

many sections in which they are not previously visible, they are seen after staining by the solution of red aniline, which is the method I recommend for their demonstration. In sections in which they are not previously visible, solution of extract of logwood and alum sometimes demonstrates them by a uniform staining of the cell substance; but it is somewhat difficult to manage this process, except in extremely thin sections, as the ground substance is apt to stain too deeply to allow the cell to become visible. The aniline staining is for this purpose much to be preferred.

The stellate cells and their fine processes are seen in most cases unaltered, even when they are surrounded by rows of swollen spindle-cells, and great numbers of colourless blood-corpuscles. In some parts, the globular form of the cell, and the beaded appearance of the processes previously described, are seen. Of the condition of the nucleus of the stellate cells in such preparations, little information is obtainable. When the osmic acid has acted alone, and no additional dye is used, the nucleus is invisible. When there has been subsequent staining by logwood and aniline, the stained nucleus can be seen in the body of the cell, but not with sufficient distinctness to permit an accurate judgment regarding its condition. It is noteworthy, that in preparations in which the contours of the nuclei of the spindle-cells and white blood-corpuscles are indicated with the greatest precision by logwood and aniline, the nuclei of the stellate cells, although stained, are still obscure.

(Chapter III. will be continued in our next Number.)

ARTICLE VIII.—*Clinical Lecture on Intermittency and Irregularity of the Pulse, and on Palpitation, Cardiac and Aortic.* By GEORGE W. BALFOUR, M.D., F.R.C.P. Ed.

GENTLEMEN,—There is perhaps no single symptom connected with the heart which gives rise to so much discomfort, uneasiness, and feeling of insecurity, as intermittency or irregularity of the pulse; yet both of these phenomena are perhaps at least as frequently associated with the absence of serious disease of the heart as the reverse, and this is especially the case with intermittent action. Nevertheless, intermittent action of the heart is so alarming in itself, and so frequently occurs in those who are otherwise of a highly nervous temperament, that it not unfrequently constitutes a very serious complication, almost worthy of being regarded as in itself a disease.

Simple intermittence is the slightest form of derangement of the cardiac action, and consists in the occasional omission of a pulsa-

tion, the next recurring at the usual period, without any alteration of the cardiac rhythm. The intermission may occur once every two beats, or once every twenty, forty, or more; it may consist in the omission of only one pulsation, or two or three pulsations may be omitted each time, or one pulsation may be generally omitted, and at occasional times we may have the intermission extending over two or three pulsations, thus introducing the element of irregularity in its simplest form. In these cases we have the pulsations equal in strength, but with intervals of varying length between them. But this irregularity is frequently not confined to the intervals, but extends to the pulsations themselves, which in such cases not only occur after pauses of uncertain and varying length, but are themselves of very unequal strength. In the simplest form of irregularity we recognise the truthfulness of Dr Richardson's description. He says, "The ventricle continues in diastole for two or more strokes of the systole of its auricle, and then relieves itself by a prolonged effort: it is like a man who, striking at the forge a number of strokes in rhythmical succession until tired of the action, changes it for a moment to give a more deliberate and determinate blow, and then rings on again in regular time."¹ But irregular pulsation of the kind last referred to does not come under this description. Of it we may have a variety of forms, which may be referred to two heads: in the first we have the hammer ringing on in regular time upon the anvil, but only striking the irregular blows at irregular intervals; in the second we have the irregular blows made still more strikingly irregular by occasional cessation of the regular ringing which carried on the continuity of the action: while we may also have the effective blows, the ineffective ringing, and the total cessation of action combined in every possible variety of rhythm. Thus a heart, which usually or occasionally intermits, may at long, and uncertain intervals of time, have suddenly, without any known provocation, a series of half-a-dozen or so of rapid ineffective ventricular contractions, usually felt as a sort of fluttering by the patient himself,—a sensation which the practitioner also recognises when he has the chance to feel them either in the radial artery—which they do not always reach—or in the cardiac area itself, and these flutterings once passed may not recur for months. At other times the pulse and the cardiac action itself present such a combination of irregular intermissions, unequal pulsations, and occasional thumpings, as can be likened to nothing else than an irregular game of hop, step, and jump, in which each element is liable to be omitted, to be repeated more than once with varying and unequal effect, and also to be transposed in every possible way, till you actually think that the heart must have forgotten how to beat and must soon cease; yet all this may go on for hours, days, months, or years, I do not say without

¹ Transactions of the St Andrews Medical Graduates Association for 1869, p. 234.

detriment, but I can safely say without any apparent detriment to the patient's well-being and even usefulness in life, provided he be not called upon for any very active, or at all events long-continued, exertion. At first such irregularity is no doubt very alarming, but it never becomes extreme at once, usually beginning by occasional intermissions and gradually passing into its severer forms, though occasionally at any period of life, but especially about middle life, one may be suddenly surprised by an attack of extreme irregularity without previous warning; but in such cases, as a rule, it soon passes off, seldom lasting more than a few hours. It is only in advanced life that we find irregular action persisting continuously for months or years.

Palpitation is merely the occurrence of abnormally rapid pulsation in the heart or in the aorta, most usually the abdominal aorta. This may persist for only a few minutes and then die off, or it may last continuously for a much longer period.

All these abnormalities of cardiac action are very closely connected together, and they are all neurotic in character. That is to say, the nervous system plays a most important part in their production. I do not say in their origination, because, though that is sometimes the case, it is by no means always so.

We know that the heart of an embryo chicken has been seen to beat (Funke, Lebert, etc.) when merely composed of cells, long before any nervous structures were visible—while, therefore, the nervous force to which its action was doubtless due was nothing more than a diffuse *vis insita*. By-and-by, however, nervous ganglia are formed in the substance of the heart, and to the influence supplied by these ganglia most modern physiologists seem inclined to attribute the ordinary rhythmical movements of the heart. It is true enough that in the adult heart we cannot disconnect these movements from the ganglia, because to remove the latter we would require so to dismember the heart as to destroy its capacity for rhythmical movement, or for any continuous movement whatever. But, inasmuch as these rhythmical movements commenced and continued long before the development of any ganglia, it seems reasonable enough to conclude that the same *vis insita* still maintains them after the formation of these ganglia, and would maintain them after their removal, if that could be done without destroying its perfection as a piece of mechanism, and that it is to this *vis insita*, and not to the retention of these ganglia, that the rhythmical movements of a shark's or a frog's heart are due,—movements which may last for hours after the complete severance of the hearts from the respective bodies of the animals to which they belonged. From this point of view it would seem that these ganglia are developed, not so much for the purpose of providing a nervous force, which already exists and thoroughly pervades the cardiac muscle, as rather for that of connecting the heart with the rest of the organic frame, and co-ordinating the

cardiac movements with the multifarious requirements of that frame, both in health and in disease.¹ But for this co-ordination the heart would, to the great and manifest inconvenience of the organism, maintain one uniform rate of pulsation in the stillness of repose, and amid the turmoil of the most strenuous exertion; and with an impartiality even more remarkable than that of death itself, would march to its final repose at the same steady and unfaltering rate through the depression of cerebral coma on the one hand, or the excitement of violent fever on the other. No doubt, for wise, if not always for very obvious purposes, these cardiac ganglia have been developed, which connect the heart and its movements on the one hand with the sympathetic nervous system, mainly through the lower cervical ganglion, and on the other hand with the cerebro-spinal system, chiefly by means of the inferior cardiac branches of the vagi. The term *excito-motor* has been applied to the one system, the appellation *inhibitory* to the other, and I leave these terms as they stand, doubting if we have as yet sufficient information as to the actual and reciprocal action of these two systems on the heart to warrant their acceptance in the ordinary meaning with which they are employed. The sympathetic nervous system we know presides over ordinary nutrition, maintains the bloodvessels in their normal condition, and, when excited, constricts them; while the cerebro-spinal system has for its chief action the maintenance of the general *consensus* of the organism, and by propagating influences from one organ to another, antagonizes the sympathetic and permits dilatation of the arterioles and the passage of blood in quantity sufficient for rapid and increased secretion, etc. But the heart is not an arteriole, and the difficulties in the way of understanding the actual influence of these two systems upon the heart is not lessened when we find that Bernard states that section of the vagus in the neck lessens the respirations by one half, and doubles the cardiac pulsations, while Brown-Sequard alleges that in the frog at least, section of the vagus has no influence whatever either upon respiration or cardiac pulsation. Be that as it may, however, it is enough for us for the present clearly to understand that the heart beats rhythmically by virtue of a *vis insita*, and that its pulsations may be variously modified by influences conveyed to it through the two great antagonistic nervous systems—the sympathetic and the cerebro-spinal; and, till physiology comes to the rescue with some more definite and more universally received views than any she has yet produced in this matter, we must content ourselves by feeling along the lines of nervous communication in any case of palpitation, intermittence, or irregular action, for any perverted action or

¹ I am glad to learn that this important doctrine, which I have always held and taught—*vide* Introduction to the Study of Medicine, Edin. 1865, p. 97—is now being recognised by physiologists. *Vide* Proceedings of the Royal Society, vol. xxiii., No. 160, p. 318, and Ed. Med. Journal, Oct. 1875, p. 370.

secretion which may be capable of affecting the heart reflexly ; and in doing so we must employ our reason as well as our observation ; and we must also carefully determine whether there is anything in the mechanism of the heart itself which renders it more than usually susceptible to extraneous injurious influences.

It is somewhat remarkable, that so long as the heart remains mainly under the influence of the *vis insita*, and unaffected by extraneous agencies acting through its nervous connexions—that is, so long as the fœtus remains *in utero*—intermittent action is unknown. It must occasionally occur, because, even *in utero*, agencies are now and then at work which ought to produce it. But its occurrence must be very exceptional, as I know of no such case recorded, and have inquired at several friends, much in the habit of auscultating foetal hearts, without ascertaining that intermittent action has ever been observed in such cases. But no sooner is the child born than injurious agencies multiply and increase in intensity, and by their reflex action it comes to pass that we have intermittent cardiac action at once developed in so many instances as to constitute infantile intermittence a well-known fact. And from man's birth to his grave it is a phenomenon of frequent occurrence, though in itself it has as little influence in precipitating his exit from this world as in influencing his entrance on its stage. The late Dr Matthew Baillie was once consulted by a patient with an extremely irregular pulse, and being pressed to give a reason for its occurrence, he replied, "I don't know what is its cause, but I can tell you this, it won't shorten your days." The patient, a native of this city, was forced to content himself with this opinion, and lived to prove its truth, for he died at a very advanced age many years subsequently. But it is not always so innocuous ; for while it always indicates some weakness of the cardiac walls, or some irritability of cardiac innervation, not always of much importance, so it many times is also associated with serious lesion of the valves, or of the cardiac muscle, which does tend to shorten life.

I have already mentioned¹ to you that extremely irregular action is almost pathognomonic of mitral stenosis ; Mr Adams of Dublin² regarded it as quite pathognomonic of this lesion, provided the irregularity were of such a character that several of the faint fluttering cardiac pulsations every now and then failed to be felt at the wrist. In this he was no doubt wrong, as irregularity of this character is at least as common in the gouty heart, whether dilated or not, as in mitral stenosis ; and he was also wrong in following Corvisart and attributing extreme irregularity in both force and frequency of pulse to narrowing of the aortic orifice. Elliotson corrects this opinion, for he says, "I do not happen to recollect a pulse irregular in force and frequency in a single case of narrowing of the aortic opening solely, while I know that it is very common

¹ Ed. Med. Journal for Jan. 1872, p. 616.

² Dublin Hospital Reports, vol. iv. p. 494.

in the narrowing of the left auriculo-ventricular opening, though possibly not peculiar to it, nor indeed to narrowing of any opening."¹ My own experience leads me to coincide with Elliotson's opinion, which I believe will be found to be correct. To constitute it pathognomonic of mitral stenosis, irregular cardiac action need not present any special form of irregularity, for that varies in each case, but it must be associated with some at least of the other concomitant phenomena diagnostic of this lesion, and most certainly with accentuation of the pulmonary second sound, a phenomenon not always easily recognised in such cases, because both second sounds are apt to be much weakened when the cardiac action is extremely irregular; still in mitral stenosis it will be always possible to discriminate the pulmonary second as a shade more distinct than the aortic second, though it may not be markedly accentuated. Very frequently in such cases the existence of an irregular mitral systolic murmur simplifies the diagnosis, though this is by no means always the case. In all such cases there is also evidence of cardiac failure from pyrexia or overwork, frequently a history of rheumatism, and very often well-marked signs of pulmonary and of general venous congestion. I know of no cardiac cases more amenable to proper treatment than these are, none in which relief is so certain of attainment, though of course perfect cure is unattainable, and even complete removal of the irregularity is hardly to be expected, though it is sometimes temporarily obtained. In all such cases the pulse is of course permanently small and feeble even when it is not irregular, and this—as well as the presence of pulmonary accentuation—constitutes an important point in the differential diagnosis between irregularity depending on mitral stenosis, and that depending simply upon gouty weakness of the cardiac muscle. In the latter class of cases, with which for diagnostic purposes we may associate atheroma of the coronary arteries, also said to be an occasional cause of cardiac irregularity, we have of course no accentuation of the pulmonary second; in the intervals between the fits of irregularity the pulse is of the normal fulness and strength, and this is also the case with those pulsations which during the attack fairly reach the radial artery. In mitral stenosis then, while some of the cardiac pulsations fail entirely to reach the radial artery, even those which do reach it are all small and feeble; but in the gouty heart, while some of the pulsations also fail to reach the radial artery, most of those which do reach the periphery are of average strength and fulness. The chief exception to this rule is when the gouty heart is already dilated and the mitral valve incompetent, but in these cases we have superadded to the irregular action, all the ordinary signs of dilated hypertrophy to guide our opinion. Once fairly developed there is probably no class of cases, not associated with absolute organic disease, in which a permanent cure is

¹ On Various Diseases of the Heart, fol. London, 1830, pp. 16, 17.

so rarely attained as in gouty irregularity, though they are susceptible of great relief from appropriate treatment, and with moderate care are not usually attended by any considerable shortening of the normal span of life; some indeed with even extremely irregular gouty hearts continue in fair health to a very advanced age, without any obvious impairment either of bodily or mental vigour, except that depending upon senescence.

There is one form of abnormality, however, in a gouty heart which I do not hold to be so susceptible of a favourable prognosis. I refer to that to which attention is ordinarily first directed by the occurrence of symptoms referrible to cerebral anæmia, in which abnormal slowness of the pulse is the most remarkable symptom—a slowness of pulse not because the cardiac action is slow, but because many of the pulsations fail to reach the periphery. It is long since Hope pointed out that though cardiac action was occasionally really slow, yet the bulk of these cases in which the pulse was said to range from 20 to 30 a minute, were really cases in which one or two of the ventricular beats were regularly and permanently imperceptible in the pulse, every second or third pulsation only reaching the periphery;¹ and Dr Stokes has made some most important and instructive remarks on the same subject, expressly in connexion with the production of cerebral anæmia, and all the peculiar and important phenomena which may result from that.² In one very instructive case which I saw some years ago, an old lady, long gouty, though without regular attacks, and with a dilated feeble heart, had been suddenly seized while shopping with what seemed to be an epileptic attack. These attacks continued to recur when she made the slightest exertion, and at the time I saw her she was unable to rise from the recumbent posture without bringing on one. They were associated with flatulent dyspepsia and an extremely slow pulse, averaging about 20 per minute. On careful examination I found that her heart acted with perfect regularity, but with unequal force, so that the apparently abnormal slowness of the pulse was simply due to the fact that only about every third beat reached the periphery. It was not difficult to connect this defective cardiac action with diminished arterial pressure, perfectly sufficient to produce all the phenomena of cerebral anæmia on the one hand, and among these epileptic seizures, and also defective secretion generally, and as one of the results of that flatulent dyspepsia. There is but one remedy that I know of capable of remedying this state of matters, if, indeed, the muscular fibre be still perfect enough in structure to permit its being remedied, and that is digitalis; full doses of that were prescribed, and with nutritious diet and a fair allowance of stimulants, it succeeded so well in her case, that within a week she was going about as usual, was so well indeed, as to give a

¹ On Diseases of the Heart. London, 1839, p. 337.

² The Diseases of the Heart and the Aorta. Dublin, 1854, p. 362, etc.

dinner party, and she died gradually from asthenia some years subsequently, without any return of these serious symptoms. Such cases are, however, always more serious than those of simple irregularity of the cardiac action, and are not always so easily to be remedied, considerable degeneration of the cardiac muscle being only too frequently concomitant.

Irregularity of the pulse is, you will see, most frequently associated with mitral stenosis or with gout; no doubt it is also associated with other cardiac affections, or with apparently simple dyspepsia, rarely, however, I think, unless these affections or that dyspepsia be associated with the gouty dyscrasia. Simple intermission, however, stands in a somewhat different category; sometimes it is only an early indication of failure of cardiac power dependent upon anæmia, over-work, or worry, or upon valvular disease or gout, but it is often a purely nervous phenomenon. In the former class of cases we have the affection commencing by an intermission, followed by a thump. As the disease progresses this thump becomes associated with a sensation of tumbling, and by-and-by the irregularity and inequality of the heart's action reveals itself to the sufferer by a rapid and irregular succession of thumps and tumbles of varying force. In the class of cases, however, to which I now refer, the disease never progresses beyond the thumping stage, and the thumps are not even very distinct; the patient has at the most an uncomfortable sensation in his cardiac region of varying intensity, lasting for less than a second, and if we happen to feel the pulse at that moment we become aware that this uncomfortable sensation is associated with the omission of a radial pulsation and nothing more; and sometimes this takes place regularly without the patient being in any respect conscious of it. Such cases are of purely nervous origin, and arise from sudden fright, grief, or anxiety; and the intermission thus produced, though for a time of frequent recurrence, gradually dies out, and sometimes disappears entirely, while in many cases it remains permanent, though much more infrequent than at first. This form of intermission originates in the accidental coincidence of fright or anxiety with a heart congenitally or acquiredly feeble, or with a nervous system from similar causes unduly impressionable. I have known it commence with the shock of a railway accident, and in that case the intermissions were at first every second beat, but in a few months came down to one intermission in twenty beats, and I have no doubt will ultimately disappear. Richardson has known it follow shipwreck in one instance, with a somewhat similar result, and sudden grief, anxiety, or anger, in several other cases.

This form of intermission is simply an exaggeration of what we have all probably felt at one time or other when our heart has, for the moment, stood still in the face of any impending danger to ourselves or others. It is merely an aggravated form of what our

vernacular poet James Smith has so graphically described as indicative of maternal anxiety :—

“ My vera heart gaes loup, loup,
Fifty times a day.”

This “loup” being nothing but the perceptible thump which succeeds a momentary intermission. In nervous, and therefore impressionable individuals, now and then, there is no returning thump, the intermission, as Paddy would say, becomes permanent, and we have sudden death from emotional causes, of which not a few are upon record. At other times, partly from the intensity of the impression, but chiefly from debility of the nervous system, this “loup,” thump, or intermission, of which the loup is the most striking subjective symptom, not only occurs under the instantaneous excitement of any emotion, but repeats itself, at first at shorter, afterwards at longer intervals, until at length it dies out under the reassertion of the normal condition of the nervous system. Now and then, however, it never dies out, but repeats itself so long as life continues. We may, however, be permitted to doubt in such cases if the emotional excitement have any other connexion with the intermittence except simply as the accidental incentive to a series of actions already from other causes about to begin. Be that as it may, however, the connexion between emotional excitement and muscular motility of a convulsive and rhythmical character is not an unknown thing in other departments of medicine; and cardiac intermittence and irregular action from emotional causes, finds its counterpart in those imitative choreas and epilepsies, which are of no infrequent occurrence, and has even no very distant connexion with the vagaries of the convulsionnaires and choreomaniacs of the Middle Ages.

In the treatment of intermittent or irregular pulse, we must be guided very much by the condition of the patient, and the existence of any actual cardiac disease, or of any irritation capable of reflexly producing such irregularities. And this we must carefully ascertain for ourselves, and never trust to the mere statements of the patient; because there is nothing more common than for a dyspeptic patient to say, “I never have a headache; I may eat and drink what I please, my stomach never troubles me.” True, but his heart does; and careful examination will discover that his stomach is not so perfect as he represents it to be. It is precisely the same with him as with a patient with neuralgia of the shoulder-joint and a decayed molar tooth. “You need not look there,” he says; “I never have toothache.” But he winces when we touch the tooth, and if we get leave to extract it his neuralgia is cured. The one man has toothache in his shoulder, the other dyspepsia in his heart. The cases are analogous, and teach us to put more faith in our own careful examination than in the statements of any patient, which, let me add, however, there is no need

to contradict. We are bound to cure our patient if we can, but it would be both thankless and dangerous to attempt to confute all his prejudices.

In the intermittent pulse of infancy and childhood little treatment is required; the bowels must be regulated if necessary, but more by food and exercise than by medicine, for whatever enfeebles the frame tends to keep up the intermittence. We must also by moderate exercise in the open air, early hours, plenty of sleep, and the use of a nutritious but unstimulating diet, seek to tone down any nervous instability, and to develop a state of rude unconscious health. The patient ought also to be warmly clad, and the use of quite cold water as a bath avoided, as any nervous shock ought to be most carefully shunned. If any remedies seem needful, the bromide of iron is a very useful one, or in very irritable patients it may be necessary to have recourse to the bromide of potassium, for a time at least.

In patients affected with cardiac disease, we of course regard the irregular pulse as a mere symptom, and treat the central lesion upon which it depends, whatever that may be. In by far the larger proportion of cases it will be found to be mitral stenosis, as I have already told you; and as the irregular action accompanying this lesion is merely a sign of cardiac debility, what we require to do in these cases is simply to slow and steady the heart's action, increasing at the same time the force of its muscular contractions. All this we can do most effectually by the judicious use of digitalis, so much so, that in a few days the patient will express himself as feeling a new man, and he will not much mind any little remains of irregularity, which it may be difficult if not impossible altogether to remove. Of course, though digitalis in small, repeated, tonic doses, must be our main stand-by in these cases, other drugs as subsidiary agents are frequently of great importance and must be used *pro re nata*; such as carbonate of ammonia when bronchitic rhonchi are present; squill if there be much œdema—if only a little we may safely trust its removal to the digitalis; arsenic if there be much cardiac pain, which there seldom is in these cases; bromide of potassium, with or without morphia—subcutaneously or otherwise—if there be much nervous restlessness; and iron in some form or other if anæmia be a prevalent symptom.

When, however, intermittent or irregular cardiac action comes to be a subject for medical treatment apart from cardiac disease, the heart may still be soothed and steadied by small doses of digitalis if necessary, but the treatment falls mainly under three heads—*First*, to remove the cause if possible; *second*, to brace up the whole organism; and, *third*, to soothe the nervous system. If the cause be mental, such as grief or anxiety, all our care will frequently be baffled, and our success will usually depend not so much upon our remedies as upon our influence, and also upon the amount of mental firmness originally possessed by our patient, and

whether he is still capable of being roused to exertion. In nervous shocks from anger or fright, we have a potent help in the narcotic needle, which timeously employed abbreviates the period of shock, and lessens its subsequent influence, besides giving the patient confidence in our resources and in their power to relieve him; the dose of morphia injected must, however, be a full one, and such as is sufficient to ensure sound sleep for some hours. We must in every case caution the patient against all depressing agencies, such as excess in venereal pleasures, excess in tobacco-smoking, too much work, especially intellectual work, all worry or excitement of any kind, and we must prescribe abundance of sleep, fresh country air, plenty of sunlight, perfect quiet, light amusing occupation, and nutritious diet in small quantities at regular intervals, suited to the requirements and capacities of our patient. But no solid food should be given at a less interval than four hours, so as to avoid introducing fresh food into a stomach still containing undigested material, as nothing is more injurious; but a tumblerful of hot water, or a large teacupful of hot solution of Liebig's extract of beef, washes out the stomach, prevents the accumulation of flatulence, and often proves most useful in stimulating the completion of digestion and the emptying of the stomach.

Alcohol is the one domestic remedy which exercises the most potent influence upon an irregular and intermittent heart;¹ it is, however, one which must be used with caution, because excess in its use is apt to perpetuate and increase the very evil it is employed to cure. Still, moderately employed, its action is not only palliative, but to a certain extent curative; only it must be employed in moderate doses, and in those forms which contain fewest substances likely to disagree, and these are in the main good sound claret, and pure whisky free from fusel oil or all injurious impurity. Next to these comes sound sherry, neither too dry nor the reverse, but of medium quality. Porter, ale, and beer are useful enough at times, as well as all other alcoholic fluids, but as a rule are not to be commended, though in every case we must be guided by the idiosyncrasy, the purse, and the convenience of our patient. The object we seek to attain is to provide a nutritive, diffusible stimulant, slightly narcotic or sedative in its qualities, and one the components of which shall disturb digestion as little as possible, while we also take care that the quantity introduced shall not be sufficient materially to interfere in this way. About two ounces of absolute alcohol is the most that can be introduced into the system in one day without detriment, but this may be given in divided doses, and in various forms, according to the requirements of the patient. Coffee, but especially tea, are excessively injurious to such neurotic patients; they ought therefore to be avoided, and a French breakfast, with meat, fruit, and claret,

¹ In this I may seem to follow Dr Richardson, but the fact was well known to me long before the publication of any of his papers.

will be found to suit such a patient much better than our ordinary one with tea for its principal beverage; but if preferred, hot soup with a little well-boiled rice will answer equally well in most cases. For lunch, a tumblerful of milk and Carrara water, a glass of beer, or a basin of soup, according to taste. For dinner, plain roast or chop, vegetables in moderation, no pudding, and two or three glasses of claret, or a couple of glasses of sherry, will be found very serviceable. No tea, and at night a glass of whisky and potass water, with or without a biscuit. This is a sort of model diet for such cases, which must be varied to suit each individual case. We must, especially in this climate, secure that whatever is taken in the morning be sufficiently stimulating to enable the patient to withstand the cold—especially in the winter—and to soothe him under the unavoidable worries of life. To this end, if soup be preferred for breakfast, a glass of sherry, or a tablespoonful of brandy stirred into the white of an egg previously dissolved in a little water with a pinch of sugar, will be found a most agreeable and useful lunch. What we must avoid is the production of a catarrhal condition of stomach, or its keeping up, if it already exist, as to that, more perhaps than to anything else, is due the persistence of intermittent cardiac action. But in these cases alcohol is really a remedial agent from which we can obtain more good than from any other drug, only it must be used as a drug, with caution. Definite rules only apply to definite cases, but there are three grand rules which apply to every case, and these are, that the alcohol must be given in a digestible as well as stimulating form, in divided doses throughout the day, and never in excess, otherwise we shall increase the evil we desire to cure.

What we desire to do in such cases is to brace up the general system, at the same time protecting it from injurious influences. Warm clothing, therefore, is a necessity, and cold sponging of the chest, especially every morning; but bathing, particularly sea-bathing, must be shunned as dangerous, the shock being only too apt to produce, in such cases, spasm of the heart, cramp as it is so often called, which is so instantaneously fatal that the patient sinks, but is not drowned—he is dead before he sinks.

The drugs which will be found most useful vary with each case; pepsine in doses of ten or fifteen grains with each meal seems to do good always, but beyond that we must be guided by subsidiary symptoms. If there be much catarrhal irritation of the stomach, nitric or nitro-hydrochloric acid and calumba or quassia are often useful, soda, potass, or lime in the form of lime-water, often gives great relief, but never produces such a permanent effect as the acids; occasionally the alkaline treatment may be combined with the acid one with advantage, the acids being given before food, the alkalies from half an hour to an hour subsequent to a meal, and with these we may combine the use of podophylline in quarter-grain doses, with a third of a grain of ipecacuan and a quarter of a grain of belladonna,

which in enfeebled patients unloads the liver, and relieves the right side of the heart without purging. If torpor of the liver be more marked, then small doses of blue pill and aloes just sufficient gently to move the bowels are most useful. If torpor of the colon be the chief apparent ailment, the long-continued use of Barbadoes aloes in small doses, with sulphate of iron, hyoseyamus, and nux vomica, answers very well; and if much flatulence be present, we may substitute a couple of grains of the compound galbanum pill for the hyoseyamus with advantage; or if gout be the fundamental ailment, then small doses of the acetic extract of colchicum with Barbadoes aloes, both in such doses as shall insure no more than one stool, a little more bulky or looser than usual, and continued daily or every second day for some time, will be found most useful.

When a hæmatinic tonic is required, as will be the case in most instances, the citrate of quinine and iron will be found to be the mildest, and the one most useful in all cases, while Easton's syrup of the phosphates of strychnine, quinine, and iron, is the most powerful, and if continued in drachm doses twice a day for several months, will often effect a most wonderful improvement in the patient's health, and in the state of his heart; that it may do so we must be careful to have all catarrh of the stomach removed in the first place, and the liver also acting freely, otherwise this tonic will not only do no good, but occasionally seems to do harm.

Whenever, from the state of the patient and the defective secretion of urea, gout seems to be impending, the most important remedy will be found to be the free administration of colchicum along with alkalis.

Although for temporary purposes there is no sedative equal to the subcutaneous injection of Squire's solution of the bimeconate of morphia, yet for continuous use as a nervine sedative bromide of potassium far surpasses it, but it must be given in full doses, from half a drachm to a drachm three times a day, till its full sedative effect is secured.

You will see then, that for the relief of intermittent and irregular cardiac action, we must endeavour first to determine the lesion upon which it depends, cardiac or otherwise, and we must treat this with due regard to the organic debility to which that lesion owes in injurious efficiency, and we must meanwhile not forget, that between the cause and its effect, we have the nervous system as a connecting link, and that by modifying or interrupting this connection, which we often can do by the judicious use of sedatives and narcotics of various kinds, we may cause to cease, or at all events mitigate the results pending our attempts at cure.

Cardiac palpitation is only too frequently dependent upon similar causes as irregular action, and is to be treated accordingly, especially by such means as shall restore a normal tone to the heart and to the organism generally. Now and then, however, an apparently accidental though violent attack of palpitation seems dependent upon acidity of the stomach, and can often be at once

relieved by an antacid draught of soda, potass, or ammonia; and indeed not only palpitation, but also some of the minor forms of irregular action are promptly relieved by a draught containing a drachm of aromatic spirits of ammonia, with or without an equal quantity of tincture of valerian, or failing that, by a tablespoonful of whisky or brandy, with a teaspoonful of carbonate of soda, in about a wineglassful of water, just enough not wholly to drown the miller, as we say in Scotland.

Epigastric pulsation depending on irritability of the abdominal aorta is a local neurosis not always apparently dependent on dyspepsia, nor to be relieved by tonics. I have, however, found it almost invariably to yield to full doses of the bromide of potassium in some bitter infusion such as calumba, gentian, or chiretta. The only exception to this that I remember seeing was that of a woman, a patient in Ward XIII., in whom this excessive abdominal pulsation was accompanied by a preternatural hardness of that part of the artery, probably due to atheromatous disease, and in her case large doses of the iodide of potassium gave great relief, though nothing had any permanently curative effect.

In connexion with the subject of increased cardiac action generally, I may mention, that while increased action is liable to follow any unusual exertion, such as climbing a stair or going up a hill, both in hearts valvularly diseased, and also in those which are simply weak, palpitation or irregular action occurring while the patient is at rest is by no means to be regarded as a certain symptom that a heart is only weak or gouty, because of course hearts valvularly diseased are always weak, and often gouty, and therefore liable to present the symptoms of both diseased and also of simply feeble hearts. There is, however, one peculiarity by which the valvularly diseased heart may be perfectly discriminated from a simply weak heart, and that is, that while palpitation or cardiac discomfort occurring as the result of exertion in a heart valvularly diseased can never be relieved by anything but rest, the same results following exertion in the feeble heart of a nervous or gouty individual are frequently calmed down by any emotional excitement, especially of a pleasurable kind, such as meeting a friend, or the sight of anything novel or attractive, or even, strange to say, by a more violent exertion. Thus a man with a heart merely valvularly diseased is not likely to have any discomfort unless he meet with a slight ascent in his walk, when he is at once brought up and must rest; but a man with a gouty or feeble heart, though he too may be "afraid of that which is high," and may also suffer during the ascent, yet has his palpitation at once relieved by any emotional excitement, and if he be seized with sudden palpitation while walking slowly on the level, he will often find it disappear at once if he takes a short race to the next lamp-post: the heart beats the faster for the exertion, but the palpitation is gone, affording an example of a very peculiar form of inhibition, which probably only those can truly appreciate who have experienced it.