by fatigue. The frequency of fracture of the second and third metatarsals is due to their commonly slender length, their fixity, their direct forward projection, their lie in the transmission line of body weight, and the part they play in the leverage action of the foot. The fourth is less often affected because it is more mobile, and subject to less direct stress; the first escapes because of its strength and mobility, while the fifth, which is fairly strong and mobile, likewise escapes because it is the least strained during the forward lifting of the body.

In the diagnosis it should be remembered that the usual history given is that the symptoms developed gradually during a march, and that rarely is there any account of the accident. The pain is localized to the metatarsus, and by running the fingers along the bony shafts a very sensitive spot will be found in one of them. If a fracture occurs discoloration of the skin due to extravasation of blood may be present, and possibly crepitus elicited. Swelling of the foot is usually a prominent feature, whence the name "foot-swelling," given to the complaint when its pathology was still uncertain. The diagnosis can only be definitely established by the *x* rays. A skiagram may show a fracture and possibly even callus formation, the break generally being in the anterior half of the shaft. If there be no fracture, periostitis may be present, shown by vagueness or irregularity of outline, or swelling of the shaft of the bone. In this connexion it is interesting to note that Momburg found in some old-standing cases definite spindle-shaped thickenings of the shaft of a metatarsal, and he also notes thickening of the compact bone at the expense of the cancellous tissue by a process of osteo-sclerosis. These osseous thickenings may occur by way of compensatory adaptation in the feet of soldiers who have never complained of any symptoms or of any unusual difficulty in marching. It may be mentioned that statistics show that troops drawn from mountainous districts suffer less from metatarsal overstrain than those from the lowlands, for hill climbing tends to strengthen the metatarsus and pedal muscles, and possibly to promote a better power in dorsiflexing the foot. This climbing influence is best seen in Alpine guides, who usually have an extreme range of movement at the ankle-joints.

The broad lines of treatment have already been given in the case quoted—that is, complete rest off the feet for four weeks and the application of massage and hot air. The heating chamber should be at a temperature of 300° F., and the limb well protected by wool and flannel bandages; the treatment should occupy from thirty to forty minutes daily. As an alternative treatment passive hyperaemia may be adopted. A Martin's bandage is applied around the leg just above the ankle, so as partly to obstruct the venous flow from the foot. The bandage should be arranged so as to cause no discomfort, and the foot must feel warm during the whole sitting. This treatment should be applied at first for an hour daily and gradually extended to several hours; at Spandau it is even persisted in for twelve hours continuously.

At the end of one month, or less in the case of periostitis, the patient is allowed to get on his feet gradually. Ten days after this, if there is no pain and no swelling, he is allowed to walk freely. In the case of fracture, the transverse "football" bar, referred to above, is worn for a few weeks, and may then be discarded. Care should be taken that a properly fitting boot is provided. The present army boot is a fairly good shape and it has to be strong, but one sometimes sees, after much wear, either a distorted upper or a "rocker" sole—that is, a sole which is extremely convex from front to back. These faults, which interfere with the proper play of the toes, are easily remedied by stretching and straightening the shoe on a last.

I am indebted to Dr. R. L. Rawlinson for enabling me to examine a large number of skiagrams.

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THE French Government has decided to establish a school of medicine at Dakar, French West Africa, on the same lines as those already in existence in French Indo-China and Madagascar.

THE VALUE OF AMYL NITRITE INHALATIONS IN THE DIAGNOSIS OF MITRAL STENOSIS.

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MITRAL STENOSIS develops insidiously and symptoms of a really incapacitating nature are frequently absent until the lesion is well advanced. In soldiers it is often discovered accidentally during the routine examination of a man reporting sick for a trivial complaint. In young soldiers, when very early and uncomplicated, it is unaccompanied by subjective symptoms which characterize the state.† The number of border-line cases seen appears to be remarkable, until it is remembered that the strains to which the men are subjected are precisely those calculated to call forth symptoms in early cases. Advanced mitral stenosis has been largely kept out or sorted out of the army, and patients who suffer from "irritable heart" in the absence of structural change very frequently present such signs as accentuation of the first heart sound, accentuation or reduplication of the second heart sound, signs which are credited with significance in the early diagnosis of mitral stenosis. In dealing with military patients a clear decision is most desirable; it is imperative when, in sorting cases bearing cardio-vascular diagnosis, tolerance of exercise is largely relied upon.‡ Men with structural heart disease are to be guarded against over-exertion. We may take a diastolic (presystolic) rumble or thrill, or both, to be the most positive and convincing sign of mitral stenosis, and it is at present inadvisable to diagnose this lesion in the absence of such a murmur. Any method, therefore, which accentuates such a murmur, or discovers it, must be of considerable value.

Amongst patients who fall near the diagnostic border-line (a border-line which it should be clearly understood varies according to the skill, experience, and opinion of the observer) there are a number of patients who present no suggestion of mitral stenosis when they are examined standing, but who present unequivocal signs while lying down; there are a number who present inconclusive signs of stenosis while standing, but signs of stenosis become clear on lying; still a further number who exhibit no conclusive signs standing or lying, but in whom the diagnosis is no longer in doubt while they lie after exercise. At the Military Heart Hospital at Colchester all cases are auscultated standing and lying, and lying after exercise, and a considerable number of presystolic murmurs are detected which would otherwise escape observation.

Amyl nitrite is used as a further test in doubtful cases; its action, like that of exercise, is to increase the flow of blood through the A-V ring, a change which favours the production of the murmurs in question. We desire to give our early impressions of the experience with amyl nitrite. The observations are not based upon *post-mortem* evidence, but upon the assumption that a clear presystolic murmur signifies stenosis in the absence of aortic disease. On that assumption, it is clear to us that amyl nitrite will often bring to light a clear presystolic or full diastolic murmur in a patient lying on his back, who had exhibited no murmur previously, and will thereby render an early mitral stenosis diagnosable.

In twelve cases in which presystolic murmurs were suspected, but in which they could not be recognized with any degree of certainty, amyl nitrite (inhaled from a 3 minim capsule until a reaction was evident) brought forth unmistakable murmurs in six instances. Amongst the first signs of early mitral stenosis is an accentuated first sound; from this sign the sounds pass to a simple reduplication with accentuation; to perhaps a triplication, and thence to what may, or may not, be termed a murmur, according to the idiosyncrasies of the examiner.

The point which is to be emphasized is that amyl nitrite, in a large proportion of cases, will raise the scale of the signs, bringing them nearer to a point where a diagnosis becomes certain.

* Observations undertaken on behalf of the Medical Research Committee.

† The actual proportion of clearly diagnosable mitral stenosis amongst such patients is approximately 4 per cent.

‡ It is inadvisable that the exercise tolerance tests should be applied in mitral stenosis, and those who suffer from this lesion are to be sifted out.

As to the cases in which amyl nitrite has the reverse effect, and produces a lowering of the scale, in some cases abolishing a diastolic murmur, we speak with more diffidence, yet it is extremely suggestive that this reversal of the usual effect has been witnessed for the most part in cases in which aortic regurgitation was undoubtedly present, and where consequently the murmur may have owed its origin to a different cause (Flint murmur).^{*} Whether it will prove ultimately that the test serves to differentiate the Flint murmur remains for the future to decide; so far as military diagnosis is concerned, it is a point of lesser importance; the point for which publicity is desired is the usefulness of the drug in bringing out clear presystolic murmurs in cases in which mitral stenosis is suspected but not proved.

A PYLON, OR TEMPORARY ARTIFICIAL LEG.

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AFTER amputation through the thigh or leg there is, as is well known, progressive diminution in the girth of the stump, owing to muscular wasting; consequently the "bucket" of an artificial leg, which fits accurately at the time of fixing, will in a few weeks become loose.

FIG. 1.—Plaster cast of stump (hollow).

It occurred to me that the bucket for a temporary leg might be made of papiermâché, which could be broken up and replaced or remoulded, if necessary, periodically, until the stump reached its minimal circumference.

It was believed also that by arranging for the end of the stump to be subjected to graduated pressure by padding the floor of the bucket, the weight-bearing power of the stump would be improved.

The main principles of the leg were explained to Mr. J. D. Danson, technical instructor in the curative workshops, Alder Hey, and as a result of his expert advice and experiments the temporary artificial leg here described was made.

An accurate cast of the stump, up to a height of 15 in., if available, is taken in plaster-of-Paris (Fig. 1); on to this plaster cast a layer of soft felt is sewn (Fig. 2); this in turn is covered with a layer of papiermâché, about $\frac{1}{8}$ in. thick. (The papiermâché is made by boiling in water disused tram tickets, paper, etc., straining, and mixing

FIG. 2.—Cast covered with felt and papiermâché.

FIG. 3.—Metal rods which support the papiermâché.

with whiting and glue.) A wooden base is fitted to the floor of the bucket thus formed, the paper bucket is then reinforced by four light metal bars, which are welded at their lower ends into a tube, into which is fitted the wooden peg (Fig. 3). If the bucket is made to fit a stump below

^{*} Thus out of ten cases of aortic disease in which a presystolic or diastolic rumble was audible at the apex, suggesting stenosis, the murmur cleared entirely under amyl nitrite in five instances.

the knee, the leg has a hinge-joint at the knee, to allow either a partial or complete range of movement at that joint (Fig. 5).

The leg provides an accurately-fitting bucket for the stump. It can be fitted as soon as the stump is healed, and

FIG. 4.—Complete pylon (for thigh stump).

FIG. 5.—Pylon for leg with knee hinge.

the use of crutches and the consequent risk of crutch-palsy obviated. The leg is not to be too light, so that the muscles may receive adequate training. The patient is early familiarized with the wearing of a bucket and also with the gradual transmission of his weight to the end of the stump; he can regulate the pressure by adjusting the thickness of the pad at the bottom of the bucket. The cheapness of the material permits of the renewal or remoulding of the bucket at a trifling cost.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

THE FARADIC CURRENT FOR THE IDENTIFICATION OF MUSCLES DURING OPERATION.

IN certain operations difficulty may be experienced when searching for structures which lie between separate muscles; for instance, in ligaturing the ulnar, radial, or anterior tibial arteries or in dealing with their corresponding nerves. Such operations are more common than usual now in consequence of war injuries, and the difficulty in defining the limits of two adjoining muscles is increased by scar tissue which naturally lies in the line of the operation.

Such operation can be much simplified by the use of the faradic current. This may be applied locally to the surface of one or other muscle before the fascia is divided or even before the skin incision is made, or it may be applied to the nerve above the field of operation if the muscles have a separate nerve supply. The current may be applied so as to give a series of twitches or the muscle may be kept in a state of contraction as long as is needed. Not only does this show the limits of each muscle, but it also makes the separation of the muscles easier if one is kept contracted while the other remains flaccid.

I recently had the opportunity of using this method in a case of bullet wound of the middle of the forearm in which the subsequently formed scar tissue had involved the ulnar nerve, causing typical ulnar paralysis and anaesthesia. On cutting down to the fascia in the line of the nerve no distinction could be made out between the flexor carpi ulnaris and the flexor sublimis digitorum; these muscles were also bound together by scar tissue. On applying the electrode to the ulnar nerve behind the elbow the flexor carpi ulnaris was at once defined, and, after the fascia was divided, there was no difficulty in