I mention it as an instance of respiratory arrhythmia.

Lastly, as another illustration of the influence of respiration on the cardiac rhythm (not this time a case of "spectral" heart disease at all but one of auricular flutter with Cheyne-Stokes' breathing) I show you tracings in which there is a heart rate of 160 per minute during the apnoëic phase (representing a 2 to 1 heart-block) and of a quarter of that rate, 40 beats per minute during the dyspnoëic phase (representing an 8 to 1 heart-block) and this sequence regularly recurring. I invite you to connect in your minds this tracing (Fig. 8) with these of sinus arrhythmia which were given you the other day.

As I do not wish to say to you now all I could about respiratory arrhythmias and still less to say again what you already know about them, let me stop here.

Of course, what I have tried to set forth in all this in regard to the illusory nature of "disease," based for our present conversation on this type of cardiac arrhythmia applies, may I suggest, to other organs of the body. What would you say, for instance, about the case of a patient, met with in my own experience, who was paralysed in a "spectral" or ideational way so that she was confined to bed for twenty years and had not walked for two or three years before that, and yet as a result of appropriate treatment, mainly psychical in nature, was walking about the hospital ward in less than six weeks—a case, happily, of cured functional paraplegia—but what a waste of life is implied.

My object, then, has not been so much to supply you with facts concerning the physiological and other cardiac arrhythmias—that has already been attempted on earlier days of the present course—but rather to bring before you once again the possibility of such illusory disease. The late Mr. Joseph E. Adams, surgeon to St. Thomas's Hospital, whose untimely death on Dec. 22nd last we are now deploring, as a loss to the post-graduate cause as well as to many others, is reported to have said, "Personally I would rather spend my time in reassuring patients who have not cancer than in operating on those who have." So he, too, in his field,

"... faced the spectres of the mind
And laid them."

We are much interested to learn that the Royal Westminster Ophthalmic Hospital is moving to a much larger site in Broad-street, W.C. 2, opposite the Princes Theatre, and it is hoped that the new hospital will be completed and occupied by April, 1928. Much improved facilities for clinical work, for patients, and for post-graduate classes will then be available. There will be 14 rooms for paying patients. The Dean will be pleased to give further information.

SURGICAL TUBERCULOSIS.*

BY

G. PERKINS, M.C., M.Ch. Oxf., F.R.C.S. Eng.

IN treating a patient with surgical tuberculosis it must be constantly borne in mind that the patient is suffering from a disease which is affecting the whole of the body. Tubercle bacilli have gained entrance into the body, and after circulating in the blood stream have settled down in one particular spot, and dug themselves in. In the healthy patient the tubercle bacilli will be at once destroyed whilst in the blood or, at any rate, as soon as they have settled down in an organ of the body; it is only in the patient that has a poor resistance to the tubercle bacilli that the bacilli will be allowed to settle and create a dwelling place for themselves in the body. Normally when bacteria enter the blood stream they are killed off by the regular protective cells of the blood; if temporarily they prove too strong for the regular defence, their presence stimulates the body to produce a specific protective cell or a specific antitoxin to attack and destroy them. Now, the tubercle bacillus is curious in this respect—it is not aggressive; once settled in some organ it causes a slow local destruction of tissue, but the presence of a tuberculous lesion does not quickly induce the body to protect itself by manufacturing a specific antitoxin capable of exterminating the tubercle bacilli. Such a specific protective mechanism against tuberculosis takes a long time to be formed. From this it follows that inoculation and vaccine treatment are of little use, because in neither case do the injected dead tubercle bacilli stimulate the patient to form a specific protective mechanism against the bacilli. It also follows that in tuberculosis treatment must be prolonged—it takes a long time to effect a cure.

As far as we know at present there is nothing we can do to stimulate the patient to form this protective mechanism. Our efforts have to be directed towards increasing the general health of the patient, so that he will the better protect himself against the tubercle bacilli. We therefore aim at improving the general health of the body, by treatment in the open air, by heliotherapy, and by good food.

OPEN AIR TREATMENT.

Most people know that a tuberculous patient should be treated in the open air, but few know why; nor is it easy at first sight to answer this question. It may be that fresh air possesses specific health-giving properties that we know nothing about, but in our ignorance we have to assume that the value of open air treatment lies in its power of increasing the metabolism of the body. Man is a warm-blooded animal, and his temperature is kept constant within certain narrow limits.

* A Lecture delivered at the Royal National Orthopaedic Hospital on Sept. 28th, 1926.

This implies the presence of a heat-forming and a heat-losing mechanism. In normal circumstances heat is lost from the body by radiation. It is true that if the body gets very warm another method of getting rid of heat comes into play—namely, evaporation. But in the ordinary course of events heat is constantly being lost from the surface of the body by radiation. Now, if the patient is deprived of clothing and exposed to fresh air, that is, to cool air, the amount of heat lost by radiation is much increased. This great increase in loss of heat has to be made good by increased metabolism. Food material is burnt, yielding heat and energy. The heat is really a by-product, the important product of food combustion being energy. Thus increase in the amount of heat lost by radiation leads to an increase in the amount of energy set free in the body. This superfluous energy presumably can be utilised to render the body more resistant to infection and to prepare a specific defence against the tubercle bacillus.

If this explanation of the rationale of open-air treatment is correct, it follows that the value of open air is much diminished if the patient is swathed in clothing. It further explains why a seaside climate is to be preferred to an inland, for at the sea there is always a breeze, blowing either from the land or from the sea. Of course, exposure to the open air must be done gradually. I do not know whether any of you saw a picture in the *Times* during the severe cold spell of last winter—a boy, naked except for a loin cloth, playing in the snow. This photograph was taken at Brockley, our country hospital. One cannot take a new arrival to the country hospital and make him play naked in the snow; his body has to be acclimatised to the great loss of heat that this exposure entails.

HELIOOTHERAPY.

As you know, heliotherapy is the fashionable form of treatment at the moment. Let me remind you that blood-letting was at one time a fashionable treatment. I do not mean to suggest that the one form of treatment is as harmful as the other has proved to be; but it behoves us to examine critically this new therapeutic whim, and to try to assess its value.

The sun gives forth heat rays which warm, light rays which illuminate, and ultra-violet rays which are credited with healing properties. How exactly ultra-violet rays act we are in complete ignorance. That they possess great therapeutic effects their use in patients with rickets testifies, and although no such proof of their therapeutic properties in tuberculosis is possible, it is the considered opinion of a large number of clinical observers that sunlight has a beneficial effect in tuberculous patients.

We know little about the effects of ultra-violet rays. We know that they are lethal to bacteria, and in patients with lupus this action is important. But we also know that they cannot penetrate the skin except to a small distance, so that they can

have no influence as a lethal agency in deep-seated tuberculosis. Moreover, in order to obtain the beneficial effects of sunlight it is not necessary for the rays to play on the affected joint; in patients with tuberculous disease of the spine, exposing the abdomen to the sun is equally as effective as exposing the back of the patient. Besides its lethal effect the only other well-recognised influence of sunlight is that it induces pigmentation in the skin. Most observers agree that the prognosis varies directly with the degree of pigmentation, the better a patient pigments the better the prognosis. Rollier is so impressed with this that he assumes that the pigmentation must play some intricate part in the beneficial effects of sunlight. He suggests that the pigment absorbs energy from the sun's rays and transforms it into chemical energy that the body can utilise for protecting itself against tuberculosis. This is only an hypothesis. Indeed, it is more natural to suppose that pigmentation is a defensive mechanism on the part of the patient to protect himself from the sun's rays. Patients who do not pigment freckle and cannot tolerate the sun, and one might argue that patients who pigment do better than those that do not, because they are thereby better protected from the harmful effects of the sun. I do not wish you to think that I do not favour heliotherapy. On the contrary, I consider it a therapeutic agency of great value in the treatment of tuberculosis. But its use is empirical and it should not be considered as the sole treatment or as a specific for tuberculosis.

In countries where the sun is more intense than in England patients have to be gradually introduced to sun treatment; day by day more and more of the body is exposed to the sun for longer and longer. In England, where the sun is not so fierce, the length of exposure need not be so carefully graduated. In England, too, the sun is such a fickle visitor that in order to make the utmost use of its rays it is desirable to nurse the patients, not on the ordinary hospital beds, but on special carriages that can be easily wheeled out of the ward into the open. One cannot expect a nurse to be constantly pulling heavy beds backwards and forwards in and out of the open-air hut. Also, the ground outside the open-air hut is levelled for some distance so that the carriages can be easily and quickly moved out of the ward when the sun appears and back again when rain commences to fall. These two refinements are not to be found in every open-air hospital.

Ultra-violet rays can be obtained directly from the sun or indirectly by reflection from the clear blue sky. In the absence of sunlight they can be obtained from special lamps, but natural sunlight is to be preferred because it necessitates exposure to the open air. It must be remembered that clothing and ordinary window glass interrupt the passage of ultra-violet rays and destroy the value of sun treatment.

Certain dangers attending the use of sunlight need mention: sunstroke, heatstroke, conjunctivitis,

and sunburn. Sunstroke is not commonly met with in England, but it is wise to protect the head of every patient with a sunshade. Heatstroke, although not common, is more often seen; it is due to a temporary paralysis, through fatigue, of the sweat glands. The warm rays of the sun heat up the body, and to rid the body of heat the sweat glands are put into action; after a while they tire, and there is nothing to prevent the temperature of the body soaring. Heatstroke is seen most commonly in young children, and whenever a child exposed to the sun commences to perspire the child should be moved into the shade. Conjunctivitis is caused by the irritation of the corneæ by the sun's rays, and can be guarded against by the use of a head sunshade. Sunburn can be avoided by exposing the skin gradually to the sun's rays, the skin then becomes sun bronzed and not sun burnt. If the skin does become burnt, it should be protected from the sun by the application of some oily substance.

LOCAL TREATMENT.

So far I have directed your attention to general treatment. Let us now consider local treatment. The title of this lecture suggests that surgical tuberculosis differs in some way from medical tuberculosis. The terms medical and surgical tuberculosis date from the time when it was thought possible to extirpate the local lesion, and thus if the site of the disease was anywhere in striking distance of the surgeon it was known as surgical tuberculosis; if the lesion was situated deep in the body remote from the reach of the surgeon it was known as medical. The surgical treatment of tuberculosis failed for two reasons. In the first place the surgeon found it hard to extirpate completely the local lesion, and secondly it came to be realised that the aim of treatment was not to remove the disease from a local focus, but to rid the body generally of tuberculosis. And so to-day the surgeon rarely operates on the local lesion. Occasionally the local lesion is situated in some site from which it can be removed entire—e.g., in the shaft of a long bone; but, as a general rule, surgical tuberculosis is not now treated by surgical means. Does this mean that nothing can be done for the local lesion? Yes and No. Nothing is done to get rid of the local lesion, but one can do something to lessen the amount of damage done by the disease. The rôle of the surgeon is that of the salvage man not that of the fireman; he does nothing to put out the fire, but stands by and sees that as little damage as possible is done.

The majority of tuberculous lesions are situated in the joints or in the neighbouring bones so that the joints become secondarily involved; and therefore the practical point for the surgeon is the care of the joint. As you know, the result of a tuberculous lesion is either a stiff joint or a joint having a limited range of movement. The surgeon can do two things. He can try to ensure that the range of movement is as full as possible; this he does by applying

traction to the two bones to pull the joint surfaces apart during the active stage of the disease. And, if there is to be only a small range of movement, he can ensure that the arc of movement is the optimum one. For instance, five degrees of movement at the knee is useless if the knee is at a right angle, but five degrees of movement from the straight position is valuable. To ensure that the arc of movement will be the ideal one, the surgeon fixes the limb in a particular position; this necessitates the use of a splint. Finally, it is the common belief that if the part is kept at rest the amount of local destruction will be less, so that the joint should be held motionless, and in the case of the lower limb and the spine this usually necessitates recumbency.

Thus, during the acute stage of the disease, local treatment consists in recumbency to ensure rest, splintage to hold the joint in a particular position, and traction to separate the joint surfaces. The manner in which these principles are applied in treating the various joints you will see when you visit the country hospital at Brockley. Most hospitals differ slightly in the details of carrying out these principles.

When the patient is convalescent the duty of the surgeon is to coax back the damaged joint to work. During this stage, if he expects a stiff joint, the surgeon will probably allow the patient to take weight on the leg while the joint is held immobile by a splint; if the surgeon hopes to get a mobile joint, he will probably allow the limb freedom of movement and prevent weight bearing. Local treatment is of great interest to those who have the care of tuberculous patients, but it is of little importance as contrasted with general treatment.

DIAGNOSIS OF HOLES IN PREHISTORIC SKULLS.

A DIFFERENTIAL DIAGNOSIS OF THE VARIOUS KINDS OF HOLES DISCOVERED IN THE SKULLS OF PREHISTORIC MAN.*

BY

T. WILSON PARRY, M.A., M.D. CANTAB., F.S.A.

"I'll see what hole is here."—

Titus Andronicus Act II., Sc. 4.

IN the year 1897 Dr. Robert Munro, for many years secretary of the Society of Antiquaries of Scotland, published a book called "Prehistoric Problems." In this book were depicted illustrations of a certain skull which had been excavated from an ancient graveyard at Eastry, in Kent. The skull was an extraordinary one, and apart from its curious shape, there were two large holes situated one on either side of the posterior parietal region. Dr. Munro stated that he considered this specimen to be the only example he had seen in Great

* A Lecture delivered at the Post-Graduate Hostel on Dec. 17th, 1926.