FIG. 1.—Showing two posterior grafts six months after implantation as thin osteoperiosteal shavings.

FIG. 2.—Showing consolidation of grafts one year after operation, and after using foot for six months. Note commencing equinus deformity due to faulty implantation of grafts and unequal growth at lower end of tibia.

FIG. 3.—Taken two months later, showing fracture of graft and further equinus deformity in tibia.

BERNARD HUDSON: A CASE OF ARTIFICIAL PNEUMOTHORAX.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

branch of the mammalian bundle—namely, running down the right side of the interventricular septum to the moderator band, etc. (see Fig. 1). There is a branch, however, which is analogous to this one, but it takes a very different course. As the avian bundle passes through the interventricular septum it gives off a branch, which runs in a curved direction to the left, then upwards and to the right, to end in that wonderful single muscle valve which in the bird's heart takes the place of the mammalian tricuspid (see Fig. 2). This avian muscle valve consists of a wedge-shaped mass of muscle, which extends from the upper limit of the right auriculo-ventricular opening to its lower part. It is situated on the lateral aspect of the opening, and it becomes closely applied to the septum when the right ventricle is in systole. It has no chordae tendineae nor muscoli papillares. This marked difference in the arrangement of the right auriculo-ventricular valve in the bird, as compared with the mammalian tricuspid, accounts for the very different course taken by the right branch of the bundles in the two hearts. On the other hand, the similarity between the avian and the mammalian mitral valves, and the almost identical distribution of the left branches of avian and mammalian bundles, has its significance. From the above considerations it looks as if the avian and the mammalian bundles have a similar function.

The general naked-eye characters of the auriculo-ventricular bundle vary very much in different mammals, and even in different individuals of the same species. In the ox heart the bundle is relatively thick, smooth, and rounded, and more like muscle tissue than the human bundle, which is thin, ragged, and pale, like a fine nerve fibre. In the ostrich heart the bundle is more like glistening fibrous tissue. This shiny appearance is more marked on the left side of the bundle than on the right, and on this aspect the bundle is easily separated from the heart muscle. Elsewhere the bundle is adherent to the muscle fibres, and it presents a ragged appearance when dissected out. Within the septum the bundle tissue gives off several fine white branches to the heart muscle in addition to the curious right branch already described. The individual variations of the several bundles dissected out in the five ostrich hearts are very considerable, especially as regards size and definition of the bundle system.

CONCLUSION.

The ostrich heart presents a system of fibres which is somewhat similar to the auriculo-ventricular bundle of the mammalian heart. The distribution of this system is such as to indicate that it has a similar function to the bundle of His—in short, that it constitutes a true avian auriculo-ventricular bundle.

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THE OSTEO-PERIOSTEAL GRAFT IN DANGLE-FOOT.

(With Special Plate.)

BY

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In *Surgery, Gynecology and Obstetrics* for February, 1926, Professor Rutherford Morison and Dr. William Mackenzie describe an "operation for dangle-foot" in which they use osteo-periosteal grafts to stabilize the ankle-joint. These grafts are taken from the patient's tibia, and are implanted to form osseous ligaments between the tibia and fibula above, and the astragalus and os calcis below. Two procedures are described:

(1) *Posterior grafts*—extending from the back of the tibial and fibular epiphyses to the sides of the os calcis below.

(2) *Lateral grafts*—stretching from the outer aspects of the malleoli above to the peroneal area of the os calcis externally, and to the inner aspect of the astragalus and os calcis below.

During the last year I have been associated with the authors at the W. J. Sanderson Home for Crippled Children at Gosforth, and I have had repeated opportunities of examining the efficacy of these procedures in fixing the ankle and subastragaloid joints, and of extending the principle in other directions. Time has shown that uniformly good stabilization is secured, and evidence is accumulating to demonstrate the superior value of the method.

In a number of cases of flail-foot astragalectomy had been performed to produce fixation, but the results were generally disappointing. It was found that there was a marked tendency for the foot to become fixed in a varus position, due partly to the over-development of the os calcis externally, partly to the irregular development of fragments of cartilaginous bone in place of the astragalus, and partly to the natural shortening of the longitudinal arch of the foot on the inner side after astragalectomy.

Other operations in which bone is removed to shorten the tarsus, and to arthrodese the astragaloid joints, are apt to leave the patient with feet that are unequal in size, and to present to him the ever-recurring problem of getting boots for feet which are not neighbours.

The paralytic foot is already often smaller than its fellow, and its bony tissue is thin and largely decalcified. For this reason alone it would seem to be better to fix such a foot by introducing bone, which may at the same time exert an osteogenic stimulus, than by removing it.

The illustrations show how remarkable is the growth of bone from the thin osteo-periosteal shavings which were used as grafts in these cases. The purpose of this communication, however, is to draw attention in this operation to the importance of accuracy in the process of embedding the grafts, and to illustrate the interesting though undesirable results which occurred in one case where the graft extended beyond the tibial epiphysis and gained an attachment over the epiphyseal cartilage to the diaphysis.

The case is that of a boy, aged 14 years, who had a paralytic dangle-foot on the left side. For this disability two posterior osteo-periosteal grafts were implanted on January 19th, 1925. Radiographic examination showed the grafts in position but reaching up over the epiphyseal "line." After fixation for six months the plaster-of-Paris casing was removed and the foot was again radiographed. Fig. 1 shows the two posterior grafts behind the ankle and subastragaloid joints. Their upper limits appear as bony shadows beyond the tibial and fibular epiphyses, the lower ends are seen to be blending with the bony texture of the os calcis. It is important to notice that the long axis of the tibial shaft is at right angles with the plane of the "epiphyseal" cartilage.

The boy was now (July 1st, 1925) permitted to walk about on this foot with no other support than the grafts. Fig. 2 is a radiogram taken six months later (December 9th). It shows how the grafts have become consolidated, and how the bones have increased in density. The upward extension of the grafts beyond the epiphysis is clear. Clinically, there was good fixation at the ankle, but a mild degree of equinus deformity. The radiogram shows this distinctly: the shaft of the tibia no longer makes a right angle with the plane of the epiphyseal cartilage, but is inclined backwards from it in a manner which is comparable to the inward deviation of the femoral shaft to its lower epiphysis in cases of genu valgum. This can only be due to the freer growth of bone at the front of the tibial epiphyseal cartilage, the posterior region having been fixed down, as it were, by the binding pressure of the grafts.

The ultimate result in this case would naturally be spoilt by the further development of this bony deformity causing a fixed equinus. Indeed, it is possible that the amount of equinus already present was enough to cause this boy to jar his foot and fracture one of the grafts two months later. Attention was called to the fact by his complaint of pain at the back of the ankle, and the third radiogram (Fig. 3) shows this condition (February 11th, 1926).

The presence of pain and the fracture in the graft are recorded as interesting features of this case, since radiographic examination of other cases occasionally shows clear areas in the graft without there being any history of pain in the neighbourhood. It is not yet certain that these areas of rarefaction are fractures; they may be, but it is fortunately true that their appearance has not interfered with the clinical results. The radiogram shows very clearly the increasing tibial deformity. Professor Morison's instruction that the grafts should extend up to but not over the

epiphyseal line is seen to be of primary importance. They are to be used as osseous ligaments, and should retain sites of implantation corresponding with ligamentous attachments. In the neighbourhood of growing epiphyses due regard must be paid to the laws of growth. This case may therefore be looked upon as an instance of the extraneous fixation of the epiphysis to the diaphysis (by a graft), which the late Sir William Macewen showed would interfere with or prevent normal linear growth.

A CASE OF ARTIFICIAL PNEUMOTHORAX.

(With Special Plate.)

BY

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A MAN, aged 26, was under treatment for eighteen months (1922-23) for pulmonary tuberculosis affecting the upper lobe of the right lung. Recovery was excellent, and, by the sanction and advice of his doctors, he went to Kenya Colony in September, 1924, and invested in a farm there. The place suited him, and all went well until some months ago, when he became very ill, apparently (as far as can be made out from the history) with an acute exacerbation, which spread rapidly through the right lung, but chiefly affected the base. He saw a doctor, who advised him to get away as quickly as possible, and go straight to Davos-Platz. He arrived here under my care on February 22nd, 1926. He was exceedingly ill on arrival, the daily temperature varying from about 99° in the morning to 102° and over at 7 p.m. (taken by the mouth). He had a racking cough, and was bringing up a large quantity of sputum loaded with tubercle bacilli; he had lost about 2 st. in weight, and was looking a typical picture of what is known as "galloping consumption."

On examination the whole of the right lung was dull, and the lower half absolutely so; the whole lung was full of moist râles, and at the base there was loud bronchial breathing, increased vocal resonance, and increased vocal vibrations. Some moist crackling râles were heard in the upper lobe of the left lung, and the disease apparently had well started in this lung.

The radiographic appearance (Fig. 1) showed extensive trouble in the right lung, cavitation at the apex, and a dense black shadow in the lower part. It will be seen that the heart is drawn well over to the right side; the left lung shows commencing tubercle in the upper lobe. The appearance of this radiograph made me consider the possibility of an effusion at the right base, and I accordingly explored with a large-bore needle, but got nothing out. As the patient was obviously going downhill, and showed no signs of any improvement, I thought it worth while to see if it would be possible to establish an artificial pneumothorax on the right side, although there seemed very little hope of being able to do so, because of the probable presence of strong adhesions. However, on March 13th an attempt was made, and, to my great astonishment, a free space was found at once, the manometer swinging well, showing a strong negative pressure; 150 c.cm. of air only was introduced and a small initial pocket made. This amount of air sufficed to raise the pressure from a negative one to a strongly positive one, the pressures being as follows:

Induction	...	...	-2 -6	...	150 c.cm.	...	+2 -4
March 16th	...	...	-2 -6	...	200 c.cm.	...	0 +3
March 21st	...	...	-2 -7	...	300 c.cm.	...	+1 -4

A radiograph taken shortly afterwards showed the production of a small pocket (Fig. 2). Two more insufflations were made, the results being as follows:

March 31st	...	...	-2 -7	...	300 c.cm.	...	0 -3
April 10th	...	...	-3 -8	...	500 c.cm.	...	0 -1.5

The fillings were continued at intervals of a fortnight, about 600 c.cm. being introduced each time, and the radiograms (Figs. 3 and 4) show the development of a fair-

sized artificial pneumothorax in the lower part of the right lung, many adhesions having given way, but leaving two or three powerful bands, which are very plainly seen in the illustrations.

An interesting point is that after the third insufflation the patient remarked that he felt his heart once more beating on the left side instead of on the right. On inspection of Figs. 3 and 4 it will be seen that the heart, which was formerly drawn over to the right side by adhesions, has returned to its proper position on the left.

July, 1926.—The pneumothorax, although only a partial one, caused an undoubted and pronounced improvement in the patient's condition. The cough and expectoration have very much diminished, the pulse rate, instead of being 120 to 130, is now running at about 80, the breathing is easier and quieter, and the temperature has come down. The patient is now getting up for a short period each day without any ill effects. The signs in the left lung are diminishing in extent and intensity.

February 1st, 1927.—The further progress of this case is as follows: The patient kept very well all through the summer, and was able to take moderate exercise, the temperature being always quite normal, and the cough and the sputum diminished. The general condition improved considerably, and he gained weight. Fillings were continued every three weeks, the pneumothorax cavity gradually increasing in size, and the adhesions thinning and stretching. On January 17th the patient's temperature began to rise again, and he developed pain on the side of the pneumothorax; this was shortly followed by the appearance of a small serous effusion, which is following the ordinary course of such effusions; and the patient is already improving daily. Incidentally it is of interest to note that with the establishment of this effusion the adhesions have given way, the pneumothorax now being nearly "complete"; the other lung is holding up in a very satisfactory manner.

I am indebted to Mr. P. G. Sutton, M.S.R., of the X-Ray Institute, Davos-Platz, for the radiographs.

PARAPLEGIA (MEGALOCYTIC) CURED BY HYDROCHLORIC ACID.

BY

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DIAGNOSIS in the following case was possible by measuring the average diameter of the red cells, and by that alone. Haematology, and all its complexities, gave no light. How forcibly this illustrates my favourite doctrine that simple recorded measurements in clinical medicine are richly rewarded, yet greatly neglected.

A florid, healthy, active young man of 37, a cargo superintendent, decent and clean living—noticed tingling in both legs up to the groins in January, 1925; later his hands tingled, he was drowsy, and had sacral pains, worse on walking. Next his ankles gave way, micturition became difficult, and the pavement felt like cotton-wool.

He was much worried sexually at this time by the exactions of his second wife, to whom he had been married a few months. In July he could no longer walk, and in August I saw him in consultation with Drs. Eddie and Robertson. I diagnosed posterior combined sclerosis, and he was admitted into the Royal Infirmary under my care. There he lay on the balcony for five months, and then went to the seaside under Dr. Sproule. The plantar reflexes were extensor, knee-jerks absent, and he could not move his feet. Hydrochloric acid was not present in the test-meal secretions, and x rays were suggestive at first of pyloric new growth, but became normal after belladonna. Haemoglobin was 75 per cent., and the pathologist reported more than once that there was no evidence of pernicious anaemia. As he had had sore tongue before admission I still felt incredulous.

In view of the recent illuminating work of Dr. A. F. Hurst on this subject I ventured to send him a blood film and an outline of the case. At his instance, Dr. Hampson kindly carried out the measurements of