the face due to the local trauma was subsiding, and the gross neck retraction present in the later stages was out of proportion to the severity of the meningitis, and was becoming worse, although the cell content of the cerebrospinal fluid was diminishing and the culture had become sterile.

As to the origin of the tetanus, it seems that spores must have been present in the wood splinter which had come off the control panel. Instances of tetanus arising from dirt carried in by splinters are well known, but in this case a careful check of the accident showed that at no time was there any ground contamination, and the wood when removed at operation was quite free from dirt. In this connexion it is interesting to note that von Eiselsberg (1888) reported a case of tetanus arising from a wood splinter, and that two years later virulent organisms could still be grown from it. Pulvertaft (1937) investigated a fatal case of tetanus developing after hysterectomy, and drew attention to the frequency of virulent tetanus spores in cellulose wadding manufactured from wood and used for dressings. From his experiments, however, he concluded that the contamination occurred after the cellulose had been made, and was presumably due to the physical characteristics of the material. Fildes (1929) in a comprehensive account of the tetanus bacillus mentions unsterilized felt used in orthopaedic work and the wads from blank cartridges as other sources of infection. It is clear, therefore, that the spores can live in wood and wood fibre for a long time and constitute a potential danger.

Immunization.—From all recent reports the value of active immunization combined with prophylactic A.T.S. at the time of wounding seems established. Bensted (1941) recorded not a single case in the immunized subject at the time of the Dunkirk evacuation, although 8 cases occurred among unprotected personnel. In the Middle East, Boyd and MacLennan's 18 cases contained 5 which had had previous immunization, but none of these received prophylactic A.T.S. These authors pointed out that the protection afforded by active immunization had its limitations. There were two special groups of cases to be considered: the odd cases that did not seem to respond to the routine two-dose method formerly employed in the Army; and the cases of overwhelming infection with excessive toxin production usually attributable to inadequate surgical treatment of the wound. They concluded that a third dose of toxoid should be given, and a routine dose of antitoxin after wounding, and they stressed the importance of adequate surgical treatment of the wound. Radley Smith's cases afford interesting collateral evidence. Both Service and civilian casualties were treated in this sector, and of the 7 cases reported six were civilians, and the one Service casualty had not received active immunization. All the cases, however, had received the customary 3,000 units of A.T.S. after injury, and Radley Smith concluded that one dose of A.T.S. did not prevent tetanus and that, following the E.M.S. recommendation, the dose should be repeated at weekly intervals for three weeks. McGill (1943), in reporting the case mentioned by Boyd and MacLennan illustrating the lack of response to active immunization, advised the giving of A.T.S. after wounding, to cover such a contingency. Norman's (1943) case affords further evidence of the necessity for regular maintenance doses of toxoid after the routine two doses at the beginning.

Conclusion

In the case here reported there is a very likely explanation for the development of tetanus. The type of wound was ideally suited for the growth of the organism, and its nature and situation prevented a proper surgical cleansing of the wound. As shown at post-mortem examination, some necrotic material and blood-clot were present along the track. The 3,000 units of A.T.S. given were presumably inadequate to combat the toxin production, and no maintenance dose of toxoid had been received since the initial immunization in 1940.

Considering all these cases together, the evidence strongly favours the present Army recommendation that active immunization be produced by two initial doses at a six-weekly interval, followed by yearly maintenance doses; and that, after wounding, 3,000 units of A.T.S. be given. Proper surgical treatment of wounds, whenever possible, is an essential factor in the prevention of tetanus.

I wish to thank Dr. Dorothy S. Russell for the necropsy report, and Lieut.-Col. C. W. Greenway, R.A.M.C., for permission to publish this case.

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Medical Memoranda

Locked Twins

As *Eden and Holland* gives a history of locked twins as occurring in 1 in 90,000 deliveries, the following case seems worth recording.

CASE RECORD

The patient was a primipara aged 36. Twins had been diagnosed, and confirmed by radiograph; the first was lying as a breech, the second as a vertex. The patient was admitted to the maternity home on the afternoon of Feb. 22, 1944, with a history of pains since midday. These were good, and she was fully dilated at 8 p.m. Half an hour later a strong pain pushed the breech out as far as the umbilicus, and must at the same time have driven the head of the second baby through the brim and on to the neck of the breech baby. During the next half-hour pains were few and poor, then started to improve. Even with the poor pains the nursing staff had expected some advance, as the babies were 3 to 6 weeks premature and small (subsequent weighing showed that they were both 3 lb.); and as this did not occur they sent for medical aid.

On arrival I found that the breech baby had advanced as far as the axillae, but was dead. Per abdomen, one foetal head was found in the left iliac fossa, and the other could be felt to be engaged from the right. Manipulation of either head moved the breech. To obtain maximum relaxation for further examination, a general anaesthetic was given.

The diagnosis of locked twins was confirmed per vaginam. The arms of the breech were easily delivered; the head of the second baby and the neck of the first were then found filling the upper part of the pelvic cavity, and in spite of the small size of the babies normal delivery would have been impossible. Per vaginam, the head was levered out of the pelvic brim while expert help pulled from the abdomen, manipulating the head into the right iliac fossa. The first twin was then easily delivered. The membranes of the second foetus were ruptured and the patient was allowed to come out of the anaesthetic. After a few good pains a living male child was born. The subsequent course of the delivery was normal; the twins were found to have been uniovular.

MARY LOVE, M.B., Ch.B., D.P.H.,
Assistant M.O.H., Borough of Bexley.

An Unusual Dislocation of the Foot

The following is an account of a simple tarso-metatarsal dislocation of the foot. According to Wilson and Cochrane (1928), pure dislocation at this joint without a fracture is very rare. The cause is most commonly direct violence from a run-over accident. It can be caused also by the fall of a heavy object or by forcible flexion of the forefoot. The dislocation may involve all the metatarsal bones, and may be anterior or divergent—e.g., lateral bones laterally, and vice versa. Böhrer (1935), describing the injury, states that the dislocations of this joint are of many varieties. All the metatarsal bones may be dislocated inwards, upwards, outwards, or downwards—upwards and downwards being the most common. Single metatarsals—usually the first and fifth—may be displaced separately. Dislocation of all the metatarsals plus the first cuneiform has also been described in the older literature.

CASE REPORT

The actual method of trauma in this case is interesting. The patient, a Royal Marine aged 38, was assisting to push a four-wheeled gun-trailer weighing 10 tons, and was standing on the right side, facing forwards, between the two wheels. The trailer was being pushed up a slight gradient, when it began to slip backwards, and the front wheel rolled slowly over his left foot, from the medial to the lateral side. The wheels had rubber tyres. He was seen within half an hour of the accident; the foot was already somewhat swollen, and a superficial wound, through the skin only, was present on the antero-medial part, as though the skin had been split open. A radiograph showed, not the multiple fractures of the metatarsal shafts that were expected, but the picture seen in the accompanying figure. The cuboid and cuneiforms appear to have been squashed together, and the base of the second metatarsal forced out of its mortise. The metatarsals have been forced laterally, the fifth completely dislocated, the second, third, and fourth being subluxated laterally to a lesser degree. The relation between the base of the first metatarsal and the first cuneiform is certainly abnormal, and it appears as though the metatarsal had been displaced below the

cuneiform. The cuneiform clinically was very prominent on the medial side of the foot. The wound was cleaned under general anaesthesia, and sutured. The dislocation was reduced, with a click, by pressure medially on the base of the fifth metatarsal, and laterally on the first cuneiform, which was unduly prominent. A short unpadded leg plaster was applied, and the longitudinal and trans-

verse arches were well moulded. A check radiograph was taken, which showed that the dislocation had been reduced and the bones were back in their normal alignment. After 12 days this plaster was removed, when the swelling, which had been considerable, was seen to have subsided. The wound was healed, and the shape of the foot appeared more or less normal. The stitches were removed and the leg replastered. Four weeks after the accident a walking-iron was applied, and weight-bearing allowed for the first time. At eight weeks the plaster was removed altogether and the patient did a week's active exercises in bed. He was then allowed up. It is now about three months since the accident, and he is walking quite well, but with a slight limp; he gets pain across the forefoot after much walking and at the end of the day. On examination there is full and painless movement at the ankle-joint, and inversion and eversion are practically normal. There is some flattening of the longitudinal arch; but this was present beforehand, and is also present in the other foot.

COMMENT

This is apparently a rare dislocation, probably explained in this case by the unusually gradual application of the weight to the foot, instead of the more sudden application when the vehicle is under its own power and travelling faster. This would most likely cause a fracture of the metatarsal shafts or, more rarely, a fracture-dislocation at this point, but very rarely a simple dislocation. With regard to the treatment, reduction was easy; but in greater degrees of dislocation, according to Böhler, traction has to be applied, and often continued so as to keep the bones in position. This was quite unnecessary in the present case. Wilson and Cochrane advised prolonged immobilization in plaster. This is obviously necessary, as the ligaments will have been badly damaged. Even then the final prognosis may be a permanently painful foot with a flat arch, especially in a man of this patient's age, although Böhler states that if perfect reduction of the bone is obtained full usefulness of the foot will be recovered.

I would like to thank Surg. Cmdr. W. H. Roberts, R.N.V.R., for his help and permission to publish this case.

E. W. DORRELL, F.R.C.S.Ed.,
Surgeon Lieutenant, R.N.V.R.

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Reviews

GENERAL AND SPECIAL PATHOLOGY

A Textbook of Pathology: General and Special. By J. Martin Beattie, M.D., D.Sc., and W. E. Carnegie Dickson, M.D., F.R.C.P.Ed. With the collaboration of A. Murray Drennan, M.D., F.R.C.P.Ed., and John Oliver, M.B., B.S. Fourth edition. (Pp. 1,368; illustrated. 84s.) London: Heinemann. 1943.

This edition, the preparation of which was begun more than seven years ago, has been in page proof for over three years. Its publication in the face of many difficulties is a great achievement, especially on the part of Dr. Carnegie Dickson, the principal author.

The publication of the first edition of "Beattie and Dickson" in two volumes 34 years ago was a successful pioneer effort to provide students in this country with a sound, well-illustrated textbook. It upheld in no uncertain way the traditions of the Edinburgh school. It was widely read, and deservedly popular with the undergraduate student. During the unfortunately long gap of 18 years between publication of the third and fourth editions the book disappeared from the booksellers' shelves. It is now a pleasing duty to welcome it back again. Its reincarnation, however, is of giant proportions; there is a truly astonishing quantity of information packed between its covers, and some subjects are treated with as much regard to detail as in the average monograph, or even more. It would be short-sighted, unwise, and unkind to recommend this edition to the average student reading for a qualifying degree in medicine. It has now become a reference book, and in this sense its success is assured. To the serious postgraduate student of pathology it will prove of immense service. He will find many parts of the book improved out of all recognition. There are new and well-balanced chapters embodying modern views on tumour formation, viral infection, vitamin deficiency, and the endocrine system. The section on the nervous system is ambitious in scope and brilliant in execution; if published separately it would make a perfectly satisfactory textbook of neuropathology for the general reader. It may be that more opportunities should have been taken to incorporate recent work on disordered function and biochemistry where this is of pathological interest. This would conform with the highly commendable modern tendency to narrow the gap between physiology and structural pathology.

THE HUMAN FOOT

Structure and Function as seen in the Foot. By Frederic Wood Jones, D.Sc., F.R.S., F.R.C.S. (Pp. 330; illustrated. 25s.) London: Baillière, Tindall and Cox. 1944.

Some years ago Prof. Wood Jones wrote a book entitled *Principles of Anatomy as seen in the Hand*, in which the detailed anatomy of the hand was used in a novel way as a text for generalizations on anatomical principles. His latest book, *Structure and Function as seen in the Foot*, follows the same lines and is equally fascinating to read. Here we find no dull academic anatomy which, for instance, finishes with a muscle when it has described its origin and insertion with its nerve supply and mechanical action, but a living account of a muscle as it develops and functions in the body. As an example of the interesting manner of presentation which pervades the book may be mentioned the paragraphs on the arterial supply to the foot, showing how this varies from animal to animal dependent upon such factors as the torsion of the limbs and their usual functional posture.

The chaos into which modern anatomical terminology has fallen is especially marked in the case of the foot, so that the author has found it necessary to include a chapter upon the subject, in which he suggests the use of the terms "pre-axial" and "post-axial," in place of the more usual "medial" and "lateral," to avoid ambiguity.

There is a particularly good discussion of phylogeny and ontogeny in their relationship to the origin of the human characteristics of the foot. The author, who is opposed to what he terms the "gorilloid" theory, which is advanced in the books of Morton and Lake, quotes from a letter by Pocock in the *B.M.J.* of April 4, 1942, denying the existence of a "highland" type of gorilla, a drawing of whose foot had been