A USEFUL SPLINT FOR COMPOUND FRACTURES OF THE LEG.

By CAPTAIN C. H. BARBER, I.M.S.,
SURGICAL SPECIALIST, INDIAN ARMY.

THE splint that I am here describing has been of such signal service to me in the treatment of certain compound fractures of the tibia and fibula due to gunshot or shell wounds that I venture to publish it for the use of other surgeons if they think fit.

For simple fractures of the tibia alone, or for compound ones with a small anterior wound and little displacement, the service pattern McIntyre is hard to beat, but in bad compound fractures of both bones, with large and septic wounds fore and aft, none of the ordinary splints is of much use when one is aiming at efficient drainage with early immobilization, and when daily dressing is a necessity. I therefore improvised the following arrangement out of any available pieces of wood; it is designed to provide for any extension necessary in view of overriding of the fragments, to support the leg in a comfortable position, to immobilize the broken bones, and, above all, to allow free access to the wounds without moving the limb. The slings may or may not be necessary according to the amount of extension. One pair of extension straps is bound to the upper part of the leg, and, passing round the central ends of the uprights D, D', is fixed to the screws J, on the outer sides of D D'; the other, pulling from below, pass through the foot board B, after being attached to a foot-piece, and are tied around one or more pieces, which, acting as a wedge, render increase or decrease of tension possible.

- A, Piece of stout board 6 in. wide, 2 ft. 8 in. long.
B, Piece of board 7 in. or 8 in. wide, 14 in. high, pierced by two slots, through which pass the extension straps.
C, C', Two upright pieces of thinner board placed one on each side of the foot and serving (1) to keep the foot in a perpendicular position, if necessary; (2) to support a horizontal heel-piece H; and (3) to strengthen B against the pull of the extension.
D, D', Pieces of stout board about 9 in. wide, 13 in. high, and 6 in. apart, firmly fixed to A, and supporting between them the double inclined plane E, F, G, made of thinner wood; the slope of F, G, is less marked than that of E, F; F, G, also projects 2 in. or 3 in. from the edge of D.

M from above.

B from below.

- H, A small piece of wood for the support of the heel, though the heel scarcely needs any.
I, A small block to support E, F, thus allowing A to be a little shorter than would otherwise be necessary, which may be an advantage.
J, A screw or other means of fastening the upper extension straps after bringing them round the proximal margins of D, D'.

K, The fastening or knot of the distal extension straps or plaster around a wedge-shaped or straight piece of wood L.

M, A strip of wood, about 21 in. long, shaped like a T square, attached to B by a screw P, so that it can be turned out of the way when it is desired to apply or remove the splint. The T end rests on the top of D, D', and is attached to them by loose nails or hooks.

From M one or more slings can be hung to support the leg at any point; it also serves to keep D, D', firm.

N, A piece of wood 15 in. or so long, attached to the base of B to keep the splint from tumbling or leaning to one or other side.

O, Foot-piece.

The drawing of a patient with the splint applied I publish by kind permission of Colonel G. B. Irvine, I.M.S., commanding No. 9 Indian General Hospital.

A STAGING TO FACILITATE DRAINAGE AND CONTINUOUS IRRIGATION.

By E. H. WILLOCK, M.R.C.S., L.R.C.P.,
ASSISTANT SURGEON, CROYDON GENERAL HOSPITAL.

IN the memorandum on the "Treatment of bacterial infection of projectile wounds" by Colonel F. E. Burghard, A.M.S., and others, published in the JOURNAL of April 24th, a passage at the conclusion of the article reads: "And clearly, so long as a wound is heavily infected, the ideal method of treatment, if only it were always practicable, would be immersion in a bath, or continuous irrigation with some aseptic or mildly antiseptic fluid."

With a view to making continuous irrigation of a wound practicable, no matter in what part of the body that wound may be, the staging now described has been devised. It will be understood that the staging can only be properly utilized if the mattress is so shaped and arranged as to co-operate with the staging.

If a shoulder or leg is to be irrigated a $\frac{3}{4}$ mattress will be required; for the buttocks, pelvis, or back the mattress should be transversely divided. The military mattress in its three sections can be readily adapted to any necessary position. In order to obtain sufficient space underneath the staging it may be necessary to place one mattress on the top of the other.

The staging is made as simple as possible. It consists of an oblong frame resting on four telescopic legs. Movable transverse bars, 2 in. wide, support the part of the body that needs irrigating or draining. For supporting the buttocks special bars are made. These transverse bars are provided with vertical detachable splint bars for the purpose of fixing a limb if necessary. Only one set of splint bars is shown in the sketch. Extension can be applied from the end of the frame.

A deep tray hooks on underneath the frame, and is placed wherever it is required. It is provided with a stopcock, and if the fluid discharged into it is excessive it can then be passed on by means of rubber tubing into a further receptacle under the bed.

The legs rest upon fracture boards, and can be adjusted to enable the frame to be raised or lowered or tilted at an angle.

The advantages claimed for the staging are:

1. Free continued irrigation can be carried on in any part of the body.
2. An entire avoidance of heavy dressings and "pus poultices."
3. Free drainage from dependent parts.

4. Free circulation of air about the wound.
5. Easy dressing.
6. By utilizing it in the transverse position it may be of use in cases of incontinence of urine and faeces.

The apparatus is in use at the Royal Herbert Hospital, Woolwich, and Major Spencer, F.R.C.S., R.A.M.C., reports "that it fulfils its purpose admirably, and enables continuous irrigation of a wound in any part of the body to be carried out efficiently and easily without discomfort to the patient or disturbance when dressings are changed, and without risk of leakage into the bed."

Messrs. Down Bros., London, have made the apparatus for me.

The Croonian Lectures

ON

TRYPANOSOMES CAUSING DISEASE IN MAN AND DOMESTIC ANIMALS IN CENTRAL AFRICA.

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS
OF LONDON,

By SIR DAVID BRUCE, C.B., F.R.C.P., F.R.S.,

SURGEON-GENERAL, A.M.S.; LATE DIRECTOR OF THE ROYAL
SOCIETY'S COMMISSION ON SLEEPING SICKNESS.

LECTURE III.—TRYPANOSOMA GAMBIENSE AND CONGO SLEEPING SICKNESS.

HISTORICAL.

Trypanosoma gambiense was first seen in the blood of an Englishman who had been employed for some six years as master of a Government boat on the River Gambia in West Africa. He was admitted to the Government Hospital at Bathurst on May 10th, 1901, fourteen years ago. Dr. R. M. Forde, the Colonial Medical Officer in charge, examined his blood and saw actively moving bodies, but was unable to recognize their nature. He therefore asked the late Dr. J. E. Dutton, of the Liverpool School of Tropical Medicine, to come to his help.

In the meantime, however, the patient had been invalided to England, where he was treated in a Liverpool hospital for some time. Thinking himself sufficiently recovered to resume duty, he returned to Bathurst in December, 1901, and on December 15th his blood was submitted to Dr. Dutton for examination. Dr. Dutton saw the parasite, described it, and named it *Trypanosoma gambiense*.

But at this time it did not enter into the minds of any one that this trypanosome was the cause of sleeping sickness. It was looked upon as an almost harmless haematozoon, causing no inconvenience to the native and only a slight ephemeral fever, known as "trypanosoma fever," to the white man.

At the same time the finding of a parasite of this kind for the first time in the blood of man raised a good deal of interest, and Drs. Dutton and Todd were sent out in the following year to investigate the question further.

They arrived at Bathurst on September 2nd, 1902, and proceeded to examine a large number of natives for the presence of trypanosomes in their blood. They examined in all 1,043 natives on the Gambia, and found the parasite only in six cases.

They summed up their report by saying that, taking all the facts into consideration, they believed that trypanosoma fever, as it occurred in natives, was a peculiarly mild one, and they suggested the possibility that the natives might bear the same relation to the Europeans as the wild game of Africa to domestic animals in nagana—the tsetse fly disease; in other words, that the black man was immune to the disease, and merely acted as a reservoir of the virus to the more susceptible white man.

For some time, then, the important pathogenic part this trypanosome plays remained unknown, and it was not until 1903, when sleeping sickness was being investigated in Uganda by the Royal Society Commission, that the discovery was made that *Trypanosoma gambiense* was in truth the cause of sleeping sickness.

GEOGRAPHICAL DISTRIBUTION.

Reference to the map published to illustrate my first lecture will show that this species of trypanosome has a wide distribution in the tropical zone of Africa. It extends on the north from St. Louis at the mouth of the River Senegal to the Bahr-el-Ghazal in the Egyptian Soudan; on the east it reaches to the eastern shore of Victoria Nyanza; and on the south to the southern end of Lake Tanganyika, the River Luapula in North-West Rhodesia and Donguela in Portuguese West Africa.

MORPHOLOGY.

When in Nyasaland I received from Dr. Kleine, German East Africa, three monkeys infected with *Trypanosoma gambiense*. These animals had been inoculated with blood from natives suffering from "Congo sleeping sickness" on Lake Tanganyika, and it is from these three strains that this description is taken. We sent for these strains because we wished to have an opportunity of comparing *Trypanosoma gambiense* with the trypanosome causing disease in man in Nyasaland, side by side and under similar conditions. It presents a strong resemblance to the nagana parasite. There are the same short and stumpy, intermediate, and long and slender forms. In size and general appearance these two species so closely resemble each other that one might easily believe them to be varieties of the same species.

Shape.—The shape of the long and intermediate forms is the same as in the nagana parasite, but among the short there is an absence of the blunt-ended forms, which have been seen to be so marked a feature in the Nyasaland trypanosome.

Contents of Cell.—The protoplasm often shows many chromatin granules in its substance.

Nucleus.—In *Trypanosoma brucei*, among the short and stumpy there are large numbers of posterior-nuclear forms. In the Tanganyika strains not a single example of this peculiarity was seen.

Micronucleus.—Small and round, and situated on an average 1.1 microns from the posterior extremity in the short, 1.3 in the intermediate, and 1.8 in the long forms.

Undulating Membrane.—This, as in the other members of this group, is well developed, and thrown into bold folds and undulations.

Flagellum.—The flagellum in the long and intermediate forms is free. There is no free flagellum in the short forms.

Length.—In regard to length there is practically no difference between the two species, as will be seen from Table I.

TABLE I.—Showing Length of *Trypanosoma gambiense* Compared with *Trypanosoma brucei*, Zululand, 1913.

Strain.	Average.	Maximum.	Minimum.
<i>T. gambiense</i> , Uganda	22.1	33.0	13.0
<i>T. gambiense</i> , Tanganyika I	22.7	34.0	15.0
<i>T. gambiense</i> , Tanganyika II	25.8	36.0	16.0
<i>T. gambiense</i> , Tanganyika III	21.3	34.0	16.0
<i>T. brucei</i> , Zululand, 1913	21.0	35.0	12.0
Breadth of <i>T. gambiense</i>	2.31	4.75	1.25

Trypanosoma gambiense is therefore very similar in size and shape to *Trypanosoma brucei*, but it would appear to be possible to distinguish them by the presence of the blunt-ended, posterior-nucleated forms which are so common in the blood of animals infected by the nagana parasite and quite absent in animals infected by the other. But as these posterior-nucleated forms are absent or scarce in the blood of man, this method of diagnosis requires the inoculation of experimental animals, and the study of many preparations of their blood. It would appear to be impossible at present to distinguish between the two species by the microscopical examination of preparations made from the blood of man alone.

SUSCEPTIBILITY OF ANIMALS TO TRYPANOSOMA GAMBIENSE.

I now pass to the pathogenic action of this species on various animals. In this it differs markedly from the nagana parasite, which is essentially a trypanosome of the lower animals, seldom attacking man; whereas the reverse is true of the species under consideration, which under natural conditions is almost wholly confined to man.