RESULTS OF THE EXPERIMENT.

Of the 72 animals fed on this diet for longer than fifty-six days, 21 were found at *post-mortem* examination to have stone in the bladder—17 females and 4 males; a case incidence of 29 per cent. The incidence of the disease varied in the two sexes, being 40 per cent. in females and 13 per cent. in males. In two other cases in females an intense cystitis, but no stone, was present; in one of these there was some earthy incrustation around the neck of the bladder. Haemorrhage from the bladder was occasionally observed during life. In males protrusion of the penis was a constant symptom in those suffering from stone.

In 18 cases in which stone was found, a greater or lesser degree of cystitis was present; in these the bladder was

FIG. 1.—Kidneys, with ureters, from two cases of experimentally produced stone in the bladder in rats. The middle kidney (with ureter) is from a healthy control animal.

usually greatly distended and congested. In 3 cases there was no cystitis, showing that the deposition of the phosphatic calculi was not secondary to inflammation of the bladder. In 8 cases the left ureter was much dilated with associated pyonephrosis or hydronephrosis (the fluid was not examined for pyogenic organisms). The photograph (Fig. 1) shows the ureters in two affected animals and that of a control animal for comparison. Earthy deposits, but no formed stones, were present in the kidney in 4 cases. The stones in the bladder were either single or multiple, as many as five being found in one bladder (see Fig. 2); they were of a dirty white colour and their surfaces were rough and jagged. Occasionally formed stones were not found, or if

FIG. 2.—Experimental production of stone in the bladder in rats. The diet was the same as that described in the text, except that whole wheat flour was substituted for the oatmeal. Each ureter also held a small stone; there were five in the neck of the bladder.

found were so minute as to be more properly called "gravel." Earthy incrustations around the neck of the bladder were sometimes present. The stone, stones, or gravel varied in weight in individual cases from 17 mg. to 27 mg. in males, and from 8 to 42.6 mg. in females. The largest single stone weighed 35 mg.; a stone of proportionate size in man would have weighed about one pound. Chemical examination showed the calculi to consist mainly of earthy phosphates (calcium and magnesium) along with traces of calcium oxalate. Stone was found only in animals which died between the 84th and the 157th day of experiment; the diet did not appear to cause the disease until after fifty-six days of its use.

During the 157 days this experiment lasted 340 *post-mortem* examinations were made in rats which had been fed in various other ways. In none of these was stone in the bladder present. The stock diet in use in my laboratory does not give rise to calculus in rats; it consists of whole wheat chapatties, milk, butter, sprouted pulses, green vegetables, raw tubers, fresh meat in small quantities once a week, and water. Nor do synthetic diets deficient in vitamin B, but complete in other respects, cause stone in the bladder in rats; nor diets whose sole fault is deficiency of suitable protein or of suitable salts; nor synthetic diets whose sole source of vitamin A is 8 per cent. of pure Lucca oil. It seems, therefore, that the diet used in the present experiment was productive of calculus because of the peculiar combination of its faults—deficiency of vitamin A, absence of animal protein, richness in earthy phosphates, with possibly a toxic action of the ill-balanced diet itself on the urinary tract. This tentative interpretation of the results observed is to be considered in connexion with the recently reported observation of Fujimaki (1926) that stone in the bladder and kidney can be produced in rats by feeding them for long periods on synthetic diets deficient in vitamin A. The experimental production of stone in the bladder by means of an ill-balanced diet composed of foods in common use by man would appear to confirm and to extend the observation of Fujimaki, although it raises other considerations which require further investigation for their elucidation.

CONCLUSIONS.

1. Stone in the bladder has been produced in rats by means of an ill-balanced diet composed of foods commonly used by man. The stones were of the phosphatic variety.
2. The main faults of this diet were: (a) absence of protein of animal origin; (b) deficiency of vitamin A; and (c) excess of earthy phosphates. To these faults there may possibly have been added a toxic action of the diet itself on the urinary tract.

REFERENCE.

Fujimaki (1926): *Japan Medical World*, February 15th, vi, 2.

ACTINOMYCOSIS IN THE BRAIN OF A CHILD.

BY

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ACTINOMYCOSIS is sufficiently rare to warrant a record of the following case in a child, aged 11, in which the brain was affected.

Actinomycosis, first reported by Bollinger in bovines in 1877,¹ and in man by Israel in 1878,² and by Porfick in 1879, is rather rare, and this appears to be the only instance of its occurrence in the brain of a child. Records of English cases appear to be limited to that described very fully by Delépine in 1889³; the patient was a decorator, 65 years of age.

Moersch in 1922⁴ reported from the Mayo Clinic seven cases affecting the brain, all of which were secondary infections, the youngest being aged 20 and the oldest 41.

In the United States Sanford and Voelker collected (1925) 670 cases.⁵ Among 574 in which the ages are known, there were 14 under 10, and 89 between 10 and 20. Of 588 cases where the location was known, there were only 9 in which the brain was affected; of these the youngest was 24 years of age, and the oldest 63.

A boy, born on January 15th, 1915, was admitted to the Booth Hall Infirmary for Children, Manchester, on September 27th, 1926. The history was that he had been quite well until March, 1926. He then complained of pain in the right side, and had twitching of the right arm and leg, of which he also lost the use. Later on he complained of headache and vomiting, and was admitted to the medical side of the Manchester Royal Infirmary, being transferred to the surgical side on July 26th, 1926, as a case of left cerebral tumour with increased intracranial tension. He then had left-sided headache, and the right arm showed flaccid paralysis. Vomiting, unaccompanied by nausea, was present. Sensation was unimpaired, but there was bilateral optic neuritis.

Operation.—On July 28th Mr. C. Roberts, F.R.C.S., performed left parietal decompression; considerable bulging of the brain was noticed when the dura was opened, but no localized tumour could be detected, and when the wound healed there was still bulging.

After-History.—On admission to Booth Hall Infirmary there was a large swelling over the left parietal area—4 inches by 2 inches; the skin in one part was broken down, and there was a purulent discharge. The right foot was in the position of talipes equinovarus. The wrists were hyperflexed, but could be extended voluntarily. The oculist reported slight blurring only of the disc edges; the vessels were not engorged. The Wassermann test was negative, and general examination, including x-ray examination of the thorax, did not afford any evidence indicative of tuberculosis. The diagnosis was cerebral tumour, not syphilitic, and probably not tuberculous. The child remained comfortable, and gained 2 lb. in weight until the second week in November, when he was reported as not so well; there was oozing of cerebro-spinal fluid and oedema of feet and scrotum. Albumin, half a gram to the litre, was present in the urine. Diarrhoea commenced a week later, and vomiting started the day following, death ensuing in a couple of days (November 24th, 1926).

Post-mortem Examination.—This was performed on the following day. Dr. Dawson reported as follows: "Beneath the fluctuant swelling on the left side of the head was an abscess the size of a Tangerine orange in the brain substance, containing greenish pus. Pus of the same kind was free at the base of the brain. The liver and spleen, the latter fixed by dense fibrous adhesions to the stomach, contained very extensive suppurating areas with a honeycomb appearance, with pus of the same greenish colour. The base of each lung was similarly affected, but to a small extent only. No other organs were found to be affected. Microscopically, sections of isolated nodules from the liver and spleen showed granulomatous lesions, including one or more typical actinomycotic colonies.

"Diagnosis: Actinomycosis, with extensive metastasis. The site of the original infection is not clear, but may have been gastric."

Thorough inquiry into the history shows that the patient had nothing to do with horses or grain, but regularly carried straw from banana crates. This is the only suggested means of infection.

Thanks are due to the librarians of the Manchester Medical Society and of the British Medical Association for their assistance in an extensive search of the literature, to Mr. Charles Roberts for the use of his notes, and to others for the assistance they have given.

REFERENCES.

- ¹ Bollinger: *Centralbl. f. d. med. Wissensch.*, Berl., 1877, xv, 481.
² Israel: *Arch. f. path. Anat.*, etc., Berl., 1878, lxxiv, 15. ³ Delépine: *Trans. Path. Soc.*, London, 1889. ⁴ Moersch: *Archives of Neurology and Psychiatry*, vii, 745, 1922. ⁵ Sanford and Voelker: *Archives of Surgery*, December, 1925.

PERNICIOUS ANAEMIA IN ELDERLY PEOPLE.

BY

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PERNICIOUS ANAEMIA is regarded generally as a disease of middle and later life, and it does not seem to be as generally recognized that it may occur in persons of 70 years and over.

Cabot¹ makes the striking statement that pernicious anaemia is a disease of elderly people, its incidence being not far different from that of cancer; and Eason,² working on the figures of the Edinburgh hospitals, concludes that senility is a much more important etiological factor in the production of the disease than has been hitherto recognized. He finds, too, that the rate of incidence in the sexes varies with age. Under 50 the rate of incidence is higher in females than in males; over 50 the reverse is true. Ward³ could find in the literature four other cases besides his own in which the disease had been recognized in patients over 70 years (70, 73, 76, and 80), and his own patient was 85 when she died.

The following notes refer to two women over 70 who both died of the disease. In one (Mrs. B.) the disease undoubtedly began after she had passed her 75th birthday, and in the other (Mrs. M.) probably at the age of 67 or thereabouts. The fact that the disease may have commenced at a much earlier age and undergone long remission has not been forgotten, but a careful inquiry into the history does not reveal any evidence to support this view, and both patients were under the supervision of the same medical attendant for many years.

CASE I.

Mrs. B., aged 75, was operated on for double hernia when over 70 years of age. She was very feeble for several years before the symptoms and signs of severe anaemia appeared, and was thought

to be suffering from general arterio-sclerosis, but no focal lesions were observed and her blood pressure was below normal. She had a good appetite, slept well, and complained of little until three or four months before her death, when she showed the typical lemon tint of the skin, developed complete anorexia and obstinate constipation, and died from progressive weakness. A blood examination, which was repeated, showed:

Red cells	...	...	...	...	850,000 per c.mm.
Haemoglobin	...	...	...	...	30 per cent.
Colour index	...	...	...	...	1.7
Leucocytes	...	...	...	...	2,000 per c.mm.
Differential count:					
Polymorphs	...	...	...	...	30 per cent.
Small lymphocytes	...	...	...	...	69 "
Normoblasts	...	...	...	...	1 "

There was marked poikilocytosis and anisocytosis.

CASE II.

Mrs. M., aged 70, was always pale but had no severe illness before three years ago, when some grave form of anaemia was suspected. No blood examination was made, and the patient was able to go about her household duties fairly well until about six months before her death, when she complained of sensory changes in the fingers and toes, described as tingling, burning, and numbness. Later loss of temperature sense was noted, but at no time was there evidence of involvement of the pyramidal tract except for involuntary twitching of one big toe. She had a peculiar interrupted form of speech, cog-wheel in type, for which no explanation could be found by the laryngologist or neurologist who examined her. A blood examination showed the following:

Red cells	...	...	...	...	1,500,000 per c.mm.
Haemoglobin	...	...	...	...	28 per cent.
Colour index	...	...	...	...	1+
Leucocytes	...	...	...	...	5,000 per c.mm.
Differential count:					
Polymorphs	...	...	...	...	32 per cent.
Small lymphocytes	...	...	...	...	64 "

Poikilocytosis and anisocytosis were present.

Three weeks later the red cells fell to 900,000 per c.mm., whereas the haemoglobin was if anything higher, in the region of 30 per cent., giving a colour index of 1.6.

REFERENCES.

- ¹ Eason: *Edinburgh Med. Journ.*, 1920, pp. 389-399. ² Idem, *ibid.*
³ Ward: *Practitioner*, 1920, civ, pp. 145-148.

ANEURYSM OF POSTERIOR TIBIAL ARTERY
CAUSED BY FRACTURE OF THE
TIBIA AND FIBULA.

BY

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CASES of aneurysm of the posterior tibial artery of traumatic origin are of sufficient rarity to justify the publication of the following notes.

A native cavalry soldier, aged 26, was admitted to hospital, having fallen and broken his left leg, both bones being fractured at about the junction of the middle and lower thirds. Radiological examination showed no points of special interest, the fracture being transverse with little displacement and separation. The limb was treated by fixation on a back splint, with footpiece and side splints. I was asked to see the man four months after the accident as there were no signs of union. I found him to be a healthy man with no venereal history; the limb was considerably wasted. Radiological examination showed the fragments to be in good position. There were no signs of callus or reaction at the ends of the bones. I recommended that the limb be re-splinted, and the patient given a liberal diet, a course of tonics, and potassium iodide. His Wassermann reaction was negative on two separate dates. Three weeks later (seven weeks after the accident) there was little or no callus formation and a very poor attempt at union. I now found a pulsating expansile swelling in the calf opposite the point of fracture; it was the size of a hen's egg and in the line of the posterior tibial vessels. A loud blowing systolic bruit could be heard over the tumour; this disappeared on compressing the main vessel above the mass. The pulse at the ankle could not be felt, but the circulation in the foot appeared to be normal. There was some disordered action of the heart, consisting of marked irregularity and a very accentuated first sound. I wondered if these physical signs were the so-called "tumultuous action of the heart" described by Makins in cases of aneurysm of peripheral vessels. A diagnosis of arterio-venous aneurysm was obvious, and, as the swelling at the end of a week appeared to be rapidly enlarging, I decided to operate.

Operation.

The operation consisted in applying a tourniquet and excising the sac, tying the vessels above and below it. Posteriorly the sac was covered by fascia and skin only, any muscle tissue having entirely disappeared; the fascia was stretched and thinned out over it. Anteriorly the sac was very adherent to periosteum, and had hollowed out the tibia, forming a smooth cup-shaped depression