gives us his protein allowance. As carbohydrate is the food-stuff which gives rise to the greatest expenditure

of insulin, we keep this as low as possible, so we arrange that to make up the remainder of the diet we allow 1 gm. C to 3 gm. F. These figures are arrived at by the following easy calculation (R. A. Lawrence's formula) :—

$$\text{C allowance in gm.} = \frac{\text{Total cal.} - \text{P cal.}}{30}$$

[The figure 30 is obtained by adding the calories* obtained from 1 gm. C to those obtained from 3 gm. F—i.e., (1 gm. C = 4) + (3 gm. F = 27) = 31, the odd 1 being dropped, as it greatly simplifies the calculation, and also because the error caused thereby is small, and tends to compensate for a small inefficiency in food absorption.] Having thus found the requisite amount of protein and carbohydrate, the amount of fat necessary is three times that of the carbohydrates.

To take an actual case :—

The patient for whom we wish to prescribe is 50 kilo. in weight and is doing minimal sedentary work ; he will therefore only require 30 calories per kilo. ; hence his caloric value will be 1500.

He will require 50 gm. protein (1 gm. P per kilo. of body weight) = $50 \times 4 = 200$ calories.

The carbohydrate allowance will be :—

$$\frac{\text{Total cal.} - \text{P cal.}}{\text{Cals. derived from 1 gm. C} + 3 \text{ gm. F}} = \frac{\text{Total cal.} - \text{P cal.}}{31}$$

* 1 gm. protein = 4 calories.
 1 gm. carbohydrate = 4 calories.
 1 gm. fat = 9 calories.

Dropping the odd 1 in the 31, as described above, we have :—

$$\frac{\text{Total cal.} - \text{P cal.}}{30} = \frac{1500 - 200}{30} = \frac{1300}{30} = 43.3 \text{ gm.}$$

as his carbohydrate allowance.

His fat allowance will be :—

$$F = 3 C = 130 \text{ gm.}$$

Thus the patient requires 43 gm. C, 50 gm. P, and 130 gm. F. Having arrived at the necessary amounts of foodstuffs required, we then allot these values in actual foods over the day's meals :—

		C gm.	P gm.	F gm.
<i>Breakfast.</i> —	Bread, $\frac{1}{2}$ oz. -	10		
	Greens, 6 oz. -	5		
	Bacon, 2 oz. -		10	30
	Milk 1 oz. -	2	2	2
	Butter, $\frac{1}{2}$ oz. -			15
<i>Lunch.</i> —	Meat, 1 oz. -		10	3
	Greens, 6 oz. -	5		
	Butter, $\frac{1}{2}$ oz. -			15
<i>Tea.</i> —	Bread, $\frac{3}{4}$ oz. -	15		
	1 egg -		5	5
	Greens, 6 oz. -	5		
	Milk, 1 oz. -	2	2	2
	Butter, 1 oz. -			30
<i>Dinner.</i> —	Meat, 2 oz. -		20	6
	Greens, 6 oz. -	5		
	Butter, $\frac{1}{2}$ oz. -			15
		49	49	123

It will be seen that the above diet approximates closely to the exact amount laid down. Also the main carbohydrate meals are breakfast and tea. As the carbohydrate is the foodstuff which is the

most likely to raise the blood-sugar immediately, the insulin is given before these two meals.

The patient is put on the above diet, and 5 units of insulin are given half to three-quarters of an hour before breakfast and tea. *Each* specimen of urine that is passed is examined. If no sugar-free specimen is obtained, each dose is successively increased by 5 units every alternate day until a sugar-free specimen *is* obtained. Thus 1st and 2nd days' doses are 5 units twice a day; 3rd and 4th days', 10 units in the morning and 5 at night; 5th and 6th days', 10 units twice a day, and so on. As soon as a sugar-free specimen is obtained no further increase is made, but the urine is watched for the next few days, as it is probable that when the metabolism becomes balanced more sugar will be used up, and all specimens of urine will become entirely sugar-free. If this result is not obtained, a small increase of insulin is needed.

It is very advisable to have frequent blood-sugar estimations taken at this time; these will show whether the patient is using up still more sugar. Diminution in the blood-sugar will necessitate reduction of the insulin before symptoms of hypoglycæmia arise. Any blood-sugar reading below 0·08 per cent taken three hours after administration of insulin should be an indication to reduce the dose by 5 units. As a rule the dosage thus found will be satisfactory for some weeks, but usually a slight alteration has to be made in about

a month's time—often a reduction, but occasionally a slight increase of the dose.

Such is the outline of procedure ; some details must now be considered.

Insulin can only be given hypodermically, and as the injections are going to be continued for life, care must be taken to inject each dose at a different spot ; otherwise painful areas and even definite fibrosis may appear. Asepsis must be rigidly enforced, but boiling the syringe is not necessary. If it is kept in spirit and washed through with antiseptic after the injection the asepsis procured is sufficient. Many patients keep their syringe and needles in alcohol, and this is probably the most satisfactory method. The sites of injection that are found best are the arms, legs, abdomen, and thighs, and, in stout subjects, the chest and calves. The skin should be pinched up and the needle plunged in obliquely. A sharp needle obviates much pain.

Sepsis should never occur, but a transient erythema may appear, of which the cause is very uncertain ; it rarely gives rise to any real difficulty, and soon subsides. It occurs more frequently in stout subjects.

Occasionally patients complain of much stinging when the dose is injected. This is due to the acid medium in which the insulin is dissolved, and can be obviated by taking a drop of a sterilized 2 per cent solution of sodium bicarbonate into the syringe immediately before injecting.

The Treatment of Diabetic Coma. — If coma threatens, the patient should be put on a diet of skimmed milk, and Insulin used boldly. In most cases it is advisable to give not less than 50 units subcutaneously as an initial dose, and to follow this up with 30 units at two- or three-hourly intervals until definite improvement has occurred. In most cases the simultaneous administration of glucose is not necessary, and it tends to nullify any blood-sugar examinations, which give the first indication that the patient is reacting to treatment.

The chances of hypoglycæmia in any case of definite diabetic coma are exceedingly slight—the writer has given between 300 and 400 units of insulin within six hours on several occasions without reducing the blood-sugar below 0·25 per cent, and has never seen hypoglycæmia occur. If the patient shows no sign of reacting in six hours the dose should be pushed, and the 30 units two-hourly may be doubled, or even, in extreme cases, trebled. Apart from frequent blood-sugar estimations, the best clinical test of improvement is a diminution of the amplitude of the air-hunger excursions, or, if the apparatus is at hand, an estimation of the carbon-dioxide content of the alveolar air. When definite signs of recovery are manifest the insulin should be greatly reduced, or, if the dose has been very high, it may be withheld altogether for some hours.

Alkalis are useful adjuvants in the treatment of diabetic coma. Bicarbonate of Soda may be given

by the mouth in quantities of one teaspoonful dissolved in 6 oz. of water or soda-water every three hours until the urine is neutral or alkaline. In urgent cases 2 to 3 pints of a 3 per cent solution may be given intravenously with caution.

The Treatment of Hypoglycæmia.—Hypoglycæmia is a complication of insulin therapy which should rarely occur, except in its slightest manifestations. It is often due to the fact that the physician has not observed that the patient has diarrhœa, or suffers from some other gastrointestinal disorder which interferes with absorption. It may also be due to some gross error of diet, the result of carelessness or insufficient instruction of the patient. If hypoglycæmia occurs, Glucose or Sugar in any form should be administered at once, $\frac{1}{2}$ to 1 oz. being usually quite sufficient to ward off symptoms. Should the patient have become unconscious, 1 c.c. of a 1-1000 solution of Adrenalin should be given subcutaneously, or failing that, 1 c.c. Pituitrin, and not less than half a pint of a 20 per cent solution of glucose should be injected intravenously. If other stimulants—e.g., Strychnine—are considered necessary, they should be given in small doses, as some of these patients seem to react unduly rapidly to them.

CHAPTER XIX

ENDOCRINE TREATMENT

THE only *rational* use of endocrines in treatment is as substitutions in cases of absence or deficiency of the natural internal secretion. The thyroid and the pancreas, however, are probably the only instances of organs whose internal secretion can be replaced by an artificially prepared substitute, and in the great majority of cases when endocrine therapy is employed it is used *empirically* because it is believed, or hoped, that it may do good. Hence much pseudo-scientific quackery. The use of the endocrines is made still more difficult by the fact that few of them are active when given by the mouth, whilst many commercial preparations of them are altogether inert, and by the prevailing uncertainty as to their standardization and dosage.

Apart from the pancreas, whose internal secretion (Insulin) is dealt with elsewhere, there are only three endocrines of proved therapeutic value—thyroid, suprarenal, and pituitary. None of the others, with the doubtful exception of parathyroid, is generally admitted to be of use as ordinarily administered.

Thyroid.—Pharmacologically the thyroid is a great metabolic stimulant, its active principle

being an iodine compound of uncertain constitution (thyroxin). It is used rationally in all cases of hypothyroidism (cretinism and myxœdema), and empirically in a large number of other conditions in which it is believed that stimulation of metabolism will prove useful (obesity, etc.). It acts better than any other endocrine when given by the mouth—some would say that it is the *only* endocrine that so acts. The chief contra-indication to its use is the presence of tachycardia.

The official preparation is the Pulv. Thyroid. Sicc., 1 gr. of which is the equivalent of *five* grains of the fresh gland. Unfortunately many proprietary thyroid preparations are standardized differently, 1 gr. being equal to *one* grain of fresh gland. This introduces great confusion, and makes it desirable for the prescriber to use always one preparation the potency and dosage of which he is familiar with.

Suprarenal.—There are two suprarenal preparations used in treatment:—

1. *Dried Whole Gland.*—This is given as a substitution treatment in cases of hypoadrenia, the dose being 2 to 4 gr. thrice daily. It is, however, of doubtful efficacy.

2. *An Extract of the Medullary Portion of the Gland,* which contains the active principle Adrenalin. The latter is of known constitution, and can now be prepared synthetically. It resembles a drug rather than such an internal secretion as thyroxin, and indeed there are some who deny that

it is a normal internal secretion at all. Pharmacologically Adrenalin stimulates the sympathetic fibres, and is used to bring about (*a*) constriction of the arterioles in hæmorrhage and in great falls of blood-pressure, e.g., in shock, (*b*) relaxation of the bronchial muscle in asthma and of the œsophageal muscle in cardiospasm.

Adrenalin is used in 1-1000 solution. It is applied locally in cases of hæmorrhage, but is of little if any use when given by the mouth, except, perhaps, in hæmatemesis. In asthma it is given under the skin or into a muscle in doses of 2 to 5 min. In shock 2 to 5 min. diluted with at least 20 times its volume of warm normal saline may be injected into a vein.

Pituitary is used as:—

1. *Desiccated preparations* either of the anterior or posterior lobe or of the whole gland. The anterior-lobe and whole-gland preparations are given by mouth in some cases of infantilism, but are very uncertain in their action.

2. An *extract of the posterior lobe* which contains the active principle (Pituitrin). This, like adrenalin, is more drug than internal secretion, and resembles adrenalin in its mode of action. It (*a*) raises blood-pressure, (*b*) stimulates unstriated muscle, (*c*) brings about contraction of the uterus, (*d*) lessens over-secretion by the kidney. It is therefore used as a remedy in cases of shock and collapse, in meteorism, in post-partum hæmorrhage, and in diabetes insipidus.

It is of little or no use by the mouth, and may be given hypodermically, intramuscularly, or intravenously. The first of these methods is slowest and the last most rapid in effect. The dose for subcutaneous or intramuscular administration is from 0.4 to 1 c.c. (3 to 15 min.). When given intravenously it is best to begin with a small dose, which should be well diluted with normal saline.

CHAPTER XX

SPECIFIC TREATMENT
(BACTERIOTHERAPEUTICS)

It is necessary that the student should understand the principles of specific treatment as carried out in the wards, but the underlying theory is a matter for the bacteriologist to teach.

The essence of specific treatment, or bacteriotherapeutics, is the assisting of the natural mechanism of immunity by means which either inhibit the growth of organisms or neutralize their poisons.

Two classes of agents are used: (1) *Immune sera*; and (2) *Vaccines*. Immune sera supply 'antibodies' ready made and confer 'passive' immunity; vaccines stimulate the production of the natural antibodies and therefore produce an 'active' immunity.

1. **Sera.**—There are two kinds of immune sera: (a) *Antitoxin sera*, which neutralize the 'exotoxic' poisons produced by the organisms, as in diphtheria and tetanus. They are prepared by injecting a horse with increasing amounts of exotoxin and are standardized in 'units' representing the amount of serum required to neutralize an arbitrary quantity of toxin; (b) *Antimicrobial or bactericidal sera*, which act on the organisms directly, and which are

used in those diseases in which the organisms act by the production of *endotoxins*. Examples of such diseases are streptococcal, pneumococcal, and meningococcal infections. No way has yet been discovered of standardizing bactericidal sera.

Sera are usually administered under the skin, but are sometimes injected intramuscularly or into a vein, or even, in the case of antimeningococcal serum, intrathecally. Dosage is purely empirical.

Method of Injection.—It is best to warm the serum to 99° or 100° before injection, and this must *always* be done when it is injected into a vein or the spinal canal. The syringe should be well washed and boiled for five minutes before use. The skin must be cleansed with soap and water, and afterwards painted with a 2 per cent solution of iodine in alcohol. The needle fitted to the syringe should be inserted into the bottle, the neck of which has been previously broken by filing.

Subcutaneous Injection.—Where the injection is to be subcutaneous, the flank between the crest of the ilium and the last rib, or the lower part of the abdomen, is generally selected, but any region with loose subcutaneous tissue is suitable.

If it is necessary to use more than one syringe-ful, the needle should not be withdrawn, but the syringe merely detached and refilled.

Intramuscular Injection.—Serum is absorbed much more quickly into muscular tissues than when given beneath the skin, the relative rates being about 8 hours and 48 hours. A convenient place for an

intramuscular injection is about the middle of the outer side of the thigh, pushing the needle deeply into the vastus externus muscle, with the same precautions against infection as in subcutaneous injection.

Intravenous Injection.—The most convenient site for this is one of the large veins at the bend of the elbow. It is unnecessary to incise the skin; cleanse the site as for subcutaneous injection, and place a few turns of bandage sufficiently tight round the arm to obstruct the venous circulation. Draw up the serum so as not quite to fill the syringe, and attach a sharp needle. Remove any air-bubbles from the syringe. Insert the needle into the vein, withdraw a little blood into the syringe so as to be assured that the needle is properly within the vein, and, having removed the bandage, slowly inject the serum.

If a larger amount of serum has to be introduced than the capacity of the syringe permits, place the finger gently upon the vein and disconnect, leaving the needle in the vein, whilst an assistant refills the barrel of the syringe. Great care must be taken to avoid injection of air into the vein.

2. **Vaccines** consist of a suspension of killed organisms in a neutral medium, and are really preparations of endotoxins. They are best prepared from the organism present in the particular case (autogenous vaccines), but are often used ready prepared from standard cultures ('stock' vaccines).

Vaccines are administered by hypodermic injection, the most convenient site being the arm about the deltoid insertion; the dose is measured by the number of organisms in a cubic centimetre of the suspension. When used prophylactically it is usual to give an injection every week or ten days, the dose being doubled each time unless the local reaction has been marked. When used therapeutically the initial dose should be small in proportion as the infection is acute.

The syringe should be boiled before use, and the phial opened by snapping the neck after nicking with a file. If the bottle is rubber-capped, the cap should not be removed, but a drop of lysol placed on the cap and the needle plunged through it; the bottle is then inverted and the desired quantity of vaccine drawn into the syringe.

Specific treatment is used both in prevention and in cure. Examples of the former are the employment of antidiphtheritic and antitetanic serum in the prophylaxis of diphtheria and tetanus respectively; and the use of vaccines for the conferring of immunity against the infections of cholera and the enteric fevers.

For curative purposes, sera are chiefly used in acute and widespread infections; vaccines in those which are chronic and localized. Of the 'immune' sera, antidiphtheritic is the most definitely curative; but bactericidal sera have, on the whole, proved disappointing in practice. The same may be said of

the *curative* use of vaccines, except in a few infections such as boils.* There are, notwithstanding, no remedies—except perhaps the endocrines—which have been used with less discrimination or less of that healthy scepticism which should always characterize the therapist, and this uncritical attitude has done much to discredit unjustly the whole of bacteriotherapeutics.

* It has been suggested by Dr. Ledingham that even in this case the staphylococcal vaccine acts by preventing the formation of new boils and not by curing those already present—i.e., that it is really prophylactic.

CHAPTER XXI
PSYCHOTHERAPY

WHEN a person is out of mental harmony with his environment, when he finds the stresses of life too hard to be borne and can cope with them no longer, he may develop symptoms of illness, which may be either bodily or mental. Symptoms arising in this way are amenable to psychotherapy, i.e., to treatment by mental means; and illnesses of this kind are designated as psychoneuroses. It is probable that some people who cannot withstand the stresses of life become insane; these are not amenable to psychotherapy, and are therefore in another category, but the diagnosis between psychosis (insanity) and psychoneurosis cannot be discussed here.

We may consider first those patients with psychoneurosis whose symptoms are principally somatic (bodily); there are usually some mental symptoms present also, but the most obvious complaints are about the discomforts of the body. These patients fall into two great classes: (1) *Anxiety States*—sometimes called *Neurasthenia*, a word which is falling out of fashion; (2) *Hysteria*.

1. ANXIETY STATES.

The symptoms are the same as those which may accompany anxiety in a normal person. They may

affect any part of the body. The chief are anxiety, inability to concentrate, headache, poor sleep, fatigue on little exertion, anorexia, fullness after meals, constipation or diarrhoea, polyuria, sexual impotence, palpitation, sweating, blushing or pallor. The failure in the functions of the alimentary system may lead to loss of weight, and to a debility which is physical, though secondary in origin. Careful consideration will probably convince anyone that he may temporarily suffer from one or more of these symptoms if he is anxious; a patient in an anxiety state may suffer from one or all of them, and he may do so for months or years. He continues to do so because he has lost confidence in himself, for he does not know how to deal either with the symptoms or with the difficult situations out of which they have arisen. Our problem is to restore self-confidence. It may be said at once that it will *not* be restored by telling him that there is nothing wrong with him, nor by saying that he should pull himself together. He has received this information and advice many times already from all his friends, without effect.

To get confidence restored in himself he must first have someone to support him whom he can trust, and until he is able to stand alone. That someone is most suitably the doctor, and the business of the doctor is to obtain the patient's trust. Many methods have been employed by those who attend the sick to obtain this confidence; fortunately the highest and most durable confidence

is achieved by those who practise the ordinary clinical methods most conscientiously.

It is necessary that the illness should be taken seriously, and that it should not be belittled in any way. The first thing to be done is to obtain from the patient an account of everything of which he complains, and the next is to get an accurate history. History-taking is by far the most important weapon in the psychotherapist's armamentarium. It may seem absurd to say this. Everyone takes histories, but the histories required for the psychoneuroses must be much fuller than those necessary in other medical cases. They should not be merely a record of the present and past illnesses and states of health; they should be *biographies*. It is more important to know how the patient got on at school, what sort of life he led with his sisters and brothers, father and mother, than to be sure whether or not he had measles. The history should be such that at the end of it the doctor knows a great deal about the mental make-up of the patient, about his political views, his religious beliefs, his aims and aspirations in life. Very little need be asked directly about these things. If real interest is shown, most of them will come out spontaneously, and the patient will tell also of a large number of things which have been a source of worry to him, which he has not cared to tell anyone about before. Many of these will be of a sexual nature.

A history of this kind will not be completed at a single sitting. No one is going to be entirely

confidential with another person until he gets to know him. It is important to realize that these early meetings should be fairly long; the first one should not be of less duration than an hour. When a fairly full history has been arrived at, the patient should be thoroughly examined by all necessary methods, so that it may be possible to assure him that there is no physical disease which might be the cause of the symptoms. If physical disease is present it must, of course, be admitted, and, if it is the cause of some of the symptoms, just how much it is causing must be carefully explained. If there is no physical disease present, the patient should be told that he has these symptoms because he has been in a state of anxiety. If the doctor has taken the history carefully, he will probably be able to indicate where the anxiety lies, and he may be able to abolish it altogether, or show the patient that he has been meeting it in a wrong way.

a. He may be able to abolish it. There is a large number of cases where the anxieties which originated the illness have passed away, and the patient remains ill because he is anxious about the illness itself.

Thus, a patient 40 years of age had suffered from dyspepsia. There was no sign of any gastric or other physical disease, but his dyspepsia had been of so severe a nature that for about two years he had taken little else than Benger's food. He had suffered from dyspepsia when he left home as a boy of 16; his history showed that he had been

spoilt by his mother and that he was distressed at having to leave her. He recovered from this attack in time, but periods of stress later coincided with attacks of gastric discomfort. When the war broke out he had been afraid of being called up, and ever since had suffered severely. He was no longer troubled about the war. What was troubling him was that he feared that every meal he ate would disagree with him. He accepted an explanation that fear has an inhibitory effect on the gastric functions, and that he suffered after every meal because he introduced fear at every meal. On being assured that there was no other cause now why he should have dyspepsia, he said that he could eat without fear. Thereafter he was able to take ordinary food like any normal person.

It must be emphasized that a patient should not be expected to accept an assurance of this kind from a doctor until a considerable degree of confidence has been established by the methods already described. It should also be noted that the patient whose case we have just considered was not merely told that there was nothing wrong. He was taught that an emotion such as fear is able to perpetuate a symptom.

b. The patient may be suffering from anxieties which cannot be abolished. He may be in love with someone he cannot marry; he may be afraid of losing his employment; he may be labouring under some great loss. In most instances the patient will not himself have connected the presence of the

symptoms with the anxiety. The real cause, indeed, may be some emotional state which he is trying to conceal from himself. He may have behaved in some selfish way and be trying to think he has not, and so may have brought about mental disturbance. If he is allowed to talk freely he will probably be led to see some of these things for himself. All such difficulties become more easy of management when they have been discussed with a sympathetic listener.

It is taught by Freud and his followers that the anxieties which are causal in these illnesses are wholly unconscious. The writer considers that this is frequently true. But the exploration of the unconscious is too large a subject to be treated here; and anyone who wishes to use the method would be well advised to spend a considerable time exploring the possibilities of conscious worries before he proceeds to the exceedingly dangerous method of psycho-analysis.

2. HYSTERIA.

The manifold symptoms of this disorder need not be described here. We shall proceed to discuss the treatment of hysterical paralysis, hysterical fits, and hysterical amnesia. By the last term is meant, not loss of memory for certain incidents, but loss of a definite period, a certain number of hours or days or longer being blotted out *en masse* as if they had never existed. The view which is put forward here is that these manifestations arise also from an anxiety; they may be looked on as attempts to escape from an intolerable situation, just as fainting

at a revolting sight is an escape from further looking at it. This escape is not, of course, voluntary or conscious, but none the less it is an effective escape. The hysterical patient does not see it as such; in fact, he is usually placid in mind, and although his history will show that there was an intolerable situation, he will say, and say truly, that he does not worry about it. He need not, for he has escaped from it. There has therefore been a relief from the original anxiety, and as the patient has converted his anxiety into an hysterical symptom and thus got rid of it, the condition is nowadays often called 'conversion' hysteria.

a. Paralysis.—For this, as for all forms of hysteria, the first essential in treatment is a full history taken in the way prescribed for anxiety states. When this has been done and the patient has been examined, he should be informed that his loss of power does not depend on any disease of or injury to the brain, cord, nerves, or muscles, but that it is due to a mental state, of which the dominating idea is that he cannot move the affected part. At once it will be necessary to inform him that no suggestion of malingering attaches to this statement; the physician is aware that the patient truly believes that he cannot move the part, but the belief is not justified. The patient may say that he has often tried to move the paralysed limb, and the reply to this is that it is not 'trying' that we are talking about, but states of belief; that when he tried before, he did so believing that he would

not succeed. If he says that he wants to use it, it may be pointed out that he is deriving some advantage from the symptom, e.g., compensation for an accident (escape from the intolerable thought of not being compensated). To do this requires tact, for the last thing that is desired is hostility. But if the analogous case of a person fainting at a painful sight whereby he avoids the pain is brought forward, and if it is clearly demonstrated that there is no charge of deliberately seeking an advantage, but an unconscious bias only, the point will usually be conceded. When the patient has been brought to see that there is something in the idea, he will probably begin also to move the limb a little, and with encouragement will move it a little more. The séance should not be stopped until the movement has been wholly or nearly brought to the normal. This result will probably take more than an hour to achieve, and it should never be begun unless that amount of time at least is available. If the matter is not brought to a conclusion at the first attempt, it is probable that the symptom will drag on for months. The attempt should have a sitting to itself, and must not be made until the history and examination are complete, i.e., till a considerable amount of confidence has been established.

This method of direct psychotherapy is by far the best to use in the treatment of hysterical paralyses. There are other methods, such as electricity, massage, manipulations, etc., which act, not by any virtue of their own, but by the impression they

make on the patient's mind. They are to be regarded as inferior methods; they are more liable to fail in securing the desired end, and they teach the patient nothing. If he has been cured by physical means he will never be induced to think that his *ideas* require attention; whereas if the paralysis has been abolished by the method advocated, the patient cannot avoid seeing that there certainly must have been trouble in the mind. He will then be glad to discuss his difficulties, which will usually be found to be of the same kind as in the anxiety state, and which need discussing in the same way.

b. Hysterical Fits and Amnesias.—Both these are methods of escape from an intolerable position, usually from an intolerable thought. During the war a sudden reference to it might, in a man who had been badly frightened at the front, cause an hysterical fit. If the man was at home, the neighbours would be called in to hold him down; and before the fit was over a couple of policemen might have been requisitioned to sit on him. Under this kind of treatment these fits would go on for hours. The proper immediate treatment of a fit of this nature is to leave the patient alone, and by this is meant that no one should go near him at all, and if he is in the house everyone should leave the room. In the absence of an audience the fit will very soon come to an end. The object of treatment, both in fits and amnesias, is to find out what the intolerable idea is, and to try to make the patient see it in a

better light. Frequently he will say that there is no intolerable idea at all, or none that he is conscious of. Usually, however, the idea is not difficult to find. If the patient is laid on a couch and told to relax and let himself get drowsy, he will, in a large number of instances, be able to tell what is troubling him, and he will be able to say what he was doing in the amnesic period. Thus a man who had 'lost himself' for two days remembered that while in that state he had sat for hours beside the Serpentine trying to make up his mind to commit suicide. Thus many patients during the war would by this method be induced to remember some terrible scene which they had been trying to forget, and which there was a tendency to remember whenever they heard a loud noise. Discussion of all these things helps to make them more tolerable. The soldier may have thought he was cowardly ; discussion may show him that he was just the same as other people. The man who had contemplated suicide decided, after his affairs were talked over, that his troubles were not serious enough to warrant so terrible a solution of them.

There is a group of patients in whom the symptoms are wholly mental, taking the form of doubts, obsessions, compulsions, etc. These, too, are frequently due to anxieties and other emotional conditions, which are usually buried in the unconscious. These matters, however, are too complicated to discuss in a book of this kind.

CHAPTER XXII

SOME MINOR MEDICAL OPERATIONS

1. **Blood Transfusion.**—As regards their blood, all persons fall into four groups known as Groups I, II, III, and IV. These groups have to be considered in relation to the agglutinating power of the serum on other group corpuscles.

The crux of the whole question is whether the donor's corpuscles are going to survive in the recipient's blood. If they are agglutinated, then the new blood is quite useless, even if such serious results as multiple emboli or sudden death do not take place.

Group I patients are known as 'universal recipients', as their serum does not agglutinate the corpuscles of any other group.

Group IV are 'universal donors', as their corpuscles are not agglutinated by any of the other sera.

The serum of Group II agglutinates the corpuscles of Groups I and III; and that of Group III the corpuscles of I and II.

The table on p. 150 shows this graphically, as well as the relative percentage of the groups.

To test for *agglutination*, only sera of II and III are necessary. A drop of each is placed on a

white tile, and a small quantity of the blood to be tested added and intimately mixed with each; no more blood should be used than will impart a definite red tint to the serum. If agglutination occurs in either of the drops, there appears a suspension of very fine red grains resembling brick-dust. A little experience is necessary before one can always be certain of the result, but this is soon acquired.

		Serum				
		Relative frequency	I	II	III	IV
Corpuscles	I	2 per cent	-	+	+	+
	II	40 „	-	-	+	+
	III	15 „	-	+	-	+
	IV	43 „	-	-	-	-

The best method of transfusion is by citrating the blood, which is done by adding 10 c.c. of a 2 per cent sodium citrate solution to 90 c.c. of blood. The blood is drawn off by venepuncture with a large-bore needle, and run into a graduated flask in which the required amount of citrate is already placed. The flask is gently shaken while the blood is being collected.

The usual method of transference is illustrated, sufficient force being generated by pumping air into the top of the flask and thus driving the blood along the tube, an air-lock being interposed to trap

any stray bubbles of air. Before starting, the tube must be run through with citrate solution. The vein may be needled directly through the skin, or ordinary venesection done with a cannula tied in. The transfusion *must* be given slowly—certainly not faster than 500 c.c. in half an hour. If it is given too fast the patient will complain of pain in the chest and may collapse, probably from distention

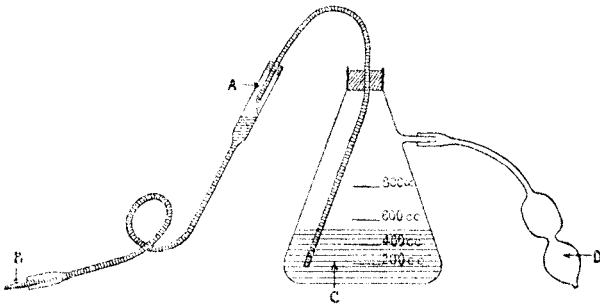


DIAGRAM OF BLOOD TRANSFUSION APPARATUS.

A, Air-lock; B, Cannula; C, Citrated blood; D, Higginson syringe.

of the right side of the heart. From 500 to 750 c.c. is the usual amount of the transfusion.

Wherever possible the donor should be of the same group as the recipient.

In cases of emergency the blood of the intended donor is tested at once with the patient's serum; this procedure is easy, and as it only takes very few minutes it is hardly justifiable to proceed without it.

2. **Subcutaneous Infusion of Saline.**—This method is not often used in view of the more

satisfactory intravenous route. The apparatus consists of two needles with rubber tubing connecting up with a Y tube from which a tube is led to a funnel raised about three feet above the patient. With due antiseptic precautions a needle is inserted under each breast or in each flank, and the fluid allowed to run in. Occasional massage aids the flow. The needles must be placed well into the subcutaneous tissue. Great care must be observed, as there is considerable danger of sepsis, and the tension on the skin must *not* be allowed to remain.

3. Intraperitoneal Saline.—This is of use in dealing with young infants, especially those suffering from the dehydration of infective enteritis. The skin and muscles of the abdomen are picked up, and the needle is passed in a slanting direction; normal saline is then run in from a funnel. If the saline is started immediately the needle enters the skin, and the operator stops inserting the needle the moment the flow is seen to accelerate, the danger of puncturing the bowel is very small.

4. Rectal Saline.—The patient is placed on his left side or prone. An 8 to 10 rubber catheter is lubricated, and, guided by the left hand, is gently passed into the rectum for 3 to 4 inches. The catheter should be filled with saline before it is passed. The saline should then be allowed to run in very slowly from a funnel—not more than half a pint being given in a quarter of an hour. For success the fluid must be at the correct temperature, 105 F°. Both rectum and bladder should be empty.

Sometimes it may be necessary to raise the foot of the bed to help the patient to retain the injection.

5. Paracentesis.—

a. Pleura.—The usual method is by Potain's aspirator, which is merely an ordinary Winchester bottle provided with a two-way stopper fitted with taps. The air is exhausted by a pump through a tube connected to one way; the other is connected up to the cannula. Both taps must never be open at the same time. The puncture should be made in the 9th space in the posterior axillary line. The most important point to see to is that the cannula and trocar fit accurately. It is still better to use an exploring needle, as the majority of cannulae are unnecessarily large, and after some use often do not fit the trocar accurately. The needle or trocar and cannula are held in the whole hand, the butt resting in the right palm and the index finger extending along the shaft. Place the tips of the left index and middle fingers in the intercostal space, and make the puncture between the fingers. This largely obviates the danger of striking a rib if the patient moves. Do *not* stab the patient—the proper movement is sharply and steadily downward, and is made entirely from the wrist. In small effusions one draws off all one can without disturbing the patient, but in large effusions three pints is as much as is advisable. The fluid must be drawn off slowly. If the patient begins to cough, or complains of pain or dyspnoea, one should stop aspirating at once.

b. Pericardium.—The same method may be used as in tapping the pleura. The safest place is between the outer limit of cardiac dullness and the apex beat. A fine needle should always be used, and if one turns on the tap connecting the needle with the vacuum in the Winchester bottle as soon as the skin is punctured, one will see at once when the pericardial sac has been entered. Draw off all the fluid obtainable.

c. Peritoneum.—The technique of tapping the peritoneal cavity is different from the above, as the fluid is under positive pressure. A Southey's or other fine trocar and cannula is attached to a rubber tube, which drains into a bottle under the bed. If the rubber tube is attached to the cannula, and the trocar inserted through the rubber, much mess will be avoided. Puncture in the mid-line or in either iliac fossa. The safest place is just external to McBurney's point, as the liver rarely extends down as far as this. Beware of a distended bladder if puncturing in the mid-line. If the patient is rolled over towards the side of puncture, the risk of injuring bowel is obviated. A binder must be placed around the abdomen immediately before starting, and must be tightened continually *during* the tapping; otherwise the relief of pressure will cause great distention of the abdominal veins. As much fluid as possible should be removed.

6. Venepuncture.—The veins chosen are usually those in the antecubital fossa. The needle is held at an acute angle to the skin, and the vein must

be steadied by the left thumb, the fingers grasping the forearm behind. The needle must be sharp.

7. **Venesection.**—With due aseptic precautions, a 1-in. incision is made to the side of the vein, after injection of novocain, and the skin retracted. The vein is freed, and two catgut sutures are placed in readiness under it at each end of the incision. The vein is then divided between them. If it is intended to tie in a cannula it is better to slit the vein transversely, as it is then much easier to insert the cannula. When the operation is completed, both ligatures are tied, and the skin is closed with one suture.

8. **Intravenous Medication.**—

Saline.—This is a solution of 9 per cent sodium chloride. It must be given slowly through a cannula introduced by venesection, and must be kept at 100° to 110°. Not more than a pint should be injected, as syncope may be caused.

Gum Saline is the same as the above, but also contains 6 per cent of gum arabic. It is introduced in the same way.

Hypertonic Saline.—This is double-strength normal saline.

Various *drugs* are also given intravenously—the commonest being salvarsan and its derivatives. If these are given with a syringe, the plunger should be drawn back as soon as one thinks the vein is penetrated and blood must be seen to enter the syringe. If this precaution is not observed, the

drug may get into the subcutaneous tissues and cause extensive sloughing.

9. Passage of an Œsophageal Bougie.—Before passing a bougie, aneurysm of the aorta must be excluded. The bougie selected should be a fairly large one (size 20 English), and the end should be dipped in hot water or glycerin. The patient sits up with his head slightly bent forward. If the pharynx is unduly irritable, it may be swabbed with novocain. The end of the bougie is placed at the back of the tongue, and the patient told to swallow. As he does so, the bougie is gently pushed downwards, and this movement is continued until the stomach is reached or an obstruction encountered. The danger of entering the larynx is negligible.

If an obstruction is met, the bougie is withdrawn a little, and after a short interval a second attempt is made, in case the delay is due to spasm. Under no circumstances must force be used, as it is very easy to penetrate the œsophagus if the obstruction is due to carcinoma—by far the commonest cause. The length of bougie passed is noted, and this gives the site of the obstruction.

10. Passage of a Stomach Tube.—This is passed in exactly the same way as the œsophageal bougie. For washing out the stomach, the tube is connected to a three-way junction, one branch going to a bucket, and the other to a large funnel. By alternately raising and lowering the funnel, normal saline is run in and siphoned off.

11. Removal of Œdema.—Two methods may

be used—multiple small incisions or Southey's trocars.

In the former, the skin of the patient's legs is carefully sterilized, and multiple small incisions of a half to one inch in length are made through the true skin only. The limbs are then dressed with gauze and plenty of cotton-wool, and wrapped in sterilized towels. Underneath the towels are placed suitable flat trays or dishes to avoid soaking the bed. The most scrupulous asepsis must be observed, as the water-logged tissues may easily suppurate. It is well not to incise the dorsum of the foot, as there seems to be a much greater risk of wounds there becoming infected. Frequent dressings are necessary, and are to be continued until the incisions heal.

If Southey's tubes are used, the trocar and cannula are inserted obliquely into the subcutaneous tissues and up to the hilt. The trocar is withdrawn, and a rubber tube attached which conveys the fluid into a bottle under the bed. The tubes are not so satisfactory as multiple incisions, as the serum tends to escape by the side of the cannula, and hence frequent changes of the dressings are required. There is also greater risk of sepsis.

12. Dry Cupping.—The edge of the cupping-glass is smeared with vaseline and the interior lightly swabbed with methylated spirit. This is lighted, and the cup immediately inverted on to the skin. A partial vacuum is formed, and the skin is drawn into the cup. To remove the cup, the skin

at its edge is depressed and the vacuum is destroyed. The cup is then gently lifted off.

13. Wet Cupping.—The skin is carefully cleansed and the area dry-cupped. The skin is then scarified with a scalpel, and the cup re-applied and emptied of blood as often as desired. After the cupping, the skin is washed with a mild antiseptic and a gauze dressing is applied.

14. Application of Leeches.—The skin over the area to be leeches is first thoroughly washed, and then dabbed with milk. It is next covered by a piece of lint, in which a few holes have been cut in proportion to the number of leeches to be used. A leech is taken out of the bottle of cold water in which they are kept, dried with cotton-wool, and held at one of the holes in the lint. Usually the leech bites at once; if it does not, one should apply a little sugar, or prick the skin so that a drop of blood exudes.

As soon as the leech has bitten, it is laid on the lint until it drops off. After the leeches have dropped off, the wounds are lightly dressed and covered with a thin layer of cotton-wool. If the bleeding is not sufficient, fomentations may be applied. Excessive bleeding can be stopped by firm pressure, but occasionally it may be necessary to touch the bites with silver nitrate. The leeches are killed by dropping them into strong antiseptic. In most cases three leeches will be found sufficient.

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