In other words, I suggested that the antibacterial substances which are elaborated in the organism in response to inoculation are elaborated by the tissues into which the vaccine is introduced. Now inasmuch as we may make our inoculation into any part of the subcutaneous tissue, it would, upon the theory that antibacterial substances are produced at the site of inoculation, seem to follow that we ought, by inoculating in a series of different places, to get a summation effect. The idea that such a thing might be opens up whole vistas of therapeutic possibilities. But at present the achievement of a summation effect from a series of simultaneous inoculations undertaken in different parts of the body belongs, like the achievement of a summation effect from a series of consecutive inoculations undertaken each after the previous one has evoked its immunising response, to the realm of unrealised possibilities. There lies before us here a wide and very difficult and unexplored field of work.

"Something lost behind the Ranges. Over yonder.
Go you there."

A CASE OF CHONDRO-CARCINOMA OF THE TESTIS.¹

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THIS case is published because it seems to be rare and interesting from both clinical and pathological standpoints. The growth of the testis belongs to the class "embryoma," 23 cases of which are described, mainly from the pathological aspect, by Nicholson in the Guy's Hospital Reports.² Particular attention is called to the microscopic examination of the metastatic growth, possible in only one of Nicholson's cases—viz., his Case 60—the well-known case of Sir James Paget, re-examined by Kanthack and Strangeways. The value of the "creatinin and creatin excretion" in helping to determine the possibility or otherwise of successful operation should also be noted.

Clinical account of the case (W. S.).—The patient was a man, aged 30 years, with a strong tuberculous family history, three sisters and one brother dying from phthisis between the ages of 19 and 30. The patient was struck by a hockey stick on the left testis in February, 1908. He had pain, stopped playing for two minutes, then finished the game. Swelling of the testis appeared at once and gradually grew larger, and he wore a suspensory bandage; he had no pain and did not lose flesh. On Feb. 5th, 1909, he consulted Dr. Bloxham of Cardiff, who brought him to Mr. Sheen on Feb. 12th. He was well nourished and in good general health. The left scrotum contained a smooth, ovoidal mass, roughly as big as the adult fist, hard, uniform, elastic, not tender, not translucent, veins not dilated, testicular sensation retained at the upper and front part of the swelling, and no thickening of the cord. Rectal examination showed nothing abnormal. The patient was placed in a nursing home and on Feb. 16th the testicle and cord were removed through an inguinal incision, the inguinal canal being opened to its outer end. The cord was apparently normal. The patient left in 14 days with the wound soundly healed. Mr. Sheen next saw the patient on June 3rd. After leaving the nursing home he had gained from 11 to 12 pounds in weight, but latterly his weight had been stationary. He had noticed an abdominal swelling for a fortnight. There was a large abdominal tumour, hard, elastic, smooth, prominent, slightly tender, reaching from the umbilicus to the symphysis, and from the left anterior superior spine to three inches to the right of the middle line. Slight frequency of micturition was present. There was a slight yellow tinge on the cheeks. The patient was told of the gravity of the condition and another surgical opinion was suggested. He saw Mr. Stanley Boyd in London, and Mr. Boyd has kindly

stated that he made a small abdominal incision and found a little bloody fluid, a greenish tumour, and omentum studded with nodules of growth. The patient, returning to his relatives, was afterwards under the care of Mr. R. E. W. Brewer of Newport, Mon. He was tapped twice for ascites. He died on August 20th. There was no necropsy.

Description of the tumour (H. A. S.).—Its macroscopic appearance shows an irregularly nodular oval-shaped tumour weighing 450 grammes. Dimensions 12 cm. by 8 cm. by 7 cm. The tunica vaginalis testis, which is intact, is thickened and its surface covered by many ramifying dilated veins. The membrane with the vessels can be easily separated from the underlying tumour. The globus major and minor are atrophied and small. Attached to the mass is a portion of the spermatic cord about 7 cm. in length, the structures of which appear natural. The testis is

Microphotograph of the primary growth of the testis. a, Cystic space. b, Mass of young cartilage. c, Epithelial nest-cell. d, Spheroidal cells of carcinomatous type.

replaced by a uniformly hard growth of a greyish-white colour. Scattered throughout its substance are many minute glistening particles of cartilage, small cysts containing clear fluid, and small hæmorrhagic foci. There is no evidence of calcification, bone formation, or hair.

Sections were cut from the cortex and the deeper parts of the tumour, from the globus major and minor, and from the spermatic cord. A portion of the secondary growth in the abdomen was secured by Mr. Boyd, who has very kindly supplied a microscopic section which is described below.

The histological findings are briefly as follows:—A connective tissue stroma of varying characters. A large number (a) of hollow, cystic spaces and tubules lined by epithelial cells which differ in type, some columnar, others cubical or flattened; (b) masses of young cartilage which is richly cellular; (c) numbers of epithelial cell nests; and (d) masses of spheroidal cells of a carcinomatous type, which show some attempt at alveolation and which are supported by a loosely woven connective tissue stroma. The structure of the growth in the abdomen is similar to that of the primary growth. It is to be noted, however, that the connective-tissue stroma is much more delicate and cellular, and is in places of a myxomatous type. There are, further, no epithelial cell nests. The same branched tubular and cystic spaces with different types of epithelial lining and the same masses of carcinomatous cells mentioned above are easily recognised, as is also the formation of cartilage. The globus major and minor do not show any evidence of infiltration. Their tubules are degenerated and filled with debris, and there is a considerable increase in the fibrous connective tissue of the surrounding parts. The spermatic cord does not show any

¹ A paper read before the Cardiff Medical Society, Feb. 8th, 1910.

² G. W. Nicholson: New Growths of the Testicle, Guy's Hospital Reports, vol. lxi., 1907, p. 249.

evidence of cartilaginous infiltration; nor do its blood-vessels, lymphatics, or duct betray any sign of cancerous infection.

Following the descriptions of new growths of the testis as given by Nicholson,³ the tumour may be classed as an embryoma in which the hypoblastic layer has undergone a malignant change giving a spheroidal-celled carcinoma.

Analysis of the urine (R.L.M.W.).—The recent work on the significance of the excretion of creatin in malignant disease, particularly of the liver, whether primary or secondary, led to inquiry into the matter in this case. For this purpose a 24 hours' sample was obtained on March 5th, 1909, three weeks after the operation. At this time a clinical examination of the patient showed no palpable metastatic deposits, and if the creatinin excretion was normal, such a result would have corroborated the opinion that there was no secondary growth of any size present in the abdomen or abdominal organs. The analysis of the urine gave the following results: Volume, 1200 cubic centimetres. Acidity 40·5 per cent. in terms of $\frac{N}{10}$ NaOH.

Specific gravity, 1015. No sugar. No albumin. Preformed creatinin estimated by means of the method devised by Folin, 1·240 grammes. Creatin calculated as creatinin, 1·160 grammes for the total daily excretion.

The creatinin excretion in normal individuals varies between 1 and 2 grammes per diem, and is in general proportional to the body weight. The ratio of creatinin excreted per kilogramme of body weight, or in other words the "creatinin coefficient," varies between 18 and 30 milligrammes per kilogramme. The creatinin value in this case is low considering the body weight of the patient—viz., about 67 kilogrammes—the coefficient being 18·7 milligrammes. Now, creatin is entirely absent from normal urine, and since it is not excreted as a result of its ingestion it is clearly derived from some pathological changes taking place in the organism. Mellanby has clearly demonstrated⁴ that creatinin is directly related to the creatin contained in muscle and other tissues, and that the latter is converted into creatinin in the liver. In hepatic disease he finds the creatinin excretion is lowered. There seems, however, to be a very marked difference between the excretion of creatinin and creatin in cirrhosis of the liver and carcinoma of the liver respectively. In cirrhosis of the liver the creatinin content of the urine is low and creatin is almost entirely absent. On the other hand, in carcinoma of the liver the creatin excretion is high, and in this case reaches a total of 1·160 grammes for the 24 hours.

These results have been confirmed by Hoogenhuyze and Verploegh,⁵ but in addition they find an increased excretion of creatinin in some cases. The various details and also tables of results will be found in the respective papers of the above-mentioned authors. The results obtained by one of us (R.L.M.W.) in an investigation of several cases of malignant disease tend to support the view put forward by Mellanby. The outcome of this work seems to establish the value of the changes in creatinin and creatin excretion as a means of diagnosis in malignant disease. In the present case the creatinin excretion being subnormal and the creatin excretion high, it was concluded that the chondro-carcinomatous growth was not confined to the testis and neighbouring structures but had invaded other regions and was probably of widespread distribution. This conclusion was later shown to be correct, although, unfortunately, the want of a necropsy prevented an investigation of the condition of the abdominal organs.

Conclusions.—The following brief conclusions are drawn from the present case, from an interesting case recorded by Caddy⁶ and from Nicholson's paper. All primary new growths of the testis are comparatively rare. Carcinomata are commoner than sarcomata. Carcinoma proper and embryoma occur with about equal frequency. Chondro-carcinoma belongs to the embryoma class. Its usual characters are as follows: a tumour of the testis in a male adult, of average age 30, often following an injury, particularly a blow, sometimes with a considerable latent period between the blow and the rapid growth of the tumour.

The tumour is often painless and only noticeable because of its size and weight. The general health is at first unaffected and may remain so even at the commencement of the formation of metastases. Metastasis is rapid and general, abdominal organs, and next in frequency lungs, being affected. The growth is often highly malignant. Microscopically, the growth originates in the testis and contains representatives of all the embryonic layers; commonly it is the hypoblastic portion which assumes malignant properties. Involvement of the liver by secondary growth is shown (as with other malignant growths) by the diminution of creatinin and the appearance of creatin in the urine. With such alteration the removal of the primary growth can be only palliative.

We have much pleasure in recording our indebtedness to Mr. Barton White, of the Cardiff Mental Hospital, Whitchurch, for the excellent microphotograph reproduced above.

Cardiff.

THE ENUCLEATION OF TONSILS WITH THE GUILLOTINE.

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THE importance and advantages of the total removal of diseased tonsils are partially, but, we believe, not sufficiently recognised. As this operation is performed by most members of the profession both in surgical and general practice its results are often disappointing, owing to the recurrence of symptoms, so that one or even two further operations have to be performed before complete relief is gained. It is surprising that an incomplete operation such as tonsillotomy should have persisted so long, which does not fulfil the surgical canon "that the whole diseased focus should be removed." In order to carry out complete removal some form of enucleation is generally necessary, and this has usually been performed by means of dissecting forceps or other blunt instruments. The guillotine as generally used removes little more than the projecting portion of the tonsil, and in that large class of case where there is no projection beyond the faucial pillars the guillotine is considered inadequate or no operation is performed at all. In some cases the tonsil is completely enucleated with the guillotine, but this is the exception rather than the rule. By a special method of using the guillotine we are able in nearly 50 per cent. of all cases, including tonsils of all shapes and sizes, to enucleate the tonsil complete in its capsule in one piece. In other cases it is possible to remove the tonsil in two or more pieces even to the last fragment of capsule. The recurrence of symptoms after tonsillotomy is somewhat discreditable to the method. Serious discomfort, inconvenience, and illness during an important period of life—namely, that of adolescence—are only too frequent in those who have had their tonsils removed previously, commonly more than once. In these cases the septic focus remains, and is able continuously to exert its harmful effect.

There are some anatomical points in connexion with the tonsil of importance from a surgical point of view. The tonsil represents a lymphatic gland, with numerous lacunæ which extend through its substance as far as the capsule. Its two surfaces, faucial and cervical, have important relations. The faucial, which is seen on looking into the throat, may project for some distance towards the middle line, and is studded with the orifices of the lacunæ; this is their narrowest part, so that there is no readiness of discharge should the lacunæ become filled with pus or caseous material. The cervical surface embedded in the wall of the pharynx is covered by a distinct capsule which is connected to the pharyngeal aponeurosis by loose areolar tissue, so that the tonsil can be freely moved over this surface. Its firm attachments are those where its mucous membrane joins that of the pillars of the fauces, and this is the only part which requires division in the operation of enucleation. The upper pole of the tonsil is usually

³ Loc. cit.

⁴ F. Mellanby: *Journal of Physiology*, vol. xxxvi., 1908, p. 447.

⁵ Hoogenhuyze and Verploegh: *Hoppe Seyler, Zeitschrift für Physiologische Chemie*, vol. lvi., 1908, p. 161.

⁶ Arnold Caddy: *Chondro-carcinoma of the Testicle*, *Annals of Surgery*, 1899, vol. xxx., p. 210.