taught, the result of such embarrassment. That such is the case is known, for the irregularity appears first; it serves as a warning of future events. Moreover, the circulatory failure is not always immediate; when the heart muscle is stronger it may not show signs of failure until months or years after the onset of the disturbance.

The recognition of the disorder when it is seen—and it is frequently seen by all who practise medicine—is of consequence from several points of view. When, as is so often

Fig. 19.—An electro-cardiogram taken from a case of mitral stenosis; the heart contracted in a grossly irregular fashion. The curve shows that the irregularity was due to auricular fibrillation. The ventricular beats are of the usual form (R and T); the impulses have consequently come down from a point above the ventricle. The whole curve shows continuous oscillations of large amplitude (the conspicuousness of the oscillations is an indication of auricular hypertrophy), oscillations which, as I have shown, result from the fibrillation of the auricles. There are no P summits, representing co-ordinate auricular contraction.

the case, it develops in a case of mitral stenosis, a murmur limited to presystole is no longer audible, for this murmur is dependent upon co-ordinate contraction of the auricle. So it often happens that patients who have exhibited either no diastolic murmur, or only an early diastolic murmur at the apex during life,* are found to have mitral constriction after death.

But its recognition is of chief importance on account of the indications it gives for treatment. These are the cases in which digitalis may be looked to to give its conspicuous reaction. Administered in suitable doses, a great reduction of heart rate and a rapid improvement of the circulatory conditions may be anticipated in a large number of the cases, especially in young subjects. The fibrillation is not abolished, but a check is placed, and may be maintained, upon the number of impulses which reach and stimulate the ventricle. In such cases digitalis brings one of the most successful changes which modern therapeutics can record. Not only does it bring the moribund back to life, but it staves off disaster in those in whom the approach of failure is threatened.

While the disorder may be recognized in a large percentage of cases by ordinary clinical means, its certain and invariable demonstration can only be accomplished electro-cardiographically. The type of curve which it yields is illustrated by the last figure (Fig. 19). The curve was taken from a patient already under the action of digitalis; the ventricular action (R, T) is consequently relatively slow (the actual rate is 70 per minute; it had been 150). The shape of the ventricular curves (R, T) indicates the usual spread of the ventricular contraction, the impulses have come from the auricle. True P summits are absent, for the auricles are no longer contracting co-ordinately. The P summits are replaced by a series of irregular oscillations (f, f) which may be traced continuously throughout the whole curve. These little oscillations are the result of the perpetual and tumultuous activity in the walls of the auricles. They are the result of "fibrillation" in these chambers.

SUMMARY.

To sum up, galvanometric examination of the heart is important from many points of view. It may give indications of enlargement of the walls of one or other cardiac chamber; it may accurately locate small lesions in the musculature. It informs us when the heart beat starts at the normal impulse centre or away from it; in the last named condition it tells us that the rhythm is no longer under the normal nervous control—a fact which is of fundamental importance in the management of our case; it tells us within certain limits where the new beats have their origin. It gives us a separate record of contraction in auricle and in ventricle, and accurately defines the time relation of contraction in one chamber and the other; thereby it frequently elucidates physical signs which otherwise remain obscure. It provides us with a perfect means of ascertaining the functional efficiency of the

auriculo-ventricular bundle, the sole conducting tract upon which the ventricle depends for the reception of impulses which start its contractions. It allows us to differentiate between separate forms of slow and rapid heart action, which are of totally different significance. It provides us with an analysis of every form of cardiac irregularity, an analysis which is unrivalled in its precision by any other method. While the information derived from it relates essentially to the condition of the muscle, the method is

often helpful in the diagnosis of lesions of the valves. It brings us into nearer contact with the functions of the heart muscle than does any other clinical method; it is a precise means of studying the heart as a living and moving organ.

The information obtained by electro-cardiography is not, as commonly thought, of purely scientific interest in the analysis of disordered heart action. It has a great and growing value in the practical management of patients. There are few heart cases in which our knowledge is not added to by its employment, and in a steadily increasing percentage facts which are essential if sound prognosis and treatment are to be attempted are elicited. The time is at hand, if it has not already come, when an examination of the heart is incomplete if this new method is neglected.

SUBPERIOSTEAL HAEMATOMA.

BY

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THE two following cases are recorded because they seem to throw some light on the pathology of cases in which formation of new bone is associated with injury to the periosteum.

CASE I.

A. P., male, aged 16, came under my care at the West Ham Hospital in January, 1911. He complained of pain in the knee and front of the thigh, which began after a fall on to a rail in November, 1910. The pain was constant, of a dull aching character; it was made worse by exercise, and was relieved by lying down. On the front of the thigh, just below its middle, could be felt a hard irregular swelling. This was fixed to the bone, and was less evident when the knee was forcibly and voluntarily extended. The movements of the knee-joint were not interfered with, and the skin over the swelling was normal. An x-ray photograph which was taken showed a deposit of new bone, lamellar in character, and lying for the most part parallel to the shaft of the femur.

An exploratory operation was performed, and an irregular plaque-like mass of rough cancellous bone was found. This was deep to the periosteum and in close contact with the shaft of the femur. The wound was closed, and the limb kept at rest on a splint for three weeks. At the end of that time the mass was considerably smaller, and all pain had ceased. Seven weeks after the operation the mass was scarcely palpable, and a skiagram taken showed nothing but a slight smooth swelling.

CASE II.

L. D., female, aged 23, was admitted to the Cancer Hospital under the care of Mr. Jocelyn Swan, to whom I am indebted for permission to publish this case. Her history was as follows:

Seven weeks ago she fell off a counter and severely bruised her left thigh. She was unable to walk for an hour or two, but afterwards resumed work. She began to feel pain directly after the accident, and this drew her attention to a swelling in the thigh. A fortnight after she attended another hospital where an x-ray photograph was taken, a diagnosis of sarcoma made, and she was advised to submit to amputation. She was able to walk, but had severe aching pain after prolonged standing. On admission she stated that no increase in the size of the swelling

* Such patients are not infrequently mistaken for aortic cases.

had been noticed. The middle third of the left thigh was enlarged by a fusiform swelling which was connected with the bone. It measured 6 in. long, and formed a very obvious prominence on the outer and front aspects of the limb. Behind, and more particularly internally, the swelling became ill-defined. There was a sharp demarcation between swelling and normal shaft below, but above the thickness of the soft parts made accurate palpation impossible. The skin over the swelling exhibited some prominent veins. The swelling was painless on palpation, hard, elastic, and of even consistency. The surface was smooth and no pulsation could be detected. No glands could be felt in the groin. There was no history of syphilis or tubercle.

On the evidence afforded by the history, a skiagram and the physical signs, a diagnosis of subperiosteal haematoma was made and confirmed by operation. A large quantity—over a pint—of blood-stained fluid, mixed with gelatinous clots, was evacuated, and a cavity exposed through which passed the shaft of the femur stripped of periosteum and eroded on its surface.

These two cases illustrate a late and early stage of the same lesion—subperiosteal haematoma. In the first case the haematoma was small, and the boy was not seen until a free deposition of bone had taken place. In the second case the haematoma was of large size, and the girl was operated on, at a time when bone had only been deposited at the margins of the swelling where periosteum again joined the shaft. Similar cases have been recorded by Bowlby and by Makins and Godlee under the title "Myositis Ossificans Traumatica." Godlee concluded that the essential conditions were, first, an injury to the periosteum, and secondly, an effusion of blood. He deprecated, on these grounds, the use of the term "myositis," and regarded the condition as analogous to the cephal-haematomata of infants.

The evidence afforded by the cases detailed above strongly supports this view, and suggests that operative measures are indicated if the lesion be detected soon after the injury.

REFERENCE.

Proceedings of the Royal Society of Medicine, Surgical Section, April, 1911.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

X RAYS IN SCIATICA.

HOLDING the view that, however tempted one might feel to draw conclusions on the efficacy of a new method of treatment on a small number of cases, one should resist the temptation; yet, while thus waiting for further clinical material to establish a claim, when abstracts from the Continental medical press appear claiming priority in a new method of successful treatment of inveterate disease, one may be justified in speaking, as I recently had occasion to do.¹

In the *Epitome of Current Medical Literature of the BRITISH MEDICAL JOURNAL* of October 7th, 1911, an abstract on the above subject opens as follows:

"Cure" is not too positive or definite a term to describe the results of x-ray treatment in sciatica, according to Babinski, Charpentier, and Delherm, who report four observations (*Arch. d'electr. méd.*, June 10th, 1911).

From the interesting details which follow it is clear that the four cases of sciatica were all of the most inveterate type, which had resisted every other kind of treatment, including such as those recommended by Dr. W. B. Watson in his instructive article on the diagnosis and treatment of sciatica, which appeared in the *BRITISH MEDICAL JOURNAL* of April 27th, 1912. The underlying pathological condition in these cases might be safely assumed to be one of varying degrees of dense neoplastic perineuritic adhesions, along particular parts of the tract of the sciatic nerve, the sequelae of previous subacute attacks. The indication for treatment is to set free the adhesions, by the induction of fibrolysis and resolution, to effect which the time-honoured resolvents and counter-irritants, including bee-stings, have had their day.

Four such cases came under my care in the same year as that of the authors' cases reported (1907), two being

hospital patients and two in my private practice. One of the latter was referred to me somewhat reluctantly by a general practitioner of Cricklewood, as he admitted, from his superficial knowledge, he had many qualms regarding possible unforeseen evil effects of the x rays. Later I was the gratified recipient of a highly congratulatory letter from him. None of these cases have had any recurrence up to date. The tendo Achillis reflex was not elicited by me, though the importance of making this test must be appreciated when, as is shown in the cases of the authors cited, restoration of this function was attained in the course of cure.

There is no doubt that radio-therapy is paying the penalty of neglect and the careless manipulation of practitioners in the past, as well as of the ignorance of its limits, both for good and evil, by earlier users. It is hoped that in time this valuable method will find its legitimate place in the armamentarium of the physician, for such intractable chronic diseases; more so, as laying up in bed, splinting the limb, and the well-known irksome applications, can be entirely dispensed with.

London, W.

H. D. McCULLOCH.

MINERS' NYSTAGMUS.

IN the issue of the *JOURNAL* for May 18th, 1912, p. 1127, Dr. Edridge-Green suggests, as the cause of miners' nystagmus, "a necessity for movement of the eye in order to be able to see with the fovea."

In April, 1911, in a thesis for the degree of M.D. at the University of Edinburgh, I put forward a similar suggestion as an explanation of the way in which the darkness of the mine plays its part in the production of coal-miners' nystagmus. My thesis was an endeavour to bring into line the existing, but previously controversial, theories as to the etiology of this interesting malady, and also to break new ground with regard to a determining factor. Briefly summarized, my conclusions were as follows.

In order to maintain central fixation in all positions of the head—that is to say, in order to keep the retinal image of an object upon the fovea centralis—there must be absolutely perfect co-ordination between the six extrinsic ocular muscles. The actions of these muscles are so complicated and, as a general rule, their co-ordination is so perfect, that it is justifiable to assume the presence of a higher cerebral centre—a fixation centre—whose function it is to control automatically the delicate and highly complex impulses sent out to the various muscles by the oculomotor nuclei in order to maintain central fixation.

Miners' nystagmus is a perversion of the function of central fixation due to the conditions under which the coal miner works, but determined by a personal factor which, in the majority of instances, is an error of refraction. The three factors most concerned in producing the disturbance of central fixation evidenced in miners' nystagmus are:

1. Defective illumination in the pits.
2. Insufficient room in which to work, necessitating a cramped or stooping position.
3. Refractive errors on the part of the men.

How these factors, and possibly some others, such as poisoning of the nerve centres by fire-damp, increased atmospheric pressure acting through the vestibular nerve, etc., could work together in causing a perversion of ocular stability was discussed at some length, but here I shall first refer to factor No. 1 (defective illumination), because this has a direct bearing upon Dr. Edridge-Green's recent communication. I wrote as follows:

It is generally recognized by physiologists that the fovea centralis is not so sensitive to a minimal stimulus of white light as the rest of the macula lutea. Consequently, in the blackness of the mines, the miner instinctively moves his eyes so as to bring the feebly illuminated image of the object he wishes to see upon some part of the macula other than the fovea centralis. Now this movement, infinitesimal though it may be, is in itself a departure from central fixation which is very disconcerting to a centre that has been educated to keep the visual image fixed always upon the fovea centralis. In other words, the balance of the fixation centre is disturbed.

With regard to factor No. 2 (insufficient room in which to work)—in nearly all pits the miner spends most of his working day in a more or less stooping position, because the thickness of the seam does not permit him to stand

¹ *BRITISH MEDICAL JOURNAL*, February 24th, 1912.