the adjustment and use of the syringe and needle are very simple. Any possibility of contamination is fully excluded by the use of an alcohol flame. To discharge the blood from the syringe, the needle, on withdrawal from the vein and while still attached to the syringe, is heated and pressed through the cork of the flask. Both clamps on the rubber tubing should be released before depositing the blood, and afterward retightened. The flask may now be packed for transport.²

FLASK FOR DISTRIBUTION OF STERILE ENRICHMENT FLUIDS IN QUANTITATIVE AMOUNTS TO CULTURE TUBES

The subsequent bacteriologic investigation of the body fluids is so closely connected with their collection and transport that a brief reference to a device dealing with this

Fig. 6.—Flask for distribution of sterile enrichment fluids in quantitative amounts to culture tubes.

aspect may be regarded as within the scope and intention of this paper.

The purpose of the flask is to provide a sterile receptacle so that enriching fluids can easily and without risk of contamination be distributed quantitatively to tubes of the ordinary laboratory mediums. Some such method is almost a necessity if the work is not routine in character. In this part of the work, as well as in the collection of body fluids, simplification in the technical detail is the surest method of incorporating bacteriologic examinations with the practice of medicine.

The arrangement of the apparatus consists in attaching to a large filter flask a graduated tube by means of pressure rubber tubing as shown in Figure 6. The tightly fitting rubber cork of the flask is pierced by a cotton-plugged air vent, and the glass tubing (for siphonage) which is connected to the graduated cylinder. This cylinder plugged with

cotton at the top leads by means of pressure tubing to a hooded pipet, which is protected by a test tube held in place by a cork in the manner shown by the illustration. It is safer if all rubber tubing connections and the cork are wired and after sterilization paraffined. As the different fluids must be obtained sterile or rendered so by filtration or other

2. Besides the individually desired materials for skin sterilization, very few articles need be carried to the bedside when the methods described above are used. Thus for the first type of operation the only necessary articles are: (1) wrapped sterile trocar and cannula; (2) wrapped sterile flask and extra piece of tubing, and (3) spirit lamp. For the second type: (1) sterile case of syringe and needles; (2) sterile flask containing citrate solution, and (3) spirit lamp. My experience with these two types of collecting flasks might be summed up by stating that all specimens of cerebrospinal fluid and blood, collected as described from seven patients, showed no contamination after transport from the North of Ireland to London; and that material shaken and immediately incubated remained sterile.

means, the flask thus fully assembled is sterilized before being filled through the side arm, after which this side passageway is properly blocked by a heated rod or tube and clamped. Once the flask is filled, siphonage is obtained by forcing air through the air vent and releasing the clamp to the graduated chamber. As the hooded pipet is made of quartz glass, there is no danger of cracking during the necessary use of the Bunsen flame before and after the withdrawal of the fluid.³

THE RATIONAL AND COMFORTABLE TREATMENT OF FRACTURE OF THE CLAVICLE BY MEANS OF A CRUTCH SPLINT

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Not long ago there came under my observation a case of fracture of the clavicle wherein the Sayre dressing, or Velpau, could not be utilized. The patient, in addition to sustaining a fracture of the clavicle, had also received a severe trauma of the upper arm and forearm of the same side, causing great swelling at the elbow. The arm was fleshy, and this, together with the swelling, made it impossible to use any of the conventional dressings, as in order to do so it would have been necessary to keep the patient continually narcotized and to take chances of interference with the circulation.

A diligent search of the literature for some kind of apparatus or dressing which would take care of the case in

Fig. 1.—Side view of fracture crutch.

Fig. 2.—Rear view of patient with straps adjusted.

hand revealed the Velpau, Sayre and Dessault dressings, and a few modifications of these, as the only hope which could be offered the patient for the correction of his injury.

I constructed an apparatus which would perform the dual service of correcting the injury and alleviating the suffering.

The apparatus consists of a T shaped steel bar, on the horizontal or upper part of which rests a pneumatic tube covered over with chamois skin and which fits into the axilla (Fig. 1 A). The upright steel bar fits the side of the chest and extends downward to the hip (Fig. 1 B), where it is attached to an aluminum plate covered also with chamois skin and shaped to fit snugly over and rest on the hip. (Fig. 1 C). Holes placed equidistant in the upright bar (Fig. 1 D) render the apparatus adjustable to any adult. The bolt (Fig. 1 E) fastening the aluminum plate to the

3. A properly filled flask may quite safely be forwarded, provided all three exits are additionally clamped, and of course breakage guarded against by careful packing. Flasks of 1,000 c.c. of filtered horse serum have provided sterile enrichment fluid for culture tubes until emptied. This means that small amounts have been easily withdrawn on about 200 occasions, without the stock fluid becoming contaminated. The following precautions are suggested on the avenues of infection that might be overlooked: 1. In refilling the graduated tube, care should be taken that the fluid is not allowed to reach the cotton of the air vent. 2. The tube to which the enriching fluid is to be added should be thoroughly flamed before being inserted within the hood, so that there is no possibility of the discharging tip becoming contaminated from the inner wall of the tube. The test tube protecting the tip and blocking the mouth of the hood should be treated in the same way before being reinserted.

upright bar may either be adjusted tightly so as to prevent mobility of the crutch with the forward and backward movement of the body, or fixed loosely so as to allow for such motion. (The latter seems preferable—note dotted lines *F, F*, Fig. 1). A belt (Fig. 1 *G*) fastened to the aluminum plate buckles around the waist; and straps extending from this plate over the opposite shoulder (Fig. 2 *A*) give additional security and comfort. A strip of adhesive tape 3 inches wide is placed round a pad (Fig. 2 *B*) over the arm on the injured side just below the axilla, the free end extending back under the opposite axilla and to the sternum in front.

With this apparatus we are enabled to meet all the requirements known as cardinal principles in treatment of fracture of the clavicle, namely, bringing the arm upward, outward and backward: (1) upward by means of the crutch resting on the hip; (2) outward by means of the pneumatic cushion in the axilla acting as a fulcrum, and (3) backward by the use of the adhesive strap around the arm and fastened to the back.

Fig. 3.—Front view of patient with straps adjusted.

Fig. 4.—Fracture crutch strapped to patient.

ADVANTAGES OF THE CRUTCH SPLINT

1. Most important of all, it is comfortable, and free from the almost intolerable suffering caused by other dressings.
2. It can be used in many cases in which the Sayre or Velpeau dressings cannot be applied.
3. It can be used innumerable times.
4. It can be adjusted to any adult physique.
5. It is inexpensive.
6. It is easily applied and cannot be worked out of place by the patient as are the Sayre and Velpeau dressings, on account of their discomfort.
7. There is no chafing of the skin, the parts are open to inspection, and the apparatus can be easily removed and the injured parts massaged.
8. It allows free use of the forearm and hand.
9. It applies the proper mechanics, meets all the cardinal requirements, and affords perfect immobilization.

Atypical Meningitis in Denmark.—The *Hospitalstidende* publishes a notice from the state serum institute at Copenhagen to the effect that in the towns and rural districts of Denmark there have recently been cases of cerebrospinal meningitis in an atypical form: slight or no meningeal symptoms, high fever, mild catarrh and hemorrhages into the skin, either as petechiae or blue patches, some as large as one's palm. The disease thus simulates scurvy or typhus, but the meningococcus is responsible for it, as also for certain cases with an exanthem suggesting roseola. The institute urges that spinal fluid from all such cases be sent at once for examination, and asks for the data from all such cases that have been encountered, whether terminating in death or recovery.

BACILLUS WELCHII INFECTION AND INTOXICATION*

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The problem of gaseous gangrene in connection with shot and shell wounds has been only partially solved by improvements made in the antiseptic treatment of wounds. The essential nature of *Bacillus welchii* infection has not been established, and this lack of a certain basis of knowledge has hampered progress. Whether the bacilli are mere saprophytic concomitants of an infectious process induced and maintained by other pathogenic micro-organisms, as is held by Weinberg and Séguin, or whether tissue destruction is due to a mechanical action of the gas formed, as is held by Kenneth Taylor, or whether they possess invasive powers of their own, as others believe, has not been definitely settled. The indications are, however, that the bacilli tend not to invade the general blood stream and hence do not produce a septicemia to which the severe effects often noted in gas bacillus infection may be ascribed. It would appear, therefore, that a form of poisoning from local action of the bacilli arises; but it has yet to be shown that the bacilli of Welch are toxin-producing bacteria.

We have been able to establish this point. By cultivating the bacilli anaerobically in broth to which sterile, unheated skeletal muscle of the pigeon or rabbit has been added, a highly toxic fluid is obtained. The toxicity of the fluid is independent of acid and is not essentially influenced by filtration through porcelain which removes the bacilli. The degree of toxicity is also very high if the incubation has not been continued too long. For example, 0.25 c.c. of such a filtered fluid injected into the breast muscle of the pigeon produces intense edema and degeneration of the muscle, and death in a few hours. Corresponding lesions are also produced in the guinea-pig and rabbit. In other words, aside from actual gas formation, the essential lesions arising in *Bacillus welchii* infection in animals are reproducible with this toxic fluid.

The toxic substances are thermolabile. They have been distinguished into a hemolysin which destroys the red corpuscles and another poison not acting on the blood directly, but nevertheless lethal in effects.

If rabbits and other animals are immunized with the toxic filtrate, (a) active immunity is produced, and (b) an effective antitoxic serum is obtained. With the latter, infection with the bacilli and intoxication with the poison are preventable. The reaction between the immune serum (antitoxin) and toxin conform to the law of multiple proportion.

Our experiments lead us to place the pathogenic members of the *Bacillus welchii* group in the class of toxin-producing bacteria, and to ascribe to them invasive and poisonous properties of their own which are directly responsible for many of the severities observed in connection with the wound infections of the war. They also indicate that by suitable methods of preparation a protective and curative immune serum may be produced.

A detailed account of the experiments on which these statements are based will appear in a forthcoming number of the *Journal of Experimental Medicine*.

* From the Laboratories of The Rockefeller Institute for Medical Research.

Results of Tuberculosis Treatment at Home.—A report of the Association for Improving the Condition of the Poor of New York on the Home Hospital of the association has recently been issued covering a period of four years. The feature which this report particularly emphasizes is that by their plan many of the patients have been enabled to return to their work. The hospital has found that the care of children in homes where one or both of the parents are tuberculous constitutes one of its greatest problems. They find that nearly one third of the children in such families are afflicted with tuberculosis, while many more than one third are delicate or underweight. Of 140 adult patients who have been treated in the hospital for more than three months and who followed advice, only ten died and seventeen were reported as unimproved. In sixty cases the disease was definitely arrested, thirteen were reported improved, twenty-five as apparently arrested, and fifteen as quiescent.