so safe nor so feasible as they seem to be and are apt to be followed by wrinkling of the capsule cell proliferation or more or less obscuration of the pupil. Besides, the breaking up of the capsule sets free particles of lenticular cortex which are not easily seen at the time of extraction and which although comparatively harmless when retained within the capsule become a formidable source of irritation if set free in the anterior chamber or when brought into contact with recently cut surfaces. It is best, therefore, I think, as a rule, to follow Professor Knapp's advice and to incise the capsule in its periphery only on a level with the upper border of the lens, to get rid of as much cortex as possible, and to take the chance of a second operation should that become necessary. If it does become necessary then we must above all be careful to avoid any manipulation that will involve drag on the ciliary processes. The late Sir W. Bowman endeavoured to avoid this risk by breaking up the capsule with two needles, one in either hand. With these he penetrated the cornea at an angle of 60° or thereabouts, pierced the capsule, and then, by revolving the points of the needles round each other and separating the handles, tore the opaque film asunder without any drag on the tissues with which the capsule is connected. The needles, however, are apt to dig into the vitreous humour, manipulation of the doubly impaled eyeball is difficult, and the operation is not always successful; hence Professor Noyes of New York has suggested that we should transfix the eyeball with a Graefe's knife, and then with two blunt hooks passed through each of the external wounds and pulling one hook against the other, establish a sufficient aperture without drag on the ciliary region. The hooks, however, can only be withdrawn with their concavities upwards, and the double manipulation of the eyeball on the stretch and with a contracted pupil complicates matters sometimes to an embarrassing degree. I have, therefore, substituted sharp hooks so curved that they may be entered and withdrawn in any position. These operations, however, do not always attain the end in view, and we are at present practically limited to a choice of three methods when operating for secondary cataract: (1) simple discission through the cornea as practised by Professor Knapp and myself within a fortnight of extraction; (2) simple discission behind the iris and through the sclera, three millimetres from the limbus, as advocated by Gama Pinto and at present practised by Harry D. Noyes of New York; and (3) avulsion of the membrane, as adopted in the case which I have here recorded—an operation which is habitually practised by Professor Panas of Paris and which may be rendered comparatively safe by first separating the circumferential attachments of the capsule.

Nottingham.

A CASE OF MALIGNANT DISEASE OF THE OVARIES.

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THE case here recorded is one of malignant disease of the ovaries which presents clinical and pathological features of considerable interest.

The patient, a single woman, was admitted into the London County Asylum, Hanwell, on Nov. 7th, 1897. At the time of her admission she was 56 years of age and was suffering from terminal dementia. She had been insane for over 17 years, was of German nationality, and was absolutely incoherent, and quite incapable of describing or complaining of any unusual sensation or symptom. Her bodily health was indifferent, but until October, 1898, this called for no particular note. Early in this month, however, she became obviously worse and was put to bed. On Nov. 3rd she was allowed to get up, but walked about with her body bent slightly forwards and with her hands placed over her abdomen as if in pain. She was therefore put back to bed and on examining her abdomen nothing abnormal was detected. The abdominal parietes were

somewhat retracted but not more so than would have been expected from her partially emaciated condition. No vaginal examination was made at this time. She remained in bed and no further detailed examination was made until Nov. 17th, on which day she vomited. It was then found that there was a swelling occupying the lower part of the abdomen. It appeared to be rising out of the pelvis rather to the right of the middle line and extended to about half-way between the pubes and umbilicus. It was rounded in shape, fairly regular in outline, dull upon percussion, and firm but somewhat elastic to the touch. A catheter was passed upon which about an ounce of normal urine was withdrawn. Per vaginam it was found that the uterus was pushed over towards the left and against the posterior pelvic wall, the cervix being depressed and easily accessible. Her temperature on the evening of this day reached 99·6° F. and on the 18th at 8 P.M. it reached 100·6°, the highest recorded point. During the next few days her temperature generally rose to 100° at night, falling in the morning to 99°. On Nov. 27th she commenced to suffer from diarrhoea of a mild type. By this time the tumour had increased enormously in size, being, as far as one could judge, at least three times as large as when first observed on the 17th (10 days previously). Its character also had altered. It was no longer regular in outline but had become distinctly nodular and the percussion note over it was now not uniformly dull. Its highest limit had reached to above the level of the umbilicus, and about three inches to the right of the middle line the tumour was crossed in a nearly vertical direction by a line of resonance. This line of resonance ceased in the right iliac region about two inches above Poupart's ligament. On the left the tumour had now extended well towards the flank. The left upper corner of the growth was cut off from the remaining portion by a line of resonance almost semicircular in shape. With these two exceptions the whole of the tumour was dull on percussion and no evidence of the presence of any fluid could be made out. There was no ascites. The superficial abdominal veins were more evident than usual.

On Dec. 6th the patient was put under chloroform and an exploratory incision was made by Dr. M. Handfield-Jones. There were extensive adhesions and the tumour was found to be almost solid throughout. Death took place on the morning of Dec. 9th.

At the necropsy, which was held within 24 hours after death, a large tumour was revealed arising from the pelvis. The kidneys were quite free. Some coils of intestine were free in the upper part of the abdominal cavity, but the remainder were adherent to the tumour which to all appearances had infiltrated the mesentery. The tumour was in the middle line and was firmly adherent around the brim of the pelvis. It was slightly adherent to the posterior parietes, but had formed somewhat firmer adhesions with the lower part of the anterior abdominal wall. On removal it was found to be a growth from the region of the right broad ligament. The ovary on that side could not be found, but the Fallopian tube was intact. The tumour therefore in all probability grew from the right ovary. In doing so it pushed the uterus backwards and tilted it to the left side. It appeared to have infiltrated the sacral glands, making a firm union with the rectum and also the lumbar glands and the mesentery above. On its anterior surface were two coils of intestine which corresponded with the resonant areas found clinically. On the left it was adherent to the left ovary, which was also the seat of malignant disease and had become enlarged to the size of a small fist.

On section the central part of the tumour was white and had the appearance of loosely packed fibrous tissue. The peripheral parts had a red, fleshy appearance. These growths, together with the uterus, which was small and atrophic, weighed 3·63 kilogrammes (a little over 8 lb.). The larger tumour measured, taking its greatest diameters, 24 centimetres long by 18 centimetres broad and 14·5 centimetres thick.

Microscopical examination of the various parts of the tumour revealed a great diversity in the component elements. Some parts were composed almost entirely of cells, with an intercellular substance slightly fibrillar or granular; other parts were almost entirely composed of bundles of fine fibres, with here and there a small round cell; and other parts had a striking lymphatic structure. There were extensive hæmorrhages into the substance of the tumour generally, every field containing scattered blood corpuscles and many

of them altered in shape. The blood-vessels were for the most part not clearly defined, or were defined by rows of spindle-cells. A correct description of the cell elements of ovarian tumours is of extreme value from many considerations which cannot be entered into here. The normal structure contains many cells of a very elementary type, which makes it conceivable almost for any kind of tumour to be developed, and also renders it possible for great metaplasia to occur in any one growth. Some parts one could classify as being fibro-sarcomatous, others as small round-celled sarcoma, and others as lympho-sarcoma. Oval cells did occur, but were isolated and few in number.

The following were some of the commoner cell elements : (1) extremely small, darkly-stained, round cells, about two-thirds the size of a red blood corpuscle, which may have been nuclei of broken-down cells (?); (2) cells a little larger than a red blood corpuscle, staining poorly with a small nucleus or nucleolus; (3) still larger cells staining deeply and containing many granules; (4) cells similar to No. 3 but oval; (5) cells like large leucocytes with two or three nuclei present; (6) large flat cells, oval or irregular, sometimes containing a nucleus; (7) small branching cells; and (8) red blood corpuscles, some showing a degree of poikilocytosis (?).

Remarks.—Pathologically, malignant ovarian tumours are of interest because of the obscurity which surrounds the actual tissue from which they develop, particularly when they occur after the climacteric period. In the normal ovary the cell elements are mainly of two kinds : (a) the germ epithelium of Waldeyer with the various cells forming a Graafian follicle; and (b) connective tissue elements, condensed in the cortex but everywhere of an elementary type. The rapid growth and extensive infiltration in this case point to sarcoma. The age, however, is somewhat over the time at which the commoner forms of sarcomata commonly develop. According to Cohnheim, tumours grow from unutilised embryonic tissue, and it is extremely probable that in this case the growth took its origin in the elementary form of connective tissue mentioned. A malignant growth having its origin in the epithelial coverings of the ovary was possible. The age of the patient was one at which there is a proneness to malignant disease, and the most likely part of the ovary to take on this character was this elementary form of connective tissue. The growth was rapid, a little over two months being taken to produce a tumour of great size. A noticeable clinical feature was the absence of ascites, the presence of which is so usual in ovarian growths.

PRUSSIC ACID IN SWEET CASSAVA.

BY PROFESSOR CARMODY, F.I.C., F.C.S.

FRANCIS, one of my predecessors in the Trinidad Government Laboratory, was the first¹ to point out that prussic acid was present in sweet cassava to a considerable extent. Francis's results have not received the attention which they deserved, probably because they were a direct but unconfirmed denial of statements repeatedly made by recognised authorities. There are very few recent editions of toxicological handbooks that make any reference to the results published by Francis. Even in standard reference works like that of Dr. Thorpe's "Dictionary of Applied Chemistry" it is stated that "the milky juice in the sweet variety is innocuous, whilst that in the bitter is highly poisonous."

The question is of importance from a toxicological point of view in those places in the tropics where cassava is used extensively as a food. For poisonous symptoms are not infrequently reported after a meal of sweet cassava; and as the two kinds of cassava—the sweet and the bitter—are so much alike as to be almost indistinguishable, the conclusion usually arrived at is that the bitter variety has been cooked in error.

My results fully confirm those of Francis as to the presence of hydrocyanic acid, although his average figures are somewhat higher than mine. This year has been an unusually dry one for Trinidad and a diminished supply of rain does affect the character of plant juices.

¹ Analyst, April, 1877.

The method of analysis adopted by me differs somewhat from that of Francis. He grated 500 grammes of cassava into 500 cubic centimetres of water which was left for two hours in a well-closed vessel. It was next strained through a linen cloth into a flask which was then corked and allowed to stand until the starch subsided. 200 cubic centimetres of the clear liquid were decanted and distilled and the results obtained were multiplied by four for the total in 500 grammes. This calculation was based on the assumption that the original 500 grammes contributed 300 cubic centimetres of water—an assumption which is not far from the truth if the cassava is quite fresh. Francis also remarks that a slight loss occurred during the process of grating, and in a tropical laboratory this loss might be appreciable. I endeavoured to avoid this loss on the one hand, and the possibility of error through assuming that all cassavas contained 60 per cent. of water on the other, by taking the whole root, slicing it quickly, and allowing it to stand in water all night in a well-corked flask. The liquid was decanted in the morning and the whole distilled. The extraction with water was repeated a second and a third time. The slices effectually prevented the great disadvantages arising from the starch finding its way into the distilling flask, which Francis prevented by subsidence but which necessitated his distilling an aliquot part, this aliquot part being a definite volume of 200 cubic centimetres taken from an approximate total volume of 800 cubic centimetres.

Francis does not appear to have made more than one extraction with water. I have made three in all cases and in some as many as five. I have found that with slices the second extraction yields as much, and sometimes more, than the first. I have repeated Francis's method of grating and find that a second extraction yields about half as much prussic acid as the first. It would appear from this, therefore, that Francis's results are not as high as they would have been had he made a second extraction. The figures obtained by Francis and myself are :—

		HCN per cent.			
		Francis.		Carmody.	
Mean ...	...	0.0168	...	0.010	...
Highest ...	...	0.0238	...	0.019	...
Lowest ...	...	0.0113	...	0.005	...

It will be seen from this that while my "lowest" percentage is much below that of Francis my "highest" is nearly the same as his. This establishes the truth of the statement made by Francis, "that the so-called sweet or harmless cassava not only yielded prussic acid, but the quantity obtained from it so nearly equalled that from the bitter that no line of distinction could be drawn between them," so far as it relates to the amount of prussic acid in the cassava; but I have discovered an analytical difference between the two kinds by means of which they can be satisfactorily distinguished.

This discovery arose in trying to avoid the difficulties caused by the presence of starch in the distilling flask. At first I placed the slices in the distilling flask, added water in one set of experiments, and passed steam through in another and collected the distillates. This failed in each case through the gelatinising action of the boiling water or steam on the starch. This starch being chiefly confined to the inner portions, in my next experiments I soaked the inner slices in water at ordinary temperature, decanted and distilled. The quantity of starch thus admitted into the flask was so small as not to interfere with the distillation. The skin and outer cortical layer, which together constitute about one-fifth of the total weight of the sweet cassava, could be placed direct in the distilling flask, and the distillation carried on satisfactorily. It was this separation of the parts for convenience in distillation that led to the discovery that in sweet cassava the prussic acid is located chiefly in the skin and outer cortical layer.

The following are some of the results obtained from fairly representative samples of sweet cassava.

Inner part. HCN per cent.	Skin and outer cortical layer. HCN per cent.	Inner part. HCN per cent.	Skin and outer cortical layer. HCN per cent.
0.006	0.033	0.004	0.024
0.003	0.014	0.010	0.030
0.015	0.033	0.004	0.042
0.008	0.031	0.005	0.028
0.011	0.020	0.003	0.034
0.008	0.032		