THE REMOVAL AND TRANSPORT OF CAVALRY WOUNDED.

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In a previous article in the *BRITISH MEDICAL JOURNAL* of January 13th I referred to some defects in the medical organisation of our army in regard to the wounded of our cavalry and other mounted branches of the service. It was stated that over 20,000 mounted men (now to be increased to 35,000) would shortly be constantly engaged at the front in South Africa, and that for the special needs of that force a sufficiently mobile ambulance service was not in existence. A cavalry division had to depend on a bearer company on foot to look after its wounded. It was further pointed out that the greatest danger to the wounded soldier was immediately behind the fighting line—between the fighting line and the field hospital—and that, in the case of the cavalry soldier, that danger was enormously increased by his receiving his hurt at a great distance from the main body, called, as he now is, to fight in force, often on foot, ten, twenty, or thirty miles in advance; that as a result of delay in bringing him to a field hospital, the wounded cavalry soldier was deprived to a great extent of the advantages of the antiseptic system, that the mortality would thereby be unduly raised; and that, if antiseptic dressings were not efficiently applied at the proper time, a constant stream of septic cases would flow from the front through our hospitals on the lines of communication, and at our base, a danger to others and a heavy tax on the medical staff.

A plea was therefore advanced for a more mobile ambulance organisation to follow cavalry and other mounted troops, to render efficient first aid, and to collect and bring their wounded as speedily as possible for treatment at a field hospital.

In the campaign in South Africa it has been decided that all Red Cross Society and other auxiliary help must be confined to the lines of communication and to the base of operations. We must therefore be content to see the wealth of the country poured out without stint to provide every comfort and luxury to the wounded cavalry and infantry soldier on his journey homewards; but at the time when his life and the future progress of his case depends on immediate and efficient surgical aid, the cavalry soldier must trust exclusively to a rigid and inelastic official system which has broken down in the past, and will, when applied to the 35,000 mounted men in South Africa, result in a heavy mortality and an untold amount of mental and physical suffering.

The first step for the relief of the injured cavalry soldier, if still on horseback, is to lift him off; if dismounted and bandaged, to lift him on his horse so that he can ride back by himself, or with some support. It is of great consequence that all mounted soldiers should be able to render such assistance. It will increase their self-reliance, and to some extent make them independent of regular organised help.

Such instruction is now laid down in the new *Manual* of the Royal Army Medical Corps. Three bearers only are there given, but when four soldiers are available the dismounting can be more comfortably carried out. Nos. 1 and 3 look to the wound, and if necessary apply a first dressing. No. 2 relieves the wounded man of his accoutrements. No. 4 holds the horse.

Removal from Horse.

(a) In case of injured lower limb, Nos. 1, 2, and 3 approach on the wounded side; on the command "lay hold" No. 1 from behind catches hold of the pelvis and the sound leg. No. 2 is held round the neck and shoulders by the wounded man. No. 3 holds the wounded leg. On the word "ready, lift off,"

the wounded man is taken off and held over the stretcher standing near, and on the word "lower wounded" is laid on it (Fig. 10).

(b) In case of injured upper limb, the wounded man is approached on the sound side. No. 1 supports pelvis and legs. No. 2 is held round the neck by the sound arm. No. 3 supports the wounded arm. Commands, the same as before.

It is of great consequence in all field work to know how to tie up a horse so that he cannot move from the spot. Pass the reins over the head, then

push them under the girth under the saddle flap or under the surcingle; pull the horse's head round towards that side; keep it in that position by making two half hitch on the reins. The horse may describe a small circle, but he cannot break away. Knee haltering is generally used in South Africa; a strap fastens the head collar stall to the foreleg above the knee, the leg is thus kept in advance of the other.

THE REMOVAL AND TRANSPORT OF THE WOUNDED CAVALRY SOLDIER.

When a soldier is wounded, the greatest benefit, next to staunching a dangerous bleeding, that a comrade can render him, is to remove him to a place of safety, to protect him from further rifle or shell fire, to prevent him being ridden down or run over, and to bring him to the dressing station, or to a place where he may be readily found by the Army Medical Corps.

Removal by One Man.

If conscious and able to hold on, a wounded man can be

Fig. 1.—Horse Litters (from a drawing by Mr. Arthur Melville).

carried pick-a-back, or in front, with one arm round the back below the shoulders, the other underneath the thighs. If, however, the wounded man is insensible, the "fireman's lift" can be used to raise and carry him unaided.² Lay him on his face, arms to the side; stand at the head, place your hands beneath patient's shoulders, and raise him to the kneeling position (unless the legs are broken, when you must kneel); place your hands under the armpits, raise him up, stoop, place your head beneath his body, bring his right arm around your neck, put your right hand around patient's right thigh, bring his weight well on to the centre of your back, grasp his right wrist with your right hand, and rise to the erect position. The left hand is thus free to use a revolver.

Removal by Two Men.

If able to sit up, a patient can be carried a short distance by a two, three, or four handed seat, or by two rifles, with his arms round the necks of the two bearers.

With an insensible man, one bearer kneeling behind passes his hands under the armpits, and clasps them in front of the chest; the other bearer carries him feet first, with a leg on each side. If, however, a leg is broken, both the legs will be tied together and carried in a horizontal position.

Transport by Hand.

The regulation army stretcher is carried in the regimental waggons, but the want of a portable stretcher with cavalry has been much felt, and many have been invented. I had one made in 1886, and it has been in constant use since. Each pole has two joints, and metal tubes keep them rigid. When folded up each pole lies flat, and it is fastened behind the carbine bucket. The canvas is divided transversely, and one-half carried with each pole. If each pole is carried in a canvas cover to keep out fine dust, the objections usually urged against metal tube joints in sandy regions will disappear (Fig. 9).

The sword stretcher invented by Surgeon-Lieutenant-Colonel Naismith, Ayrshire Yeomanry, is strong and efficient for short distances, and readily put together. Only two clamps and the canvas are carried. Four swords in their scabbards are clamped by their points; there is an opening on each side of the canvas to allow of this being done.

A blanket or horse cover, to be carried by two men, can be utilised as a stretcher by tying loops of leather or a rope to each corner with a stone rolled up in them to prevent slipping of the rope (Fig. 6). A surcingle may be used to lighten the weight by passing it through the end loops and then round the neck.³ The shoulders thus bear most of the weight. The horse blanket alone, if rolled up close to each side of the

wounded man, can be carried by four men, two on each side, each man grasping the rolled up blanket at the middle and end. If bundles of twigs and branches or poles and lances are available, an improvised stretcher can readily be prepared by pushing them through several slits cut in the horse blanket, four on each side. A rifle stretcher formed by two rifles and a blanket, as described in the *Manual of the Army Medical Corps*, is efficient and reliable.

IRREGULAR MEANS OF TRANSPORT.

I shall now speak of the various means of transport by animals, confining my remarks to the use of mules and horses. The subject may be considered under four headings:⁴

TRANSPORT BY HORSES.

- (a) Without any special arrangement, either in sitting or lying position, supported by a comrade either walking or riding alongside.
- (b) With some support for the back, arranged behind the rider, when the patient is weak or unconscious.
- (c) With some contrivance for carrying a man lying down by either one or two horses.
- (d) With a stretcher along the back of a horse.

(a) *Without any special arrangement, either in sitting or lying position; supported by a comrade either walking or riding alongside.*

Schmucker⁵ relates how, after the battle of Leignitz, 500 soldiers wounded in the arm were brought to Breslau riding on the troop horses of a dragoon regiment, whose riders had dismounted. Larrey⁶ mentioned that on raising the siege of St. Jean d'Acre Napoleon commanded all mounted officers to give up their horses for transport of the wounded. Longmore⁷ states that not only

Fig. 2.—Surgical panniers on horseback, with stretcher. Panniers can be made into dressing or operating table.

was this carried out by the English in Spain, but that fractures of the thigh after being suitably splinted were carried on mules in a sitting position.

Dr. Huntingdon,⁸ of the United States Army, wrote in an army circular: "During the last war I saw a wounded soldier brought back from an expedition who lay across the saddle with his face downwards and supporting himself with one foot in the lengthened stirrup."

*To Carry an Insensible or Dead Man on a Horse.*⁹—Lay him flat on his face on the ground. Get two head ropes; tie one round his body below his shoulders, stretch both his arms out to the front, and with the same rope tie his wrists together, having the tail of the rope free. Tie the second rope round his waist, and continue it round his ankles with a tail free. Cross the stirrups over the saddle of the horse on which you are going to carry him. Lift him on to the horse so that he lies face downwards across the saddle-head to the offside of the horse. Pass the tail of the rope from the wrists under the horse's belly and tie it to the stirrup which hangs over the near side; similarly pass the tail of the rope from his ankles under the horse's belly and tie it to the stirrup that hangs over the offside. You can then lead his horse at a gallop if necessary to get him away from danger.

General Sherman¹⁰ recommended that where a wounded man could not keep himself in the saddle a comrade should mount behind him to support him and guide the horse.

Dr. Patzki¹¹ mentions the general use of this kind of transport in expeditions against the Indians. Persons slightly wounded can often be carried sitting on horseback, when there is no saddle, in the following way:

To Carry a Wounded Man Sitting on a Horse.—With a regimental blanket or piece of clothing make a sort of stuffed seat without folds. Prepare a stirrup from a rope or strap, which is made fast to the horse's girth. A girth is necessary, however, as you cannot improvise a saddle or seat without it. The string binding the two together should not be too thick, so as not to chafe.

If in a patrol of three one man is so wounded that with some support he can still sit on, he can be transported back by the other two on horseback.¹² They place the wounded man in the middle, and each takes a half of the snaffle rein, the curb is still held by the wounded man or else attached to the saddle. If the wounded man is exhausted he can be supported by the left rider with his right arm, by the right rider with his left arm under the arms. If the wounded man is obliged to dismount it can be carried out by one man, the other holding the horses.

(b) *With some support for the back, arranged behind the rider, when the patient is weak or unconscious.* Longmore¹³ mentions the chair arrangement of old times. Pillows behind the saddle were made often with backs, but horses, in his estimation, will usually be too enfeebled to carry two men far.

For severely wounded a saddle must be so prepared that both of the man's legs can hang down one side of the horse. Specially suitable is a chair with its legs cut short just leaving, however, a small stump at each corner. Round these stumps straps or ropes are lashed, and then made fast to the girth.

The girth or surcingle going round the horse must be lengthened by the addition of a second. To make the position more agreeable to the patient, one or two loops may be made to hang down for the feet to rest on. The patient must, of course, be firmly tied to the chair. Pads must be put in to keep the chair level if there is a dipping to one side or other.

Such a seat can also be constructed from boards, branches, or pieces of wood, if nails can be obtained.

Dr. Crane, U.S.A.,¹⁴ relates how an injured man was carried a twenty-five hours' journey with a flesh wound in the thigh, half lying in a box which had the lid and one end knocked out; the whole was tied on to a pack saddle.

Longmore states:¹⁵

In the early part of the Crimean war, when the sick accumulated in large numbers, and it was necessary to remove them from the front at all hazards, the heavy ambulance could not be used. The horses of the

cavalry were sometimes employed for transporting the patients to Balaclava on ordinary saddles. Under these circumstances it has happened that a weak man who had been carried from the tent in which he had been lying, and then lifted into his seat on the horse, has died even before the line of the several regiments of the division could be got together for the cavalcade to leave the ground. Deaths also occasionally took place during the journey. These fatal events were manifestly due, in a great degree, to the effects produced on the very enfeebled frames of the men by the change from the horizontal to the upright position. Unfortunately the evil was unavoidable, for there were no other means available for the removal of the sick from camp, where to remain under the circumstances of the time was almost certain death for such patients.

Lieutenant Sherman,¹⁶ of the United States Army, was so severely wounded in an affair in Texas that he could not remain on horseback, and the difficulty was how to get him back to the nearest fort. This was solved by some Tonkawa Indians, who placed him on the saddle, to which two bent branches were bound at an angle of 50°. Lieutenant Sherman was firmly bound to this, while his legs were tied to the branches in an extended position on each side of the horse, the branches in turn being made fast to the saddle. The arms were bound to the body.

It is evident that an arrangement like this could be of the greatest service, either by using branches or a chair made from pieces of wood, and hoop iron or other material to give the necessary stiffness at the back.¹⁷

(c) *Transport by One or Two Horses with Some Contrivance for Carrying a Man lying down.*

Lord and Baines¹⁸ mention that, where fighting savages, it is necessary to carry away all wounded at any cost; they show how, by knotting the ends of a blanket together and placing two men in the bights,

the central part might be laid across the back of a horse, with one man hanging on each side and secured with the best means available at the moment. The

Fig. 3.—Pack saddle on horse; ironwork altered to receive the iron pedestal of the wooden transverses; these can be raised or lowered for ascents or descents. Motion is more pleasant than hand carriage. Can be made 6 inches lower than in photograph.

Fig. 4.—Sledge stretcher. Used by North American Indians and by Union troops in Indian war. Litter can be made as double inclined plane for fractured thigh.

Fig. 5.—Improvised stretcher. Slits cut at corners of horse blanket. (Horse blanket is worn on service as saddle cloth.)

Fig. 6.—Horse blanket utilised as stretcher; surcingle used to lighten weight.

Fig. 7.—Mule stretcher: limbs lie on double inclined plane. Invented by Dr. McElderry, U.S.A.

Kaffirs and most other savages carry off not only their wounded but also their dead—not from any motives of humanity, but simply to deprive the enemy of a trophy. The French have constantly remarked on the rapid and sure manner in which the Arabs manage to carry off their wounded during their contests with them in Algeria and Kabylia. They use mules or horses without any regular mechanical conveyance, and with the aid only of the common pack saddle, sacks, and cords which are used in carrying stores.

Dr. Bertherand,¹⁹ Director of the School of Medicine in Algiers, has described at some length the manner in which the transport is effected. The same method might be adapted anywhere with transport mules in case of the absence or of insufficiency in number of the regular and authorised contrivances for removing wounded. It is briefly as follows:

The mule being ready saddled, two large sacks are stuffed full of straw, leaves, or grass. One of these sacks is then firmly corded on each side of

the pack saddle, and this is done in such a manner that the convexities of the two sacks, and the upper surface of the pack saddle, are all on the same horizontal plane. Any depressions between the saddle and the bags are made level by stuffing in hay and grass. This forms the litter. All that remains is to throw over all a cloak, so as to make the support soft and even for the patient, who is then placed upon it in a recumbent posture across the animal, not parallel with the line of his walk. The litter formed in the manner described has quite length enough from side to side to carry the patient crosswise. Afterwards, as opportunity occurs, branches are arched over it, so as to protect the patient, in case of need, from sun or rain.

Dr. Bertherand states that Europeans, as well as natives, who have travelled long distances in this fashion declare that this mode of transport is very easy, and almost entirely free from jolts. Sometimes in very severe injuries, and to prevent local displacement, the patient is securely tied to the litter, and when thus fixed he can be carried away at a gallop without risk or excess of pain from the movement. The objection to such a mode of transport would be its bulk in passing along narrow, winding footpaths, or through crowded places, but on occasion it might render great service.

Dr. McElderry,²⁰ U.S.A., has invented a mule stretcher (Fig. 7) for use in mountainous districts with narrow and deep defiles. The patient lies in a half-recumbent position, and the limbs lie on a double inclined plane. Where wood and nails are to be obtained it could be very easily imitated.

Two horse-stretchers or litters (two long poles with a litter in the middle, one horse or mule going in front, the other behind) are dangerous to use on account of the last horse being apt to stumble, and they involve the use of two horses for carrying one man—a great waste of transport. They have been used by the Americans, and by the Russians in the Caucasus.

A sledge-stretcher was used by the North-American Indians, and by the Union troops in the Indian war. Two long poles, not too thick, were fastened by their front ends on each side of the pack saddle. The free ends rest on the ground, and the patient lies on a litter made by transverse pieces of wood or raw hide, or horse blanket. (Fig. 4.)

(d) *Transport by a Stretcher along the Back of a Horse.*

The French surgeon, Gouchet,²¹ in his review of his recollections of medicine and military surgery, relates his experiences in an American field train in carrying ordinary loaded stretchers on mule pack saddles. (Fig. 8.)

Fig. 8.—Stretcher on mule pack saddle. Improvised arrangement preferred to hand carriage. Stretcher rests on two crosspieces of wood lashed to pack saddle. Used in American war.

Strong and tractable mules were sought out, and to the anterior and posterior bend of every pack saddle a cross piece of wood was tied on. At each end of the cross piece two other pieces were attached lengthways, and on this the field stretcher was bound. In addition, the handles of the stretcher and the rings at the side of the pad were joined by ropes. The head of the injured man lay above and behind the head of the animal. No complaints were made of a side-to-side movement, only dipping lengthways; those carried on this plan preferred it to stretchers carried by hand. My experience of this mode of transport is most favourable.

The "aparejo" of the Spanish Mexicans, described by Lord and Baines,²² I have also tried successfully. It can be quickly made by any saddler, and carried in the regimental transport. When required it is stuffed with straw, hay, twigs, etc. A man

can be carried on a stretcher lashed on to two cross pieces of wood. The motion is more pleasant and smooth than hand carriage.

Fig. 9.—Portable stretcher; one pole attached to carbine bucket; $4\frac{1}{2}$ lbs. weight. Half of canvas also carried.

I have made a simple alteration on the iron work of an army pack saddle, by which a loaded stretcher can be carried safely on it lengthways, and with great comfort even to one severely wounded. Two curved pieces of wood have each a square iron pedestal made to fit into a hole in the iron work of the pack saddle. They are placed crosswise, and can be raised or lowered in order to keep the stretcher level on uneven ground. The front transverse of the stretcher itself is curved sufficiently to clear the neck of the horse (Figs. 2 and 3).

The stretcher must be loaded before being put up and bound to the pack saddle (Fig. 3). It is always well to keep the horse steady by blindfolding him.

Fig. 10.—Dismounting by four men. Injured right leg, approach on wounded side; with arm injury, approach on sound side.

REGULAR MEANS OF TRANSPORT.

Cacolets and Litters.

These have been adopted by France since the beginning of

their wars in Africa, and form part of the usual ambulance equipment of a French army.

Fig. 11.—Cacolets on horseback. The arms are jointed at +; there is a button arrangement at the foot of the arm rest. Cacolets can thus be loaded from the side instead of from the front, which presents great difficulty if the mule or horse be tall.

In each army corps 10 litters and 20 cacolets are given to the ambulance of the *quartier général*, and 10 litters and 20 cacolets to that of each division of infantry.

Undoubtedly the French have brought their cacolets to great perfection, and ours have been modelled on their pattern, but as yet they are only served out for use with mules on mountainous expeditions, and were adopted after the good work they did in the Crimea had been seen. The use of litters has now been given up in our army, owing largely no doubt to the reasons stated later on. The French officers who served in Africa have always spoken in high praise of the use of mule cacolets and litters. Marshal St. Arnaud²³ wrote as follows:

The use of a mule with a cacolet or litter was first adopted in Algeria. By means of these ingenious equipages hundreds of wounded, amputated, and sick soldiers have been transported in safety to our base of operations.

Marshal Bugeaud²⁴ warmly advocated the mule litter; he compared the good they effected with what he saw in Spain in 1814, when, in consequence of the want of transport suited to the ground, whole divisions had been obliged to leave their wounded in the field. So strongly did he feel the bad effect which such neglect must produce that he went so far as to say, "Perhaps the courage of our troops would not have sufficed for the conquest of Algeria if we had not been able to save our sick and wounded from the Arabs." Marshal Bugeaud was led to recommend that the ambulance equipment of all the divisions of the French army, cavalry and infantry, should be exactly similar to that of the army of Africa, and that wheeled carriages should be attached to the reserves alone.

It was not without full inquiry and mature consideration that mule cacolets and litters were introduced among the conveyances of the British army. At an early period of the Crimean war it was reported home that the ambulance transport sent out with the troops had failed from various causes, and at the same time it was stated by numerous army surgeons and others that the mule cacolets and litters were acting very efficiently. Kinglake mentions that, after the battle of Alma, the French cleared their wounded off the field so quickly that they came to the assistance of the English.

In consequence of these reports the Director-General, Dr. A. Linster,²⁵ sent out instructions to the P.M.O. in the field to

convene a Board of experienced medical officers to report on the subject of mule ambulance conveyances. That Board reported greatly in favour of the conveyances under consideration. They stated that they considered the merits of the French cacolets and litters consisted chiefly in their general applicability to the circumstances of warfare, in their admitting of the removal of sick and wounded from every description of ground and over every kind of road where mules and litters can travel, and to the rapidity with which the removal could be effected over roads where wheeled carriages could not travel. On the other hand, the only demerits which they noticed were their uneasy motion in cases of serious gunshot injuries, and the liability of some of the animals to stumble and fall. Colonel Blaine, Assistant-Adjutant-General and Commandant at the headquarters of the army, at the same time reported

That the cacolets and litters now in the French service appear to be by far the most perfect system which has yet been devised for the transport of sick and wounded with an army on the field.

Patterns were obtained from Paris, and a supply of 200 more sent to the Crimea, and later a favourable report was sent to headquarters at home (Longmore).

The French, then, have used cacolets and litters in Algiers, in Crimea, in Mexico, and in the Franco-German war of 1870-71. We have used them in the Crimea and in Egypt. The Austrians have used them in Mexico. The Italians in the Tyrol and Locatis. Both, but the litters especially, were made so as to pass along narrow rocky paths and through wooded tracks.

The value of mule cacolets and litters has been differently estimated. Fischer, in his great work on military surgery, says:

On every hand favourable reports were made of this form of transport. The transport goes on without shaking, and on every kind of ground, more quickly and more certainly than by any other means. One could not wish a cheaper method.

According to Legouest, transport by cacolets is one of the most disagreeable methods, and that by litters not much less so. Neudorfer says:

Many animals have such an unpleasant gait that, whether sitting or lying, one feels as uncomfortable with the rolling as if he were in a small screw steamer. Even with an animal who goes well the constant dipping is unpleasant. Sometimes the strongest animals break down under the load, and they may take some hours to recover strength.

Leon Lefort describes cacolets as a horrible kind of transport, which causes the patient pain; lay him in the litter again and he finds the undulating motion pleasant. The mules push occasionally against one another, and sometimes lie down. He narrates how an officer who was wounded in both feet was thrown down in the streets of Metz.

It is quite true that the Americans, in their great war, set out with a great number of litters and cacolets, and soon discarded them; but it must be remembered that they fought on great plains, when other forms of transport were more suitable, and that, moreover, their litters and cacolets were not so portable as the French. It should not be forgotten also in this connection that in South Africa fighting usually takes place on advantageous heights and in hilly districts, from which the wounded have to be carried.

The opinion of Sir Vincent Barrington,²⁶ who has been out in several campaigns as Commissioner under the Geneva Red Cross Convention, is most valuable. The most important of his duties was to assist in the transport of the wounded.

Speaking in a discussion at the United Service Institution he said:

In my personal experience of actions, where I happened to be near the front, I found the great mass of those who first required removal had wounds in the hands or arms, and I could see what an advantage it would have been had there been a greater number of cacolets or mule litters at the disposal of the ambulance staff in the early part of the action. This was recognised in the Carlist war, and a great number of cacolets were used. I know very well that for serious wounds they are not desirable, but for the large number of slight wounds in hands and arms which are so common when fighting behind embankments, these cacolets are exceedingly useful.

I have made several improvements on our cacolets and litters, by which the sick and hurt are loaded with greater ease and comfort. They are also altered to fit horses so that band horses and those of the mounted infantry can be used; only good tempered, docile horses with good shoulders, and that step short should be chosen. (See Fig. 1.)

Our cyclist makers could make these much lighter and more generally useful than the present patterns issued for mountain expeditions. Though the gait of mules is more

pleasant, yet, considering the careful training which animals require for such transport, it is too risky to trust to get mules ready at the last moment. Besides, they cannot gallop well, are stubborn, and are often not equal to the weight, for animals strong and robust enough are difficult to get. The American war proved that tall mules were deficient in stamina. Even for them the weight they carry is almost prohibitive, for the cacolets weigh 56 pounds, the pack saddle almost 62 pounds, and two British soldiers 320 pounds, a total weight of 438 pounds.

When carrying litters the load is increased by 50 pounds, and if the equipment be wet then 20 per cent. may be added all round (Longmore).

Not only for the removal of wounded cavalry soldiers are these litters and cacolets admirably suited if carried on horses, but they have been found invaluable for the transport of wounded infantry.

Dé Préal,²⁷ French delegate at the Geneva Convention in 1863, described their ambulance service. He stated that each conductor has two mules, these being able to carry four sick or wounded, and as he makes five journeys in two hours, in that time he conveys twenty to the ambulance waggons; 750 conductors, with 1,500 mules, could do the work of 15,000 of the hospital staff, as experience proves it takes four men to carry a stretcher 1,000 metres, supposing that these men are able to make four journeys in two hours.

With our small staff of stretcher bearers—the minimum standard of height for whom is 5 feet 3 inches—available for such severe and exacting labours, it becomes our duty to see that we are provided with some more expeditious method than hand carriage for infantry. After a great battle our injured soldiers ought to have the assurance that they will not die unrelieved, and that they will, as soon as possible, be brought to the field hospital under the care of the surgeons of the Royal Army Medical Corps.

WAGGON TRANSPORT.

The Commander-in-Chief in his remarks on last year's manoeuvres, stated "that a special pattern of light ambulance is desirable to accompany mounted troops."

Country carts can be used partially filled with hay, straw, or grass. With framed hay carts an upper tier can be formed by lacing and interlacing from side to side with a straw or ordinary rope. Stretchers can be suspended in ordinary country carts. They are tolerably comfortable if French spiral spring hooks are made use of. Horses for these do not require any special training, and if the country is suitable, two should be able to transport five men, either sitting or lying down. Such an ambulance would be able to carry, in addition to water, a heating apparatus for soup or beef tea, as well as antiseptic dressings, and thus bring to the wounded cavalry soldier an amount of relief impossible by any other system.

REFERENCES.

- ¹ Dr. Rühlmann, *Album für Krankenträger*, p. 50. ² *Manual of the Army Medical Corps*, p. 112. ³ Roese, *Die Hülfleistungen für Verwundete und Kranke zu improvisiren*, Table II, Fig. 31. ⁴ Port, *Taschenbuch der Feldärztlichen Improvisationstechnik*, p. 107. ⁵ Schmucker, *Chirurgische Wahrnehmungen*, Berlin, 1774, 1, 346. ⁶ Larrey, *Campagnes d'Égypte*, p. 312. ⁷ Longmore, *Treatise on Ambulances*, p. 270. ⁸ Huntingdon, *American Army Circular*, No. 9, p. 28. ⁹ Baden-Powell, *Aids to Scouting*, p. 110. ¹⁰ Sherman, *American Army Circular*, No. 9, p. 28. ¹¹ Patzki, *American Army Circular*, No. 9, p. 24. ¹² Rühlmann, *Album für Krankenträger*, p. 52. ¹³ Longmore, *supra*, 270. ¹⁴ Crane, *American Army Circular*, No. 9, p. 28. ¹⁵ Longmore, *supra*, 270. ¹⁶ Sherman, *American Army Circular*, *supra*, p. 24. ¹⁷ Port, *supra*, 110. ¹⁸ Lord and Baines, *Shifts and Expedients of Camp Life*. ¹⁹ Bertherand, *Campagnes de Kabylie*, p. 116. ²⁰ McElderry, *American Army Circular*, *supra*, p. 15. ²¹ Gouche, *Recueil de Mémoires de Médecine et de Chirurgie Militaires*, 1865, p. 530. ²² Lord and Baines, *supra*, p. 414; see also Furze, *Military Transport*, Appendix III. ²³ Marshal St. Arnaud, *Rapport Equipages Militaires*, Paris, February, 1852. ²⁴ Bugeaud, Longmore, *supra*, 272. ²⁵ Longmore, *supra*, 272. ²⁶ Barrington, *United Service Institution Journal*. ²⁷ Chenu, *Rapport au Conseil de Santé*, p. 694.

THERE are now eight Pasteur Institutes in France; arranged according to the dates of their establishment they are those of Paris, Algiers, Tunis, Montpellier, Marseilles, Bordeaux, Lille, Lyons. The last was opened on the first day of this year. There are five like institutes in Italy (Bologna, Milan, Naples, Palermo, Turin), two in Austria-Hungary (Vienna and Buda-Pesth), seven in Russia (St. Petersburg, Moscow, Samara, Kharkof, Warsaw, Odessa, Tiflis), two in the Ottoman Empire (Constantinople, Aleppo), one in Roumania (Bucharest), and one in Malta.