7th, 8th, 9th, and 10th the faeces were free of ascaris eggs. On July 16th very large doses of eggs of *Ascaris mystax* 10 days old and of *A. marginata* 7 days old were given to it. These eggs contained active vermiform embryos. On July 17th a second dose of the eggs of *Ascaris marginata* was given from the same culture now 14 days old. On July 22nd, 26th, 27th, and 31st, and on August 4th, 10th, and 16th the faeces were found to be free of ascaris eggs.

These cases of Pigs B, G, and H prove that accidental infection was not common under the conditions of the experiments and therefore greatly enhance the value of the positive experiments with Pigs C, D, and E.

The experiment on Pig H of administering ripe eggs of *A. marginata* and *mystax* was performed to exclude a somewhat remote possibility—namely, that the life-history of *Ascaris lumbricoides* (suilla) was highly extended and that *Ascaris mystax* (or *marginata*) was only a stage in the life-history of *Ascaris lumbricoides*.

Corrections.

1. In the summary of results in the paper published in this JOURNAL on July 1st the following sentence occurs: "Between four and six days after infection they (the larvae) are found in the blood vessels of the lungs, liver, and spleen." I have never found larvae in the spleen. The statement is due to a clerical error in the manuscript.

2. The following sentences also require correction: "On the tenth day they are found only in the air vesicles of the lung and in the bronchi." "On the sixteenth day the host is free from parasites." Further experiments proved that the larvae appeared in the bronchi on the seventh day and that no larvae were found in the respiratory tract later than the eighth day after infection. The inaccuracies were due to the use of repeated infection in the earlier experiments.

Experiments on Infection of Mice with *Ascaris marginata* of the Dog.

Mouse N. July 9th: Given eggs of *A. marginata* six days old, containing embryos. July 12th: Eggs nine days old. July 13th: Eggs ten days old. July 14th: Mouse killed; no larvae in liver or lung.

Mouse P. Died on the first day after infection with eggs of *A. marginata* eleven days old. Larvae present in the liver.

Mouse U. Killed on the first day after infection. Larvae in liver, none in lung.

Mouse V. Killed on the fourth day after infection. One larva found in liver, none in lungs or trachea.

The mouse is therefore the intermediate host of *Ascaris marginata* as well as of *A. lumbricoides*.

VACCINE IN MEDIASTINAL ACTINOMYCOSIS.

BY

W. S. MALCOLM, M.D.,

DUNDEE.

ONE cannot fail to be impressed by the increasing frequency with which one or other of the protean forms of actinomycosis is being recorded. This increased recognition is due not wholly to habitual examination of discharge or tissue, but largely to greater familiarity with the forms the ray fungus may assume in its life cycle.¹ The increase in the number of diagnosed cases gives an ampler field for improving treatment. Mr. Telford's article² on actinomycosis of the parotid, in which treatment by salvarsan met with success, illustrates what is meant, and adds another to the list of cases similarly treated. Certainly we are confronted at times by advanced or inaccessible actinomycosis where iodine locally cannot be employed, where massive dosage by potassium iodide³ has met with limited success, where the disease is beyond the limit of surgical procedure. At such a time the only recourse is to a method by which we rely on the vascularity of the part ensuring the presence of the remedy at the seat of disease by introduction of a substance such as salvarsan, or by use of a vaccine. The employment of vaccine in the treatment of actinomycosis has been so rarely mentioned as to form an excuse for recording even a single case. The patient had actinomycosis at one of its less usual sites. It came to the body surface in the precordial region from the anterior mediastinum. Presumably the infection was air-borne, and inspired directly or indirectly from the mouth after chewing infected straw or grain. The fungus has been recognized at all the stages from the epithelium of the air vesicle through the visceral pleura adherent to its parietal layer or to the pericardium in the areolar tissue subjacent to the chest wall and to the subcutaneous tissue through intercostal spaces. This case presented a boggy swelling in the region stated. A shorter route for infection would have been through the skin, but there was no evidence in its favour. Languor, and pain on

coughing were present before any swelling was observed, and the latter appeared from within outwards. The burden of *post-mortem* evidence and of the clinical history of similar cases favour the pulmonary route. There may be no initial cough, and no sputum⁴ to attract notice in such cases, yet the oldest lesions are pulmonary.⁵ Fortunately, one cannot confirm or refute one's conceptions of this case by *post-mortem* findings.

Though a radical operation involving rib resection had been successfully performed two years before this treatment was initiated, and iodide in maximum doses swallowed month after month and pound after pound, two sinuses continued to discharge, one of which was connected with a nodule on the pericardial surface. Collie's case⁶ attracted attention to the potentialities of a vaccine, although Wynn⁷ first of all, and others^{8, 1} since have employed it.

Treatment was started by weekly subcutaneous injections of 2½ million actino-fragments. The dose was gradually increased up to 10 million. The latter was an overdose. The temperature gave no indication of this. No opsonic indexes were done. The patient's sensations proved a rough and ready index. Overdosage made him feel wretched and caused anorexia, and if one failed to recognize the importance of these symptoms and continued the overdose, a local reaction was set up, the nodule standing out in higher relief from the pericardial surface. This observation was verified, and on reverting to smaller doses the nodule receded, becoming flatter on each occasion. Ultimately 4 or 5 million was found to be an effective dose without bad effects, and this quantity was continued till about fifty doses had been given. The discharge soon lessened, the sinuses healed, the nodule in time could not be made out, and a "fullness" present in the parts disappeared.

Considerably fewer doses might have sufficed, but in view of the serious nature of the illness and the wish of the patient to "make sure of it" they were carried on. If records of other cases treated by vaccine were available they would prove of certain value. When confronted with the duty of applying this treatment one felt the lack of records to be a severe handicap. References to some of the other instances of pericardial involvement by direct spread are given.⁹

REFERENCES.

- ¹ Foulerton, *Lancet*, 1913, i, p. 361.
- ² Telford, *BRITISH MEDICAL JOURNAL*, 1915, vol. ii, p. 534.
- ³ Wild, *Ibid.*, 1910, ii.
- ⁴ Godlee, *Lancet*, 1901, i; Bridge, *Journ. Amer. Med. Assoc.*, 1911, November 4th; Israel, *Actinomykose des Menschen*; Knox, *Lancet*, 1904, ii, 1204.
- ⁵ Martin, *Journ. Path. and Bact.*, 1896, iii, 78; Israel, *Virchow's Archiv.*, 1878, Bd. 74, S. 15.
- ⁶ Collie, *BRITISH MEDICAL JOURNAL*, 1913, May 10.
- ⁷ Wynn, *Ibid.*, 1908, i, 554.
- ⁸ Mousarrat, *Ibid.*, 1909, i; Whittier, American Association of Pathology and Bacteriology, 1909; Harbitz and Grondahl, *Amer. Journ. Med. Sci.*, 1911, September; Kinnicutt and Mixer, *Boston Med. and Surg. Journ.*, 1912, July 18th; Haynes Lovell, *Royal Society of Medicine*, 1913, January 14th.
- ⁹ Weigert, *Virchow's Archiv.*, Bd. 84, S. 303; Rubrah, *Annals of Surgery*, vol. xxx, p. 435; Konigund Israel, *Berl. klin. Woch.*, 1884, No. 23.

POST-MORTEM FINDINGS IN A CASE OF EXOPHTHALMOS OF LONG STANDING ORIGINALLY DUE TO GRAVES'S DISEASE.

By RONALD MACKINNON, M.B., CH.B.,

CAPTAIN R.A.M.C.(S.R.).

THE condition which produces exophthalmos in cases of exophthalmic goitre has never been clearly understood. It seems to me desirable that the following notes on a case in which all the other symptoms of Graves's disease had disappeared, but the exophthalmos remained to a marked degree, should be put on record:

J. B., aged 35 years, was admitted with acute lobar pneumonia (double) and died on the sixth day of the disease. There was nothing unusual about the illness during life or in the condition of the lungs after death. He had very marked exophthalmos of both eyes, together with external squint and cataract of the left eye. The eyeballs were sluggish in movement and the eyelids followed them without lagging. Winking was normal.

History.

Later in 1901, while he was in the Boer war, the graver signs and symptoms of exophthalmic goitre began to show themselves. He returned to England and was treated for three years, but made no progress. In 1904 he attended a clinic at Vienna. There he began to improve, and he continued his treatment till 1906, when all the graver signs and symptoms

had disappeared, except the exophthalmos, which persisted. He then went to Switzerland, where some practitioner assured him that he could cure the exophthalmos (which was very disfiguring) by injections into the eyeball. An injection was performed into the left eye, with the result that the sight of that eye was lost. However, he considered himself practically cured of the disease.

He was accepted for active service, and was able to carry out arduous and responsible duties during the first sixteen months of this campaign.

An examination was made of the eyes and the base of the skull to see if any definite anatomical cause could be found for the exophthalmos.

The body was thin, but not emaciated. The eyes were still prominent. There was no pigmentation of the skin. The fat was of a deep yellow colour.

The thyroid was normal in size, colloid appeared rather deficient. The two chief abnormal features recognized in microscopic sections of the gland were a marked vascularity and an increase of the glandular tissue at the expense of the colloid. The latter change was not so marked as in many typical cases of exophthalmic goitre, since a number of acini with thinned out peripheral cells and a fairly large central mass of colloid persisted. The greater part of the tissue, however, resembled an acinar gland, consisting of closely packed tubules with fine central lumina, many of which contained traces of colloid. The acini varied a good deal in size, and were lined with cubical or columnar cells, both being represented in one acinus in many places. The cubical cells predominated. The cells of columnar shape stained more heavily with haematoxylin and had the appearance of more recently formed elements.

The thymus was persistent but small. The spleen was normal. A small accessory spleen was present.

The pituitary and suprarenal glands showed no macroscopic lesions, and were normal in size and texture. There was no enlargement of the lymphatics, and the cervical ganglia showed no change.

The heart was normal, and there was no thickening, hardening, or dilatation of the blood vessels.

Lungs.—The right was solid and in the stage of grey hepatization; the left contained patches of consolidation. Both lungs were adherent from recent pleurisy.

The parenchymatous viscera showed cloudy swelling. This was verified microscopically in the case of the kidneys.

The meninges were considerably congested and slightly opaque. There was no bony deformity or tumour at the base of the skull, and the brain showed no macroscopic lesion.

On removing the supraorbital plates nothing unusual was found. Owing to the protrusion of the eyeballs, the retro-orbital space was abnormally deep. This space was filled with fat.

Inasmuch as the patient did not die till the sixth day of disease and the amount of lung involved was considerable, one is justified in considering that the pneumonia was an adequate cause of death.

I am much indebted to Captain J. W. Macleod, R.A.M.C., who did the histological work.

Note by COLONEL SIR WILMOT HERRINGHAM.

The interesting feature in this case is the persistence of the exophthalmos when all the other graver symptoms disappeared. We hoped that there would be some definite anatomical cause discoverable. In cases in which the disease is recent no satisfactory explanation of the proptosis has ever been given. It is at once remarkable and disappointing that even in such a case as this, where the disease has been of old standing, we have been unable to add anything to the knowledge already in our possession.

A UNIVERSAL LEG FRAME, SPLINT, AND CRADLE COMBINED.

By MARTIN J. CHEVERS, L.R.C.P. AND S.IREL.,
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IN the BRITISH MEDICAL JOURNAL of December 26th, 1914, I briefly mentioned a "universal combined leg splint and cradle," designed by me and made by Messrs. James Woolley, Sons, and Co., Ltd., of Manchester. I had then had it in frequent use for upwards of ten years, but I have since discovered so many further advantages in it that I feel justified in describing it more fully.

The splint consists of a galvanized metal frame, 32 in. long, 7 in. deep, and 9 in. wide; along the top on each side is fixed a row of brass studs, which serve to secure a series of ten straps. These straps, each 3 in. wide, are eye-letted, so as to be adjustable to half an inch; they are made of waterproof material, and may be sterilized by boiling.

The advantages I claim for the splint are:

1. It is adaptable to any size, shape, or length of limb or amputation stump, and removal of one or more straps when being used on either the anterior or posterior aspect of the limb allows of easy access to a wound wherever it is placed without disturbing the limb.

2. By removing a strap, heel pressure can be relieved.

3. Elevation of the limb can be attained by steady graduated support to the whole under-surface.

4. It can be used as a double inclined plane by regulating the straps.

5. One or more straps can be used over instead of under the limb or amputation stump in order to steady it.

6. If alternate straps are lowered nearly to the bed, but so that the leg still swings, and the others buttoned tense across the top of the splint the latter act as a bed cradle or as a rest for lotion trays or irrigation solution.

7. If any portion of the foot should project above the splint, an adjustable and detachable guard (η-shaped) can be used; its legs fix firmly in holes placed at intervals in the upper parallel bars of the splint to remove the weight of the bed clothes at any required spot; this guard has a notch at the top, so that if the leg has been placed in another splint it can be suspended from the notch.

8. The waterproof straps are specially useful for keeping an ice-bag or dressings in place when the constriction of bandages is not advisable, or when excessively moist dressings are necessary, or where continuous irrigation is required (the receptacle being placed within the splint, underneath the suspended leg).

9. The splint, when the limb is suspended in it, is almost immovable by the patient on any ordinary mattress and covering; the leg can be placed in an abducted position and fixed extension applied by placing across the end perpendiculars of the splint a flat board containing a central perforation through which the extension loop can be passed and the loop retained there by passing through it one or more pieces of wood according to the tension required, counter-extension being attained by a graduated rise in the thigh straps towards the popliteal space. If required, fixed extension and counter-extension might be attained for the thigh if the upper end of the splint (that is, the U-shaped bar) is surrounded with Gamgee padding or spongiopilin, and made to act as the ring of a Thomas's knee splint.

10. The foot may be kept at right angles to the leg or valgus prevented by wrapping two or three turns of a bandage round the foot and making the ends fast at each side to the perpendicular or parallel bars.

11. For fractured patella I find the splint acts better than a Thomas's knee splint on account of the steadiness of the side bars, over or round which the bandages are passed, and across the front of the leg, keeping a firmer pressure on the pads placed above the upper fragment and below the lower fragment.

12. In cases of severe infection, where flush amputation has been necessary, skin traction in after-treatment is facilitated.

13. The waterproof straps can be made use of for a Thomas's knee splint; when passed round the bars they are secured by means of ordinary bone studs passed through the eyelets in the straps, attaining without any trouble perfect equality in the length of the straps—a matter of importance. I have used a Thomas's splint in conjunction with my frame, both on account of the protection the latter affords and for the purpose of suspending the Thomas's splint from the notch in the top of the η-shaped cradle guard.

14. The disturbance caused by putting on and taking off bandages, the heating and constriction of the limb which may be the result of bandaging can all be entirely done away with, the straps being used instead; they