distribution of trained personnel will raise very great difficulties during the first vital six months. At present we have a vast army of young and youngish men who have served for not less than two years with the colours, but the only soldiers who are properly trained are regulars. In field medical units, whether at the front or rear, there are four vital posts, namely the commanding officer, the company officer, the quartermaster and the regimental sergeant-major. We should ensure that not less than two of these posts are held by regulars in every unit, and must not allow units to fend for themselves as they had to do in 1939. Morale is so dependent upon training and efficiency that an untrained unit, if it becomes a rabble under pressure, soon becomes a liability.

I cannot close without mentioning morale in the Territorial Army. Although we have our parachutists and front line volunteers, many of us, by sheer weight of years, gravitate towards the base where, in middle age, we tend to occupy the higher ranks, both commissioned and non-commissioned. Our morale is always high, for as long as we attend our parades. We know our colleagues, we have our equipment and within limits we are trained, but we cannot match full-time soldiers for experience. If we are to become efficient rapidly in an emergency, we need a stiffening of regulars. Alternatively, we are useful nuclei from which fresh units can be formed. I think we are worth retaining.

SOME PRACTICAL ASPECTS OF A COMMAND TRANSFUSION SERVICE

BY

Lieut.-Colonel H. C. JEFFREY, M.B., Ch.B., D.T.M. & H.
Royal Army Medical Corps

PREVIOUS articles in this Journal have described some of the practical aspects of transfusion work in a station hospital (King, 1956) and the organisation of an Army Blood Bank (Lunn & Turk, 1957). A number of official directives are in existence covering the administrative and technical details concerning transfusion. This article is designed to describe how these may be translated into practice, particularly overseas, under peace-time conditions, in such a way as to satisfy the clinician, with his often urgent demand for blood, and the pathologist whose duty it is to ensure that blood issued is safe to give.

ORGANISATION

In the United Kingdom the National Blood Transfusion Service provides hospitals with bottles of grouped blood, banks being replenished at stated intervals or as necessary, and the hospital transfusion service need only be
Some Practical Aspects of a Command Transfusion Service

concerned with arrangements for the care of the blood and checking its suitability for transfusion to any particular patient. Abroad, however, it is seldom that such comprehensive arrangements exist, and the Army Transfusion Service requires an organisation dealing with the donor aspect as well.

To this end a panel of donors is maintained in all overseas stations, under the general supervision of the senior pathologist in the Command or District, and in hospitals under the particular supervision of the pathologist in collaboration with the transfusion officer. The transfusion officer should not be the pathologist, in order that at least two medical officers have special knowledge of the transfusion arrangements so that cover is provided should one be absent from duty. Frequently the choice of transfusion officer falls on the anaesthetist, who is specially trained in resuscitation measures. One objection to such a choice is that, in emergency, transfusion and anaesthesia are frequently required at the same time, but every medical officer should be capable of bleeding donors and giving blood, and the orderly medical officer is always available for such duties in emergency.

The pathologist's duties in connection with the transfusion services include the blood grouping of donors and recipients, compatibility tests, the care of stored blood, the testing of whole blood, plasma and plasma substitutes to ensure their suitability for transfusion, collaboration with the hospital transfusion officer, and the maintenance of records.

The duties of the transfusion officer include the maintenance of a panel of suitable donors, the bleeding of donors as required, the transfusion of recipients and the duties of the pathologist if such a specialist is not available.

Blood for transfusion is obtained by bleeding donors at the time that transfusion is required, or initially in emergency from a small blood bank.

THE DONOR PANEL

The donor panel should be divided into two main groups:

Those to be summoned in an emergency. The donors in this group should be from hospital personnel, augmented if necessary from a major unit in close proximity to the hospital. Minor units should not be used for this purpose if it can be avoided as in emergency much time can be wasted contacting such units and finding that the few suitable persons are out. Men from such units should be on the non-urgent panel. The size of such an emergency donor panel will depend largely on the number of men and families in the station, the general nature of military training (as regards the incidence of accidents) and the scope of hospital practice. It should be based on average transfusion requirements in the past, with an adequate reserve to cover major incidents and, since it is for use in emergency, often after duty hours, to have a reasonable assurance that sufficient donors can be found actually present in their units. This is not the problem it may appear, however, as in general, army personnel overseas can be found in relatively few places after duty hours—in billets, the Services' clubs or the cinema.
The following figures are suggested as the minimum requirements for this type of panel:

<table>
<thead>
<tr>
<th>Type of donor</th>
<th>Bed strength of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 100</td>
</tr>
<tr>
<td>O Rh negative</td>
<td>6</td>
</tr>
<tr>
<td>O Rh positive</td>
<td>12</td>
</tr>
<tr>
<td>A Rh negative</td>
<td>4</td>
</tr>
<tr>
<td>A Rh positive</td>
<td>12</td>
</tr>
<tr>
<td>B Rh positive</td>
<td>6</td>
</tr>
</tbody>
</table>

Number of donors requiring investigation to produce at least this number of Rh negative groups:

<table>
<thead>
<tr>
<th>Bed strength of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
</tr>
<tr>
<td>100</td>
</tr>
</tbody>
</table>

(Note: Other ABO and Rh combinations only to be included if found during investigation for the above groups.)

Home Commands should consider maintaining similar donor panels in connection with each military hospital so that blood may be available should adverse road conditions, particularly fog, preclude rapid replenishment of their blood banks.

Those to be used in non-urgent cases and for the replenishment of a blood bank if maintained. The donors in this group should be from any unit in, or in reasonable proximity to, the station, preferably from the more static ones in view of the possible protracted absence of field units on manoeuvres. Again the size of such a panel will vary according to local factors; the following are suggested as minimum figures to be aimed at.

<table>
<thead>
<tr>
<th>Type of donor</th>
<th>Bed strength of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to 100</td>
</tr>
<tr>
<td>O Rh negative</td>
<td>10</td>
</tr>
<tr>
<td>O Rh positive</td>
<td>30</td>
</tr>
<tr>
<td>A Rh negative</td>
<td>6</td>
</tr>
<tr>
<td>A Rh positive</td>
<td>30</td>
</tr>
<tr>
<td>B Rh positive</td>
<td>10</td>
</tr>
</tbody>
</table>

Number of donors requiring investigation to produce at least these figures of Rh negative groups:

<table>
<thead>
<tr>
<th>Bed strength of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
</tr>
<tr>
<td>175</td>
</tr>
</tbody>
</table>

(Note: Other ABO and Rh combinations only to be included if found during investigation for the above group.)

Selection of donors

Volunteers should not be placed on the panel if they have a history of malaria, of venereal disease, of infective hepatitis, of acute or chronic infections including those of the skin, or arm veins unsuitable for donation.

Before a donor is bled a number of points require investigation. The haemoglobin level of the blood should be estimated. In army practice male donors with less than 13.5 g. per cent should be rejected. Female donors or males in civilian practice with a haemoglobin level above 12.5 g. per cent may, however, be accepted. This is a general rule. In emergency, for life-saving purposes, it
may be necessary occasionally to bleed a donor before this check, but the haemoglobin value should always be estimated in such cases at leisure afterwards and appropriate therapy instituted if indicated. As a general rule if a man has donated blood within the previous six months he should not be bled again. If an appropriate donor cannot be found, however, it may be necessary to bleed more often than every six months (even once in three months), particularly if large quantities of Rh negative blood are required. This should only be necessary in exceptional circumstances, and if a man is bled more frequently than every six months he should be given a month’s course of some suitable iron preparation after each donation. The donor should be asked if he is attending a venereal disease treatment centre (Special Treatment Centre) and rejected if the answer is in the affirmative. Enquiry should be made as to whether the man has been vaccinated or inoculated recently. The recently vaccinated should not be used as donors until the scab has formed and separated; bleeding should not be carried out within four days of inoculations.

After a donor is bled a specimen of blood should be obtained from the taking set and a Kahn test performed at leisure. If it is positive, action should be taken to investigate the donor, and to follow up the recipient if the blood has already been given.

Investigation of donors accepted for the panel

Panels should be revised at least every six months. At this time a nominal roll of those on the panel should be submitted to the unit concerned for checking and the names of those who have left the station removed from the panel. The number requiring investigation to bring the panel to the desired level should then be calculated, from the approximate figure that 6 group O Rh negative donors will be found per 100 men investigated. Requests to units for at least this number of volunteers should be made. If close co-operation is maintained with unit commanders, personal contact being of much greater value than correspondence in this connection, it should not be difficult to get sufficient volunteers who have, as far as can be envisaged, at least six months to serve in the station and who are in possession of National Blood Transfusion Service (NBTS) Cards. (Teams from the NBTS visit most centres receiving recruits in the U.K. and issue cards showing the ABO and Rh group to those donating blood. Most men willing to give blood will probably have already done so in recruit centres and be in possession of these cards.)

Anti-rhesus sera cannot be obtained in unlimited quantities as it is all obtained from human volunteers with suitable antibodies in their blood. Stocks must hence be conserved as far as possible. It is also desirable to reduce technical work in connection with maintenance of donor panels as far as is reasonable. To achieve these objects, the following steps are suggested.

For those to be used in emergency cases. The ABO group in all instances should be checked by the five-tube method, whether the donors are in possession of NBTS cards or not.

If sufficient Rh negative donors can be found from those in possession of
NBTS cards, the Rh group of these negative donors should be checked. This should be carried out by such combinations of anti-Rh sera as are available so that the red cells are tested for the presence of the C, D and E factors, and individuals should only be accepted as Rh negative for donor purposes if they are negative to all three factors, i.e. if their Rh genotype is cde/cde. Those documented as Rh positive, who will be used for Rh positive recipients, need not be checked for the Rh group.

If the number giving the required combinations of ABO and Rh groups is insufficient, further volunteers will need to be ABO grouped. Those found in the ABO groups in which insufficient Rh negative donors are available should then be Rh grouped.

It is preferable to test donors initially with anti-D serum since it is important to know this should a donor at any time become a potential recipient. The use of anti-C+D initially, for example, would show an individual who has Cedd as Rh positive, which as a recipient he is not. D-negative donors would then be tested with anti-C+D or anti-C, followed by anti-D+E or anti-E. If supplies of anti-D serum are insufficient for screening donors, other combinations of sera (e.g. anti-C+D followed by anti-E) should be used. It is, however, most important to remember in such cases that, should an “Rh positive” man on the donor panel become a prospective recipient, his Rh group must be ascertained de novo using anti-D serum only.

For those to be used for non-urgent cases and the maintenance of blood banks if established. An endeavour should be made to obtain sufficient volunteers of each ABO, Rh combination required from those in possession of NBTS cards. These are accepted as documented until required, the ABO group being checked always and the Rh groups of Rh negative donors being checked before bleeding. The Rh group of donors to be used for Rh positive recipients need not be checked. If the number of volunteers with NBTS cards giving the desired combinations of ABO and Rh groups is insufficient, further donors will have to be grouped as described above.

(Note: In performing mass venepunctures (and the ABO group should be ascertained by examining the serum for antibodies as well as the cells for antigens) a convenient method is to have sufficient needles with about 6 cm. pieces of rubber tubing attached and sterilised with the needle by autoclaving. If the tourniquet is adjusted satisfactorily and the subject opens and closes his fist while blood is being withdrawn, ample blood can be obtained without suction using an ordinary venepuncture needle.)

Records of donors

The most convenient method of keeping records of donors is by means of a card system. Constant deletions from and additions to a book soon become unsightly and, unless new pages are prepared each time the panel is renewed, order is soon lost. With a card system those of donors who have left merely need to be abstracted and destroyed, those of new donors can be inserted in their correct place, and those of resting donors easily segregated. As a refinement,
different colours can be used for the different ABO combinations. These should conform to the colours used for the Army Blood Donor Cards—i.e. blue for Group O, yellow for Group A, pink for Group B and white for Group AB. A red line down the centre of such cards or cutting off the top right-hand corner denotes an Rh negative group. To render calling forward of donors as simple as possible, cards should be filed in two boxes marked "emergency" and "non-urgent," under ABO, Rh combinations in alphabetical order of names by units. When a donor is bled an appropriate entry is made on the card which is abstracted to a "resting" file kept in chronological order and reviewed monthly, at which time cards of those who have completed the requisite rest period can be put back into the appropriate donor panel.

A suitable format for such cards is:

```
AB RH Pos

NAME RANK NUMBER
UNIT
REF. No. OF GROUPING

DONATIONS
DATE BLED Hb KAHN BRING FORWARD
```

**TAKING OF BLOOD**

The transfusion service is completely dependent on the good will of donors: therefore the greatest care is necessary to ensure that no accidents or causes of dissatisfaction arise. Every consideration should be given to donors, as those who are satisfied will return, but the sight of a donor fainting, or of a bruised arm after a person has given blood, may discourage others from volunteering.

Care must be taken to prevent air embolism. If negative pressure is used, the means of producing it must be tested: e.g. if a reversed Higginson's syringe is used, it must be ensured that it is in fact reversed. If the air outlet becomes ineffective there is a possible danger of air embolism when the arm constriction is released, as positive pressure may have built up in the bottle. The glass window in the blood line must be watched. As the blood line is full at the end
of donation, no harm should follow if the needle is removed, or the blood line clamped, immediately the constriction of the arm is released.

Steps must be taken to prevent syncope. After the removal of a pint of blood the blood pressure is maintained immediately by vasoconstriction and restored during the next three to ninety hours by tissue fluids. One pint can usually be withdrawn without ill-effects, but if more is withdrawn, or occasionally after only one pint has been taken, or if the donor is affected psychologically, the blood pressure may fall dramatically with symptoms and signs of pallor, cold clammy skin, yawning, nausea and a desire to pass urine or faeces. The chief danger after blood donation, however, is an exaggerated response to posture, the fall in blood pressure on standing up being twice that of normal persons, and prolonged up to thirty seconds. This exaggerated response to posture may well be found five to six hours after donation and it may occur to some degree even after the loss of one pint of blood. To minimise the risk of syncope, immediate or some hours after donation, donors must be bled lying down and they should remain recumbent for at least fifteen minutes afterwards. They should then be given a drink, should sit up slowly under observation, be helped to a rest couch and remain there for a further half an hour.

Hæmatoma formation at the site of venepuncture discourages further donations. Such a hæmatoma may follow the passage of the needle either too far or not far enough. The needle should have a short bevel. Apart from that the prevention of a hæmatoma is a question of technique.

The venepuncture should be as painless as possible. A sharp needle is essential and a local anaesthetic may be used. Some consider that there is but little difference in the pain caused by the passage of the taking needle and that caused by the needle of the hypodermic syringe containing a local anaesthetic, and that local tissue swelling by the anaesthetic may partially obscure the vein increasing the danger of inaccurate venepuncture and consequent hæmatoma formation. Whether a local anaesthetic is used or not is a matter for decision by the medical officer taking the blood.

Reaction to antiseptics must be prevented. Staining, soreness or even dermatitis may be caused by the antiseptic used, particularly tincture of iodine in hot climates when the spirit may have partially evaporated, producing a strong irritant. Cetrimide is probably preferable to iodine.

It is important to avoid more than one venepuncture. The ability to take a full pint of blood from a donor with one taking set depends largely on the state of the inside of the taking needle and on the experience of the operator. If the needle has a small bore (less than 18/10) a certain amount of negative pressure may be desirable, which can be obtained readily by the use of a reversed Higginson's syringe. The bevel of the needle should be directed downwards when in the vein either by introducing it in that position or by turning it through a half-turn if it has been introduced bevel upwards as is the common practice. This prevents interference with the flow of blood by the wall of the vein being sucked against the aperture of the needle, and is especially important if negative pressure is being used.
Some Practical Aspects of a Command Transfusion Service

THE BLOOD BANK

With an adequate emergency donor panel from hospital personnel, such a bank should only be kept overseas if emergency demands, as experienced in the past, justify it. In a large transfusion centre, embracing a number of hospitals administered by the same regional service, waste of blood can be minimised by removing blood from a small bank a week before it is time-expired and using it in a hospital with large demands for blood. This is seldom feasible in army practice, and, as transfusion demands vary widely, much blood will be wasted by becoming time-expired should banks be kept unnecessarily or on too large a scale. Should the fact that blood is being wasted become known to potential donors, reluctance to donate blood may arise and legitimate demands may not be met.

The hospital blood bank should be near but, in order to minimise the possibility of contamination, not in the laboratory. If a transfusion room is available it should be kept there. The bank should be under the personal supervision of the pathologist or the transfusion officer if no pathologist is available. For routine purposes blood must be stored at a temperature between 4° and 6° Centigrade, and an alarm system should if possible be incorporated to give warning whenever the temperature rises above 6° C. or falls below 4° C. A maximum and minimum thermometer should also be provided, as an alarm bell might not be heard in off-duty hours. Readings should be recorded every morning and evening.

Blood up to 21 days old may be safely transfused and, subject to the advice of the pathologist, blood up to 28 days old may be given in small quantities. If a massive transfusion is required, blood under 14 days old is particularly required, but in the transfusion services overseas, the particular service under discussion, blood for such purposes will be fresh from donors except possibly for the first few bottles.

Points about maintenance of supplies and conditions of storage and issue are best dealt with in Standing Orders for the Maintenance of Blood Banks which should be drawn up in poster form and displayed above the blood bank. Certain details of such orders may vary according to local conditions; a specimen of how such orders could be drawn up follows.

STANDING ORDERS FOR THE BLOOD BANK

1. Supervision
   This blood bank is under the personal supervision of:
   (The officer responsible is named here.)

2. Maintenance of supplies
   (a) Normal holdings of blood will be
       Group O Rh positive ... 2 bottles
       Group O Rh negative ... 1 bottle
       Group A Rh positive ... 2 bottles

   (b) Should blood from this stock be used, the supervising officer will request the hospital transfusion officer to arrange replenishment as soon as is practicable, certainly before the next day.
(c) Blood not used within 21 days of taking will be removed from the blood bank refrigerator and either discarded or used for purposes other than transfusion under the orders of the supervising officer. If the blood is not immediately poured away a conspicuous label “DANGEROUS FOR PATIENTS” will be attached and the bottle removed from the transfusion room to some other refrigerator.

3. Conditions of storage

(a) NOTHING other than blood and material for grouping and typing will be placed in this blood bank.

(b) The maximum and minimum thermometer will be read every morning and evening by the transfusion technician and the result entered on the chart displayed beside the cabinet.

(c) The supervising officer will make a daily inspection of the bottles of blood and the temperature chart. The bottles should have a clear line of demarcation between the sedimented cells and the supernatant plasma, which should be straw-coloured and free from visible signs of haemolysis. Haemolysis is shown by a reddish-purple discoloration in the plasma immediately above the cell layer, which gradually spreads upwards. Such blood should be discarded.

(d) Blood must be kept at 4°-6° C. by refrigeration or other method of cold storage (see para. 5 (a) below) except for any period necessary for examination or transport at higher temperatures. Any such period must NOT exceed 30 minutes, after which the blood should immediately be cooled again to 4°-6° C. If this is not done, the blood must be discarded.

4. Condition of issue

(a) Bottles of blood will always be inspected before issue. (Regarding para. 3 (c) above, however, it must be remembered that good quality blood once shaken may take many hours or even days to settle.)

(b) A record of all blood issued will be kept on A.B. 129, showing the reference number of the bottle, the date and time of removal, and the patient for whom it is used.

(c) Blood will only be issued immediately prior to transfusion and then only to a duly appointed member of the laboratory or hospital staff.

(d) Concentrated cells will only be used within 12 hours of preparation.

(e) Bottles of blood which have been opened or punctured for sampling but not used within 24 hours may be retained for a further period in the blood bank, or be otherwise disposed of at the discretion of the pathologist.

5. Bottles returned

(a) In certain circumstances it may be necessary to keep blood standing by the side of a patient. In these cases it will be issued in special containers complete with ice insert. If blood so issued is not used it may be returned to the blood bank only if its temperature has not risen above 10° C. The only practical guide as to its good condition is the presence of ice in the insert. If no ice is present such blood must be discarded.
(b) Bottles not so refrigerated in special containers will not be accepted back unless the period outside the refrigerator has been less than 30 minutes (as in 3 (d) above).

(c) Partially used bottles, and the dregs of used bottles, will not be placed in the blood bank, but stored in some other refrigerator for 24 hours in case investigation into a reaction is indicated.

THE TRANSFUSION ROOM

In order that blood grouping and cross-matching may be carried out with as little interference as possible, and to have all necessary equipment and reagents readily to hand, it is desirable that a special room be fitted out as a transfusion room, preferably with a room for bleeding donors next door. Should accommodation preclude this, a special bench should be earmarked for transfusion work and used for no other purpose. If the supply of equipment permits, items for transfusion work (microscopes, centrifuges, etc.) should be kept for this purpose only. If the supply situation requires that equipment has to be used for other purposes, it should be replaced in the transfusion room, or on the transfusion bench, before duties are discontinued, in case of a night emergency. The design of such a room will vary according to what is available locally.

TRAINING

While the most experienced technician should normally undertake technical work in connection with transfusion, he may not always be available in an emergency, and it is most important that all technicians on the duty roster on call are thoroughly conversant with procedures required and the practical details involved in carrying them out. To aid this a chart is displayed in the transfusion room detailing the steps which have to be taken before blood is issued to patients (this chart is illustrated in Plate I). The detailed steps in each procedure are printed out on sheets of paper, suitably protected by transparent material, and these should be ready to hand in the transfusion room.

In addition, practice is essential to maintain a high degree of technical competence, and hence it should be a routine in any laboratory dealing with comparatively infrequent transfusion work that every technician on call perform an emergency blood grouping and cross-matching (including an Indirect Coombs test) weekly. To achieve this, arrangements should be made for all technicians who have not carried out such procedures during any one week for actual cases to perform them on practice samples on a convenient, specified day. This is considered a most essential aspect of the arrangements for emergency transfusion.

SUMMARY

Practical details regarding the maintenance of donor panels, blood banks and transfusion rooms for a static transfusion service are described.
### Plate I - Wall Chart of Laboratory Procedures

This chart is reproduced in poster form, approximately 45 x 31 inches, suitably framed. The heading "Emergency Cases" and the three boxes below, the numbers in the first two columns and the note at the foot of the chart are in red.

#### PROCEDURES BEFORE TRANSFUSION WITH WHOLE BLOOD

<table>
<thead>
<tr>
<th>EMERGENCY CASES</th>
<th>URGENT CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Exceptionally</td>
<td><strong>A</strong> Exceptionally</td>
</tr>
<tr>
<td><strong>B</strong> Generally</td>
<td><strong>B</strong> Generally</td>
</tr>
<tr>
<td>1. Check Request Form</td>
<td>1. Check Request Form</td>
</tr>
<tr>
<td>3. Rapid ABO Group of Recipient</td>
<td>3. Rapid ABO Group of Recipient</td>
</tr>
<tr>
<td>4. Rapid Rh Group of Recipient</td>
<td>4. Rapid Rh Group of Recipient</td>
</tr>
<tr>
<td>5. Select Donor Blood</td>
<td>5. Select Donor Blood</td>
</tr>
<tr>
<td>8. Check Donor ABO Group</td>
<td>8. Check Donor ABO Group</td>
</tr>
<tr>
<td>9. Check Donor Rh Group</td>
<td>9. Check Donor Rh Group</td>
</tr>
<tr>
<td>12. Indirect Coombs Test</td>
<td>12. Indirect Coombs Test</td>
</tr>
<tr>
<td>13. Compatibility Label</td>
<td>13. Compatibility Label</td>
</tr>
<tr>
<td>14. Enter Details in Record Books</td>
<td>14. Enter Details in Record Books</td>
</tr>
</tbody>
</table>

**Note:** Blood must not be given if it has been out of the refrigerator for more than half an hour or if the bottle has been opened more than 24 hours previously.
PLATE II

Side, front and rear views of the three ambulances described in the text.

Face page 111
It is a pleasure to acknowledge the helpful advice I have received from Major-General G. T. L. Archer, Dr. W. d'A. Maycock and Lieut.-Colonel P. D. Stewart, R.A.M.C., in the preparation of this article. My thanks are also due to Captain R. M. Atkinson, R.A.M.C., for the diagram.

REFERENCES

AMBULANCE LÉGERE

BY

Lieut.-Colonel J. C. WATTS, M.C., F.R.C.S.
Royal Army Medical Corps

Simplicate and add more lightness.—RIED RAILTON
Weight is of value solely to the designer of a steam roller.—UFFA FOX

As chief instructor and medical officer to the Services' Ski-ing Leave Camp at Troodos in the Olympus Mountains of Cyprus, it was forcibly brought home to the writer that there is at present no suitable ambulance car for the evacuation of wounded over snowbound mountainous roads. Only two ambulance cars are at present in use, the Car, 5 cwt. 4×4 stretcher and the Ford "Thames" car ambulance. The former provides no weather protection and the patients suffer from cold and exposure, but it had perforce to be used as the latter could not be manoeuvred on the steep and winding tracks of Mount Olympus.

Marshal Larrey, Napoleon's Chief Medical Officer, was a man of parts as, in addition to his organising ability, professional skill (he was the first to realise that gas gangrene occurred only in devitalised muscle) and administrative talents, he was of an inventive turn of mind, designing the "Ambulance Légère," a light stretcher-carrying phaeton capable of rapid and comfortable evacuation of the wounded. In this respect he was more fortunate than his British opposite number, Dr. McGrigor, who was reprimanded by the Duke of Wellington when he commandeered the returning forage waggons to serve the same purpose.

Stimulated by his experiences at Troodos, the writer has given some thought to the design of a suitable light ambulance, and carried out a few experiments. The expensive débâcle of the "Champ" suggested that the fate of a design de novo would be macabre and that the modification of an existing vehicle presented a more practicable proposition. Fortunately a suitable vehicle exists in the long chassis Land-Rover, and an additional advantage is that the normal Land-Rover is already used by the Army and therefore servicing presents no problems. The only modifications required to the long chassis Land-Rover are:

(a) Lengthening the body eight inches by shifting the rear panels and tailboard back; this is to allow for the handles of the stretcher;

(b) Fitting troughs for the lower stretcher runners;