evidence in favour of the notification of measles both in a county area and in an industrial town.

It has been strongly urged by Campbell Munro that one of the great advantages of notification is the early information it affords on which to base school closure. He has adduced numerous instances from his experience in Renfrewshire, Port Glasgow, and Jarrow-on-Tyne, of the efficacy of notification and school closure, both in his annual reports and elsewhere. Körösy, Kingsford, and others have discussed the influence of the normal holiday closure, the former regarding the effect as important, Kingsford rather inclining to scepticism. According to Gilmour, the value of school closure depends largely on the better social class of the scholars. The statistical investigations of Brownlee on the inherent tendency of epidemics to end themselves, and on rhythmic variability in the power of the virus to infect, require to be considered in drawing conclusions from all such experiments on the controlling of epidemics. He emphasizes the importance of these two factors, the former having been indicated originally by Farr and discussed, along with influences of season and susceptible population, by Ransome.

Considered over a number of years effectual school closure should reduce the case-rate; delay the age of attack, and so reduce the case-mortality; and diminish the volume of biennial epidemics. As a matter of fact, comparing the decennia 1893-1902 and 1903-1912 in Renfrewshire, one finds a fall in the mean annual case-rate of only 7.6 per cent., whereas the case-mortality has dropped by 32.0 per cent. That the lower case-mortality is not due to protection of young children from infection is shown by the fact that the mean annual case-rate under 3 years of age has fallen only 5.6 per cent., while the case-mortality at these ages has declined by 30.3 per cent. The mean age of all cases under 20 years of age has actually fallen from 5.56 years to 5.41 years. No doubt part of the disproportion is the result of imperfect notification in the early years. Again, if the years considered are periods of twelve months from September to August, the biennial fluctuation of cases is more pronounced in the six years 1907-1912 than ever previously. It would appear that some factor has come into play which has tended to reduce the fatality more than the incidence of the disease. Whether it has been the educative campaign associated with notification, or improved social conditions, or increasing immunity by selection, or a natural variation of the disease, it is not possible to decide in the absence of mortality statistics elsewhere.

In order to delay the age of attack Sykes made a strong plea for raising the age of school entrance. This might save a certain number of children, but it is difficult to see how it would materially affect the children at ages when measles is most fatal—that is, under 3 years.

Hospital treatment has been advocated in many quarters, notably in Glasgow and Kensington, and by Thomson. The difficulty of treating in hospital any serious proportion of cases of a disease like measles, which flares out in epidemics, has been generally recognized. In Glasgow hospital treatment has been adopted on a large scale for many years. And yet the curves of death-rates from 1893 to 1912 in Glasgow and in Lanarkshire, which encircles the city and has never offered hospital treatment to any extent, are remarkably similar in their trend. The influence of hospital treatment on chronic sequelae can hardly be measured, but it is probably important. On the other hand, the risk of infectious bronchopneumonia is increased.

Home visitation by trained nurses is now receiving official countenance. The educative effect and the prevention of sequelae may be valuable. It cannot have much influence on the spread of infection, and probably little upon the immediate fatality of the disease. Indeed, it is highly improbable that any measure short of the production of artificial immunity will have much influence on measles. The work of Anderson and Goldberger holds out hope that the discovery of the organism may yet lead to its administration in some attenuated form. Meanwhile, any advance in the administrative measures for dealing with measles is a move in the right direction, and must be based on accurate information, such as compulsory notification affords.

BIBLIOGRAPHY.

Anderson and Goldberger: Experimental Measles in the Monkey; *Public Health Reports*, U.S. Public Health Service, vol. xxvi, No. 23, p. 847; and No. 24, p. 887.

Brownlee: Periodicity in Infectious Disease; *Proc. Roy. Philosoph. Soc. of Glasgow*, March 25th, 1914. Investigations into the Periodicity of Infectious Disease by the Application of a Method hitherto only used in Physics; *Public Health*, March, 1915, p. 125. Certain Considerations on the Causation and Course of Epidemics; *Proc. Roy. Soc. Med.*, June, 1909. Historical Note on Farr's Theory of the Epidemic; *BRITISH MEDICAL JOURNAL*, August 14th, 1915, p. 250.

Campbell Munro: The Utility or otherwise of School Closure and of the Compulsory Notification of Measles in the Control of the Spread of Infectious Disease amongst School Children; *Transactions of the Incorporated Sanitary Association of Scotland*, 1905, p. 212; and 1906, p. 67. Measles: an Epidemiological Study; *Transactions of the Epidemiological Society of London*, N.S., vol. x, p. 94.

Gilmour: Measles and School Closure; *Public Health*, September, 1912, p. 448.

Kingsford: The Seasonal Incidence of certain Infectious Diseases amongst School Children, with Special Reference to the Effects of School Holidays; *Public Health*, June, 1912, p. 349.

Körösy: Letter to Professor W. R. Smith, *Harben Lectures*, 1899, Appendix, p. 103.

Ransome: On the Form of the Epidemic Wave, and some of its probable Causes; *Transactions of the Epidemiological Society of London*, N.S., vol. i, p. 96.

Sykes: Measles and Elementary Schools; *Public Health*, September, 1911, p. 467.

Thomson: Report upon Measles in England and Wales, and as to Measures that may be, and which have been adopted by Sanitary Authorities with a view to obtaining Control over the Disease; Annual Report of the Medical Officer of the Local Government Board, 1894-5, Appendix A, No. 10, p. 135.

Wilson: Measles: Its Prevalence and Mortality in Aberdeen; *Public Health*, November, 1905.

Annual Reports of Medical Officers of Health: Aberdeen, 1903, 1904, 1910; Edinburgh, 1902; Glasgow, 1908, 1910; Kensington, 1910; Port Glasgow, 1898-1910; Renfrewshire, 1891-1912.

UNIVERSAL SUSPENSION APPARATUS FOR ARM AND LEG.

By M. SINCLAIR, M.B., CH.B. EDIN.,
CAPTAIN R.A.M.C.

ARM.

This is composed of a movable wooden top and a fixed wooden perpendicular (Figs. 1 and 2).

The lower perpendicular pole, L.P. (2 in. by 2½ in.), 5 ft. in length, is fastened to the top of the bed by means of a flat bit of timber, F (4 in. by 1 in.) 2 ft. 4 in. long, bolted with two bolts to the pole, with bed head rail between them, on the extreme right or left of bed.

Fig. 1 (from a photograph).—Showing arm suspension applied.

This pole, L.P., has two sets of hinges, anterior and posterior, to enable it to be used for right or left arm— anterior for left, and posterior for right. These hinges are set at 15 in. apart, the upper hinge being 4 in. from the top of pole L.P. They also allow the top to swing 180 degrees.

The hinges are composed of two parts (Fig. 3), thus allowing the top to be easily moved when the suspension is required for right or left arm, as the case may be.

By this method two male parts are fixed to the upper perpendicular, U.P., and four female parts to the lower perpendicular, L.P. In alternate suspensions male and female parts are reversed.

The top has a perpendicular part, U.P., and carries two

fixed horizontals, L H and U H, and a movable arm, M A, which is hinged to the upper perpendicular, U P.

Fig. 2 (from a photograph).—Arm suspension, showing details.

This top can be completely removed from the pole by pushing the top upwards and thus separating the male from the female hinges. This renders it applicable to right or left arm. The upper perpendicular, U P, is made of the same material as the lower fixed perpendicular, L P (namely, 2½ in. by 2 in.), and is 3 ft. 2 in. in length. The two fixed horizontals L H and U H are set at right angles one above the other. They are 2 ft. 8 in. in length, the material is 3 in. by 1 in. They extend 2 ft. in one direction and 8 in. in the other.

The upper, U H, rests on the horizontal L H, which in turn rests on a block of wood X, all three being screwed to the upper perpendicular, U P. From the end of the shorter pieces of these two horizontals two stays, S S (2 in. by 1 in.), are fixed to the top of the upper perpendicular to counteract the weight that has to be applied to the longer ends. No dovetailing is done so as to avoid any weakening of the superstructure.

The ends of the longer pieces of the two horizontals are joined by a piece of wood, T S (3 in. by 1 in.), and, in order to keep this level, it is let in at the end which is in contact with the higher of the two horizontals, and rests on the top of the other horizontal. At each end of this transverse stay T S is a flat iron upright (4½ in. by 1 in. by ½ in.) projecting upwards to act as a check, K, to the movable arm, and at the same time give more strength to these joints.

The movable arm, M A (3 ft. by 1 in.), is hinged to the upper perpendicular, and the upper edge 4 in. from the top of U P moves through an angle of 90 degrees. It is for the attachment of a block when the arm is extended, as in an arm Thomas splint. When the arm is extended (as in Fig. 1) in an arm Thomas splint, there are three eyes of wire fixed to the splint, two at the ring (one on each side of the iron bars of the splint), and the third at the middle of the transverse bar at the hand end.

Three cords, C 1, 2, 3, are attached to these eyes—watch-chain hooks are very convenient—and each passes through its respective two blocks, and a suitable weight is attached to the other end.

For the right arm the cord C 1 from the hand end passes through block B 4 which is attached to the end of the M A, then passes to block B 1, which is fixed to horizontal L H, and a weight (sandbag) of about 2 lb. is attached at the other end.

The cord C 2 is attached to the outer eye at the ring end of the splint, passes through block B 5, which is fixed at the junction of T S and U H, then through block B 2 on L H, and carries a weight of about 4 lb.

Cord C 3 passes from the inner eye of the splint through the other block, B 6, fixed at the junction of T S and U H, thence to block B 3 on L H, and carries a weight of about 6 lb.

The blocks B 1, 2, 3, should be so placed on L H as to allow free play of the weights without touching.

In the accompanying drawings from photographs the irrigator rubber tube and two cords supporting the tubing which is leading to a wound that is being treated by continuous irrigation, are not lettered, to avoid confusion.

A gutter of perforated zinc is fixed to the sides of the Thomas splint, and holes are burned in the zinc opposite any drainage tubes. To prevent tissues herniating through these exits, the holes should not be too large. The whole is sterilized by flaming, and the arm with wounds is laid directly on this bed of zinc.

Fig. 4.—(i) In (i) three cords with suitable weights are arranged as follows: Fix a block with about 4 in. of cord to a hook at (a). Fix cords at (b) (c) (d). Thread cord (b) through block (a), and suspend (b) (c) (d) to three blocks about 2 in. apart at the extremity of U H. Arrange blocks, cords, and weights so that they do not foul. Approximate weights: (b) 5 lb., (c) 4 lb., (d) 3 lb. (ii) Approximate weights: (a) and (c) 3 lb., (b) and (d) 2 lb.

This form of suspension of the splint conforms to all permissible movements of the limb, and is a great comfort to the patient, who is free to move at his will, or to sit up by his bedside if he wishes. Wounds so treated, drained freely, are readily dressed, and are open to inspection at all times.

By redistribution of the weights and blocks, this suspension can be adapted to a rectangular wire splint or a square wire frame, both of which are filled in with perforated zinc, for use with the flexed elbow.

LEG.

The suspension consists of a fixed frame carrying a travelling cradle, from which the limb in its splint is suspended by a system of weights and pulleys.

Fig. 5.—Diagram of suspension.

Frame.—The material is 3 in. by 2 in. A length of T-section iron rail is screwed to the upper surface of an 8-ft. wooden bar for a distance 5 ft. 6 in. from the foot

Fig. 3.—Hinge.

end. Two such bars are supported at their extremities by 6-ft. uprights placed so that the rails are 3 ft. 3 in. apart and parallel to each other. The uprights are firmly fixed

Fig. 6 (from a photograph).—Leg suspension applied. P Z, Perforated zinc.

to the floor by suitable stays, and the pair at the head end is joined by a transverse bar.

Cradle.—The material is 3 in. by 1 in. (all dimensions are outside measurements). The travelling cradle is rectangular with sides (F1 and F3) 4 ft. in length, carrying two window-sash pulleys, each let in 4 in. from the extremity R1, 2, 3, 4. The ends F2 and 4 are 3 ft. 4 in. in length. This rectangle is divided by a transverse stay, T, at 1 ft. 5 in., and the two smaller rectangles thus formed have diagonal stays, D1 and 2, to prevent racking and give rigidity. On F2 and T iron checks, X2 and 1 (6 in. by 1 in. by $\frac{1}{2}$ in.), project vertically downwards, just clearing the horizontals BH1 and 2. Strong 2-in. screws are fixed half in into the inner sides of BH1 and 2 to engage with these checks. These are best adjusted experimentally. Sixteen round-headed

Fig. 7.—The same, showing patient raising pelvis unaided four days after injury. P Z, Perforated zinc.

2-in. screws are fixed half in into the upper edges of F2, T and F4 in the following way (Fig. 5): On F2 four screws at the 6th and 15th inch from each side. On

T four screws at the 2nd and 11th inch from each side. On F4 eight screws at the 4th, 9th, 14th, 19th, 21st, 26th, 31st, and 36th inch.

There are now sufficient for a right and left leg, and are for the attachment of the single blocks of the Hodgen's splint ($\frac{1}{2}$ in. block is the best size).

In slinging a right fractured femur in a Wallace's splint, blocks are attached to screw S1, 2, 5, 6, 13, 14, 15, 16.

There are four eyes of wire fixed to the splint, two on the ring (one on each side below the bars of the splint), and the other two to the transverse bar carrying the foot-piece.

Four cords—C1, 2, 3, 4—are attached to these eyes; watch-chain hooks are very convenient, and each passes through its respective two blocks, while a suitable weight is attached to the other end.

Cord C1 from outer foot attachment passes through block B1, which is attached to screw S5 on T, then through block B5, which is attached to screw S13, and carries a weight of about 7 lb.

Cord C2, from inner foot attachment, passes through B2, which is attached to screw S6 on T, then through block B6, which is attached to screw S14, and carries a weight of about 7 lb.

Cord C3 from outer ring attachment, passes through block B3, which is attached to screw S1, then through block B7, which is attached to screw S15, and carries a weight of about 14 lb.

Cord C4, from inner ring attachment, passes through block B4, which is attached to screw S2, then through block B8, which is attached to S16, and carries a weight of about 14 lb.

This suspension allows the patient very free movement, is a great comfort to him, and nursing is made comparatively simple. Fig. 7 (from a photograph) shows the patient, who has a fractured femur and ulna, raising his pelvis unaided four days after injury.

AN OPERATION FOR THE OBLITERATION OF THE CAVITY IN THE TIBIA REMAINING AFTER SEQUESTROTOMY.

By WILLIAM GEMMILL, F.R.C.S.,

KILMARNOCK.

The operation described is after the osteoplastic method recommended by M. W. at Schulten.¹ The patient was a man aged 61 whose left leg had been crushed nineteen years previously. At that time he was for four months in hospital; according to his own statement some dead bone came away from the lower part of the leg, and the wound healed. About a year afterwards the upper part of the leg, which had remained swollen, became very painful, was laid open, and part of the bone was removed. The wound produced at this operation had never healed, but the patient for sixteen years pursued his occupation with frequent intervals of incapacity due to the discharge becoming more profuse and foul. During this period he had four operations, which, he said, consisted in "scraping the bone," and one in which an unsuccessful attempt had been made to obliterate the cavity by filling it with wax.

The condition of the limb before operation was as follows: The whole of the shaft of the left tibia was much thickened and rounded, and scars of old sinuses were present over the lower part. The upper third of the shaft presented a cavity with overhanging edges about an inch apart at the outlet. The depth was one inch and a quarter, and the length three inches and three-quarters. The upper limit of the cavity reached to within one inch and a quarter of the knee-joint. The epithelium had grown well down into the cavity, leaving the posterior wall, however, covered with weak exuberant granulation tissue. There was some sero-purulent discharge.

Under a general anaesthetic, the limb having been rendered bloodless by means of a tourniquet, the cavity was thoroughly swabbed with pure carbolic acid. An incision down to the bone was made round the opening of the cavity just outside the margin. The epithelium