to be unsatisfactory. To be accurate and therefore successful, a nerve anastomosis must always be practised at the periphery, and not close to the origin of nerves from the cord; this has been fully proved by the work of Stoffel and Spitzzy. Therefore in the rare cases of birth palsy which show little or no recovery after correct treatment prolonged over a sufficient period, the operative methods which are used in the residual paralysis of poliomyelitis are indicated, tendon transplantations or arthrodesis according as to the exact requirements. Recovery is the rule in birth palsy, even if it is long delayed, and therefore a patient trial must be given to splint treatment and massage, before any hasty conclusion is arrived at. It is a striking fact that flail limbs following obstetrical palsy are practically unknown in adults.

II. Internal Rotation Deformity at the Shoulder.

Cases neglected for several months usually present the above feature. The position of the head of the humerus should be carefully ascertained, and if no subluxation be present an anaesthetic must be given and energetic stretching of the contracted capsule carried out, especially in the direction of external rotation and abduction, the scapula being firmly fixed during these manipulations. The limb is then placed in the same position as is used in the first stage, either in a splint or better in plaster for a few weeks, and afterwards on a T splint. The usual massage, manipulations, and exercises then follow.

If the capsule cannot be stretched fully by manipulations an open operation is necessary in which the contracted parts are divided.

In children over 2 years of age with the internal rotation deformity, Lange, Vulpius, and others recommend the performance of an osteotomy of the humerus with rotation out of the lower fragment. In the first place, this is dealing with a contracture of soft parts by a bone operation; and in the second place, it is very likely that an unrecognized subluxation of the joint is present, the direct operative treatment of which gives better functional results than osteotomy of the humerus.

III. Posterior Subluxation of the Shoulder-joint.

One may be confronted with this sequela in an infant, an older child, or in an untreated adult. It may be possible in the early stages of subluxation to accomplish reduction without an anaesthetic, but generally the deformity is so fixed as to demand considerable force. Whitman has successfully reduced a number of such cases by manipulations under anaesthesia; in some instances to obtain full reduction repeated efforts were required. The shortening of the capsule is often so great that manual force, unless approaching a dangerous degree, is insufficient.

Fairbank has found it necessary to perform an arthrotomy to effect reduction in most of his cases, even at an early age. Over the age of two years an open operation will

Fig. 2.—Position of limb in plaster after reduction of subluxation by an open operation.

always be indicated. The joint is best approached by the anterior route and the anterior capsule with the subscapularis tendon insertion freely divided. The acromion

may appear as an obstacle to reduction and require partial removal. Turner Thomas recommends its removal as a routine. After reduction and closure of the wound, a plaster-of-Paris case is applied, fixing the limb in full external rotation with the elbow well back; the original position devised by Whitman was to keep the arm adducted to the side, but the functional results are better if the typical obstetrical palsy position be employed. (Fig. 2.)

After three months' fixation, massage and movements are necessary if full mobility is to be attained. The functional result indeed depends very largely

on efficient after-treatment. In a long-standing subluxation the distorted head and glenoid are factors which modify considerably the after-results of a successful reduction. In this connexion subluxation of the shoulder resembles congenital dislocation of the hip-joint.

Fig. 3.—Result of open operation for reduction of subluxation. Note the range of external rotation possible, and compare with Fig. 1.

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DECORTICATION FOR TRAUMATIC EMPYEMA WITH COMPLETE COLLAPSE OF LUNG.

BY

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In the present war it seems that cases which survive wounds of the thorax rarely develop empyema, and traumatic empyema does not now claim the attention devoted to it by the writers on military surgery in the past. The case to be described is further noteworthy in that the empyema developed without obvious signs, the wound healing by first intention; nevertheless, in the course of three weeks from the injury the lung had become so bound down by inflammatory fibrous tissue that nothing but the modified Delorme's operation of decortication could have availed the patient.

A private, wounded on November 4th, was admitted to the 4th London General Hospital on November 27th, 1914, where I had the advantage of the assistance of Lieutenant Comyn as house-surgeon and Lieutenant Davis as anaesthetist. On admission, the man was found to be pale, weak, short of breath, and had lost flesh; the temperature was 102° F., the pulse 108, and the respirations 32. He had been wounded by shrapnel, which had penetrated the thorax under the right axilla at the level of the fourth rib. The external wound had practically healed, a fragment had lodged in the fourth rib, and another fragment in the lower part of the pleural cavity. There was a narrow zone of dullness to percussion above the level of the liver, but the impairment of resonance did not extend as high as the angle of the scapula. Except for this sign, auscultation and percussion seemed normal in character. From the dull zone Lieutenant Comyn drew off pus mixed with blood.

On November 30th (twenty-six days after the injury) I removed a portion of the eighth rib, and found the whole pleural cavity filled with a loculated mass composed of blood clot, cheesy fibrin, and purulent fluid mixed with foul gas. It was only after considerable sponging and scrubbing that the fibrinous masses could be detached and removed, but when this was completed there was no sign of any expansion of the lung, which remained in a state of complete collapse. As a result of this operation the patient's temperature fell to normal, the respirations to 26, and the pulse to about 100. Ten days later, on December 9th, as there was still no sign of any re-expansion of the lung, I enlarged the opening by removing portions of the seventh and ninth ribs, so as to be able to insert a part of the hand. The lung was absolutely bound down, being covered by a tough

fibrous membrane more than a quarter of an inch thick, so that it was quite difficult to penetrate it and commence its separation from the lung. The separation once started, however, its tough layers of newly-forming fibrous tissues were peeled off and torn away until the lung was freed. By the end of the operation the lung had so far expanded as to fill two-thirds of the cavity. A complete re-expansion of the lung followed in the subsequent days, the patient aiding in this by blowing bubbles. On February 13th, 1915 (two months after the operation), the wound had definitely healed and the patient had regained flesh and strength. When he stood upright with shoulders square there was no deformity to be seen from the front; from behind the spine was seen to be held quite straight, the only abnormality being a retracted scar below the right scapular angle. The man had already put on flesh, and was feeling well enough, after a short convalescence outside the hospital, to return to duty.

It is now recognized that the inflammatory fibrous tissue which covers the collapsed lung in empyema is formed in layers parallel to the surface of the lung from which in recent cases it is separable, so long as they are not tuberculous. Indeed the layer of this false membrane next the lung is vascular, containing newly formed blood vessels, and is loose in texture, as compared with the tougher outer layers. This inflammatory tissue forms a capsule within which the lung is confined in a state of pure atelectasis, but is capable of re-expansion when this capsule has been shelled off.

In this respect there is a marked contrast to the state of the parietal pleura in empyema. The parietal pleura is not only thickened and indurated, but the inflammatory induration is continued outwards in the subpleural connective tissue so that the parietal pleura becomes fused inseparably with the periosteum of the ribs and of the intercostal muscles. Hence in the operation of Estlander and Schede for the reduction of the cavity of an empyema the parietal pleura and intercostal tissues have to be removed with the ribs *en masse*. This operation leaves the compressed lung permanently inactive and useless, induces a deformity of the chest, and in young people a curvature of the spine supervenes with only one lung active. We are indebted for the discovery that the shelling out of the compressed lung from its inflammatory capsule is possible in recent non-tuberculous cases to Delorme, who described his operation of decortication of the lung in 1893. His method included the turning upwards of a large parietal flap so as freely to expose the capsule covering the compressed lung. This operation has been followed in a series of cases by a mortality from the operation of 15 per cent., which is much the same as the mortality after Estlander's operation. But Delorme's operation in its full extent is only needed for old-standing cases of empyema, although it has been reported that an operation combining removal of part of the chest wall with removal of the capsule compressing the lung was followed by re-expansion of the lung four years after the onset of the empyema.

For recent cases of empyema the essential thing is to sponge the cavity free from fibrin and pus, and then, by the finger, aided by sponges on holders, to seize portions of the capsule with forceps in order to free the lung. This can safely be done if the patient is given nitrous oxide gas with oxygen or air; as the lung is being freed a little ether will induce cough with which the lung will expand. The difficulty in children may be the occurrence of bronchopneumonia with the empyema. Then, after the pleural cavity has been cleared, the lung may be found free, but it cannot expand owing to consolidation. If the base of the lung is then drawn into the wound and fixed there by suture with a tube beside it leading into the cavity healing will soon occur.

In confirmation of the foregoing statements I may quote two cases of pneumococcal empyema recently in the Westminster Hospital.

A male, aged 32, was admitted with a left-sided empyema which had existed for about four months. At the first operation the pleural cavity was cleared of fibrin; a week later, the lung having shown no signs of re-expansion, it was freed from its capsule and fixed by a suture in the wound with a tube beside it. The patient was admitted on June 24th, 1914; he was shown to some American visitors on July 28th, with the lung fully expanded, and he was discharged on August 6th, soundly healed.

A female, aged 7, had right-sided bronchopneumonia and empyema of about a week's duration. After clearing out from the pleural cavity all pus and fibrin, the consolidated lung could be moved freely, showing no fibrinous covering, but it did

not expand with cough. The lower lobe of the solid lung was drawn forward and fixed by suture in the wound and a tube beside it into the pleural cavity. The child was admitted on February 2nd, 1915, and was soundly healed on March 15th following.

INSECTS AND WAR:

XIV.—THE MOSQUITO (*Anopheles maculipennis*).

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(Continued from p. 590.)

"Amongst aquatic larvae, the most beautiful and delicate are those of numerous species of gnat."—Goring and Pritchard's *Micrographia*, 1837.

THE LARVA.

In the young larva of *Anopheles* the head is broader and deeper than the thorax, but in the older larvae the segments that succeed the head have at least twice its diameter. It is a characteristic of true flies, or Diptera, that the thorax should not exhibit that separation into three divisions which is so usual in the less specialized insects, such as the cockroach, and this is peculiarly true of the larva of the mosquito—at any rate, so far as its external structure goes. The abdomen of the larva consists of nine free segments; the third, fourth, fifth, sixth, and seventh of these bear palmate hairs, something like a hand with fourteen fingers spread out. These hairs adhere to the under layer of the surface film of the water, and help to maintain the animal in a horizontal position just below that film. When the larva relaxes its hold and sinks into the water, it not unfrequently carries with it air bubbles enclosed by these fourteen "fingers."

The eighth abdominal segment bears the stigmata or the openings of the respiratory apparatus, and the ninth segment has abandoned the flattened and square cross-section of its predecessors, and is cylindrical and tapering. The posterior end of the body is cut off sharply. Round the posterior opening of the alimentary canal are four white, soft papillae, which are well supplied with tracheae and are capable of contracting and expanding. Above these are four very prominent hairs, two median and two lateral, and ventrally to the ninth abdominal segment is a fan-shaped arrangement of hairs springing from two pieces of very complicated structures. These hairs seem to act to some extent as a rudder, and they probably serve as an accessory organ of locomotion. Possibly they have also a sensory or tactile function, and act, as so many posterior filaments do in insects, as antennae "from behind."

We have referred above to the respiratory openings, and, indeed, these are the key to the whole situation. Close these openings, as they can be closed by floating petrol or other oil on the surface of the water, and the trick is done. The larvae and the pupae can no further breathe, and there is no imago. In *Culex* (the gnat) these respiratory orifices are borne on a long tube directing dorsally—a tube which is larger and longer than a segment of the body, and whose presence gives the larva the appearance of a Y with slightly unequal limbs. These breathing-openings are of the greatest complexity, but the outstanding fact is that these stigmata pierce through the watery film and put the respiratory system of the larva into communication with the atmosphere of the whole globe. If anything frightens the larva, certain side pieces and flaps fold suddenly backwards and over the stigmata, the connexion through the surface film is broken, and the little larva, like a German submarine when it sights an English battleship, darts below, frequently carrying with it the drop of air attached to the rim of the respiratory recesses which surrounds the openings of the two stigmata.

Not unfrequently the larva ceases to lie parallel with the surface of the water, its palmate hairs are put out of action, and then its body hangs down into the water, but it still maintains its respiratory connexion with the outer air through these breathing pores. From time to time the hairs mentioned above are brushed over by the mouth organs and cleaned of any debris.

The larvae when they leave the surface film sink by their own weight, but they not unfrequently swim actively