

REPORT UPON THE MICROSCOPICAL CONDITION OF THE DIFFERENT ORGANS, WITH REMARKS UPON THE PATHOLOGY OF THE CASE.

By R. F. C. LEITH, F.R.C.P. Ed., Pathologist to the Royal Infirmary; Lecturer on Pathology, Edinburgh School of Medicine.

PARTS of the mammae, lung, heart and pericardium, liver, spleen, suprarenal bodies, kidneys, peritoneum, stomach, dura mater, and bone marrow were selected for microscopic examination. They were fixed in corrosive sublimate, hardened, embedded in paraffin, and cut with a rocking microtome. The sections now shown were stained with logwood, rubin and orange, and with binodi; and the following is a synopsis of a more detailed account prepared by me of the main changes observed microscopically, and of the many questions of pathological interest suggested by the facts of the case:—

The Mammæ.—As seen under a low power, a general and somewhat diffuse infiltrating cancer is disclosed. The striking nodular appearance to the naked eye is now hardly so apparent, but distinct foci are everywhere visible, with spreading margins and communicating chains, between which are areas showing the normal secreting gland-tubes and their ducts. These are separated from the cancerous growth by well-defined and dense fibrous bands in some places, while in others only a slight barrier of fibro-cellular tissue intervenes. The secreting cells of the gland have not taken the stain well, their protoplasm being pale and their nuclei indistinct. The duct epithelium, on the other hand, has mostly stained well, its nuclei being clear and distinct. The pre-existing bloodvessels of the gland, wherever visible, seem to show a considerable thickening of their adventitia. No cancer cells can be detected in the lumen. The outlying lymphatics are occasionally seen to contain a few cancer cells, never so numerous as to form a complete plug. The cancerous foci are of varying size, and show a considerable variation in the amount of their fibrous stroma and in the size of their alveoli. Towards the centre the fibrous stroma is mostly denser than towards the periphery, and the alveolar spaces are mostly small. Some are long and tubular, others short and irregular. Their infiltrating margins scarcely show a distinct alveolar arrangement—rather an ill-defined, somewhat delicate network. Bloodvessels are sparsely present in all parts of the growth. The cancer cells are nearly all remarkably small. Some alveoli, especially towards the periphery, contain only two or three, others contain many. Those towards the centre of some of the foci are apparently much degenerated. While a few of the cancer cells are fairly large, each with a well-defined nucleus, sometimes two, and distinct protoplasmic substance, the great majority are smaller than leucocytes, with very little protoplasm and large clear nuclei. The cancerous nature of the growth is undoubted, but it is not at all typical; in places it is distinctly

of the scirrhus, and in others of the encephaloid type. Its appearances and extensions indicate that it is of comparatively rapid growth, that its cells are prone to degenerate, and, being carried by the lymphatic vessels of the gland, have everywhere along the course of these vessels been deposited as cancerous thrombi, which have formed the centres of new foci.

The Lungs and Pleura.—The deeper layer of the visceral pleura is everywhere implicated by cancerous growth. The lymphatics are extensively and apparently universally filled with cancer cells, while at close intervals there are little areas of cancerous growth around them, consisting of fairly well-formed alveoli, more or less completely filled with the same small form of cancer cells as were so plentifully observed in the mammæ. In some of the alveoli they show a tendency to form a lining to the spaces. This cancerous infiltration is seen throughout the thickness of the pleural membrane, but is always most marked towards the deeper layer. It encroaches, but only slightly, on the lung substance in certain parts, and shows some tendency to pass along the lymphatics of the interlobular septa. There are no cancer cells in any of the bloodvessels so far as can be seen, although some of the vessels showing cancer cells abundantly also show red blood corpuscles. This obviously suggests that such vessels may be small veins; but I am rather inclined to look upon them as lymphatics into which small hæmorrhages have taken place. The parietal pleura did not differ materially from its visceral layer. In no part of the lung substance was any separate cancer nodule or growth detected, though a few small black nodules, which lay in the deeper layers of the pleura and in the lung substance close to it, showed a much pigmented fibrous tissue, with cancerous implication here and there.

The Bronchial Glands.—They were implicated to a varying extent,—in parts showing an extensive growth of small-celled cancer, and in others scattered foci of the same nature. Their capsule was not thickened nor their surface irregular. There was no sign of tubercle throughout the glands.

The Heart and Pericardium.—The general structure of the pericardium and epicardium was unaltered, but everywhere along the latter were nodules of cancerous growth, some of which were quite invisible to the naked eye, and others easily visible. At these sites the epicardium was increased in thickness, diminishing to its normal between the separate foci. None of the sections showed any continuity between the separate cancerous foci, which were as distinct microscopically as they appeared to be to the naked eye. The structure of each focus is not that of typical cancer. It shows a general cancerous infiltration of the lymphatic and tissue spaces lying between and around the fat cells of the deeper layer of the epicardium. Towards the surface there appears to be a new formation of a fine cancerous stroma, but it is confined to the

deeper layer of the epicardium, being in no part seen to invade the denser superficial layer. Towards the muscular substance there is no infiltration along the intermuscular septa, and there is no implication of the muscle substance. The cancer cells are here also very small, but they stain better than those of the mammae, and appear to show much less degeneration. On the endocardial surface, towards the base of one of the papillary muscles of the left ventricle, a single cancerous nodule can be detected. It is composed of a finely fibrous stroma, with small alveoli filled with the same small vigorous-looking cells as are seen in the epicardium.

The Liver.—A considerable variety in the structure of the nodules is seen. The larger ones are much degenerated in the centre, and in parts there is much fibrous tissue. The liver substance around the nodules is acutely congested. Contiguous nodules, apparently separate to the naked eye, are now sometimes seen to be connected with one another, and such nodules often show a transition of structure from that of an adenoma to that of an ordinary so-called alveolar cancer. Thus in places the alveoli are lined by a single layer of cubical cells giving the appearance of glandular ducts; in others, while the wall is lined by a regular layer of cells similar to the last, the lumen also contains cells arising from proliferation of the lining layer, and still further away typical alveoli filled with cancer cells appear, showing a cancerous structure of the characteristic encephaloid type. The cancer cells are mostly small, closely resembling those already observed in the mamma, pleura, and epicardium. No large cells and no giant cells are anywhere visible. The lymphatics of some of the portal spaces, especially around the portal veins, are engorged with cancer cells, but the distribution is far more extensive than a mere lymphatic distribution alone could account for. The polymorphic and metamorphic character which cancer in the liver not infrequently assumes is well represented here.

The Spleen.—Sections were taken from many different parts, some involving the capsule, and others deep in the substance of the organ. A comparison of these sections reveals several questions of much interest in relation to the lymphatic and vascular distribution of the cancer cells. The subcapsular lymphatics seem pretty generally filled with these cells, but they are by no means confined to them. However well defined the separate nodules appeared to be to the naked eye, few of them are seen to be so now. A well-defined cancerous stroma is the exception, so that in very few places indeed is the structure of typical cancer revealed. Here and there, however, the alveoli are well formed, their walls of considerable thickness, and their included cells of large size. In most places the alveolar walls are delicate and their cavities small. The cancer cells are of the same small size as have been already seen to prevail elsewhere, though, as in the liver and epicardium, they

stain better than in the mammæ. The peripheral alveoli seem to communicate freely with the small venous sinuses of the pulp, as it is difficult to say whether some of the small spaces are cancerous alveoli with hæmorrhage into them, or small venous sinuses infiltrated in part with cancer cells. There are many leucocytes also in the spaces towards the margins of the foci, indicating the probability that many of these are really cancerous infarctions. Some of the larger veins of the splenic pulp appear to contain small cancer cells. The Malpighian bodies, wherever recognisable, seem to be unaltered.

The Suprarenal Bodies.—They are seen to be unequally implicated; in places there is no normal gland structure left, while in others it is clearly visible, being infiltrated on all sides by cancerous growth. The former show the older growth. The alveolar spaces are large, often rounded, and their walls are well formed and fibrous, but their included cells are mostly small, with a single clear nucleus and one or two nucleoli. This distinct alveolar arrangement gradually becomes less and less distinct where it merges into the general cancerous infiltration above mentioned. The capsule of the suprarenal is not much thickened, while the fibro-cellular and glandular tissues around the body are all extensively infiltrated with the same diffuse cancerous growth.

The Kidneys.—Separate nodules are seen in the capsule and invading the kidney substance. Other small ones are seen in the superficial cortex and in the mucous membrane of the calyces, and so implicating the apices of the pyramids, but none are seen embedded in the substance of the pyramids. These nodules are nearly all of the same structure, and more clearly circumscribed than they are elsewhere. The alveoli are mostly fairly well formed, and the cells are small, sometimes forming a distinct lining for the spaces, at others filling their entire extent. The Malpighian bodies are slightly congested. The straight vessels are also congested. The cells of the convoluted tubules are fatty. None of the vessels can be seen to contain cancer cells.

The Pancreas.—A number of minute rounded areas, invisible to the naked eye, are seen to be scattered irregularly through the substance of the organ, as well as beneath the capsule. They consist of alveoli, with delicate fibrous walls containing numerous small epithelial cells. Neither the bloodvessels nor the lymphatics of the gland seem to contain any cancer cells, and the nodules are sparsely and irregularly distributed.

The stomach shows a few small and similar nodules in its sub-mucous tissue.

The Dura Mater.—The nodules upon the inner surface are seen to consist of a profusely growing cancer, more dense in its deeper parts than near the arachnoid surface, where it is delicate and spongy. Towards this surface the cells are abundant, and the stroma is delicate and scanty, but further out well-formed alveoli

are seen, containing the characteristic small cells already observed to be mainly present in all the organs. At the thickest and central part of each nodule the whole structure of the inner part of the dura is replaced by this cancerous growth. Close to the internal surface a few large sinuses filled with blood are seen to lie among the cancer cells. At the periphery of the nodule the thickness gradually diminishes, and there is a transition into the normal membrane. The outer layers of the dura, which is apparently nearly smooth on its cranial side, are seen everywhere opposite the internal nodules to contain spaces filled with cancer cells. These spaces seem mostly to be lymphatic vessels and tissue spaces injected with cancer cells, but here and there small nodular formations appear, similar in character to those so plentifully visible upon its inner face.

The Bone Marrow.—Many small nodules similar in character to those in the spleen are seen. The cancerous tissue entirely replaces the bone marrow, and consists of the same delicate stroma and abundant small cells. Towards the oldest part of the growth in the upper part of the femur there is much dense fibrous tissue, and few cells, which are of larger size than elsewhere. This growth is here seen to implicate every part of the bone and its periosteum, while in the lower more quickly growing parts isolated nodules are well seen, though their margin fades indefinitely into the red marrow.

REMARKS.—The striking appearance of both breasts is one of the most remarkable points in this remarkable case. The clinical history seems to indicate that the left breast was the starting-point of the disease, for the patient accidentally noticed the presence of a lump in it as early as May 1890, or nearly three years before her death. This lump was about the size of a walnut when first noticed, and appears to have been in and remained in a quiescent condition, for she stated that it did not increase in size, or materially alter its character up to and after the time of her admission in January 1893, under Dr Bramwell's care. It was not until October of 1892 that new lumps appeared apparently simultaneously, so far as patient herself could determine, in both breasts. I did not detect this original lump at the time of the section, and the parts selected for microscopic examination did not include any of it, so that I am so far unable to say whether it corresponded in structure to that of the other nodules or not. The length of time intervening between its appearance and that of the other nodules only suggests the possibility of their having an independent origin and structure.¹ There is no doubt whatever

¹ At the meeting at which this paper was read, Mr Stiles, to whom the left breast had been given for examination, stated that this primary nodule was a simple fibroma. This case, therefore, adds another instance of the comparatively rare association of a benign and malignant tumour in the same breast.

that one or both breasts were the primary seats of the cancer. I do not know of any instance in which the breast has become affected with secondary cancer. No such case has been recorded, if we except the instances of one breast becoming affected from the other, either before or after removal of the latter, although secondary nodules formed by lymphatic metastasis in the same breast are demonstrable in everyday experience. It is practically impossible in this case to say whether the disease began in the one breast and spread over to the other, or began in both simultaneously. The appearance of small cancerous nodules in chains between the two breasts may be equally indicative of a spread from a primarily to a secondarily infected organ, or a mutual inter-communication between two primarily infected organs. On either supposition the condition is a rare and remarkable one. The occurrence of more than one palpable primarily malignant tumour in one breast is in itself one of extreme rarity, if indeed it ever occurs; and even in cases in which they are said to have been observed, they have occurred as quickly growing nodules which soon coalesced. I do not here refer to the small and obviously secondary nodules so often seen and felt at a distance from the main tumour in a breast *after it has been removed*. For it will be remembered that the number of separate visible and palpable tumours in each breast before its removal in this case was very great. Nor do I mean to state that all these nodules were of primary growth, for the great majority were, as their clinical history, size, and microscopic characters showed, of undoubtedly more recent appearance and younger growth, and it is now practically impossible to say whether more than one was primary. The primary nodule or nodules had thus given rise to secondary and separate nodules in the same organ by a true metastasis which was mainly, if not entirely, by means of the lymphatic vessels. These were seen microscopically to contain cancerous plugs, partially filling them, and it is possible that some unusual particulate or chemical irritant derived from the cancerous growth in its course along the lymph stream in advance of the cancer cells, set up an irritation of the endothelial lining of the lymphatic vessels, causing some alteration in them which favoured the frequent and abundant settling down of the cancer cells upon their walls, and that such cancerous thrombi formed the nuclei of new nodules. The chains of nodules radiating towards the axillary glands on the outside, towards the neighbouring breast on the inside, towards the clavicles and neck above, and towards the lower part of the thorax below, are further evidence in the same direction. In regard to the last position, however, there arises this difficulty, that if the nodules result from a transportation of the cancer cells by the lymphatic vessels, such transference must have taken place in a direction contrary to that of the normal lymph stream. It is well known and recognised that bacteria may travel along the lymphatics in a direction contrary to that of the lymph

stream, but it does not follow that non-motile cells can do so. This difficulty is most easily met by supposing that from some cause the normal direction of the lymph stream upwards towards the axillary glands had been reversed. Such a condition is generally seen in the superficial veins of the thorax when the superior vena cava is obstructed. If such were the case here, it is easy to understand how the nodules around the umbilicus and those among the inguinal glands arose, for the lower thoracic lymphatics cross and mingle above the umbilicus with the superficial lymphatics of the greater part of the surface of the abdomen, which descend and converge towards the superficial inguinal glands lying along the line of Poupart's ligament. If this supposition be not correct, I can see only other two ways of accounting for their presence. *1st*, By direct invasion. This might be aided, wherever possible, by the lymph stream, and in other places the line of communication between the separate nodules, although invisible to the naked eye, might be sufficiently obvious microscopically. *2nd*, A late deposition into the lymph spaces after a transportation of the cancer cells by the systemic bloodvessels, and the formation of cancerous thrombi. It is noticeable that many of the nodules exist where no lymphatic glands are normally found, but this might easily be explained by the supposition that new or evoluted lymphatic gland foci had been found in these positions, a condition which Stiles¹ has shown to probably frequently occur in relation to the spread of cancer.

I have now to consider the method of spread to the parietal and visceral pleura. How is the apparent limitation to the lymphatic vessels and spaces and their neighbourhood in these membranes to be explained? Three possibilities present themselves. *1st*, A direct transference from the mammæ through the chest wall to the parietal pleura. It is impossible for this to have taken place through the normal lymphatic channels, for the retromammary lymphatics all communicate with the lymphatics of the deep fascia which pass as large trunks to the lymphatic glands of the axilla, and do not in any way communicate with the lymphatics of the pleura. There remains, then, only a direct and continuous invasion of the pectoral muscle and its underlying tissues the intercostal muscles and the pleura. In support of this view it may be noticed that I found small nodules in and below the pectoral muscles and others attached to the periosteum of the ribs. On the other hand, these nodules were often some distance apart, and had apparently no connexion with one another, and may have been due to infection through the circulation; further, those in the parietal pleura were not more numerous underneath the position of the mammæ than elsewhere, and there was no sign of extension from the outer to the inner layer at the root of the lung.

¹ *Transactions of the Medico-Chirurgical Society of Edinburgh*, 1892, pp. 58, 59.

Moreover, the cavity of the pleura, into which the cancer cells were probably freely discharged, does not communicate with the lymphatics of the visceral layer, as is so clearly shown in an ordinary carbonaceously pigmented lung where the carbon particles are freely deposited in the lung tissue, and often abundantly in the subpleural tissue, but never in the sac itself. Quain, vol. ii., p. 503, says the lymphatics do communicate by means of stomata with the pleural cavity. The affections of the visceral from the parietal layer, which, it will be remembered, were not in the slightest degree adherent to one another, might be explained by an auto-inoculation. That such a method of inoculation is possible where surfaces constantly rub against one another is illustrated by a cancer of the posterior wall of the bladder giving rise to a secondary growth on the anterior wall. Coats¹ mentions this condition, but the whole question of the possibility of inoculation of cancer is still unsolved. Many experiments have been performed upon animals, and even upon man, but their result has hitherto been negative. The most recent experiments by D'Arcy Power² have so far given promise of a better issue, but in the present case the far greater extent and amount of the infiltration of the visceral as compared with that of the parietal layer would in itself contradict it even were the possibility of such an inoculation allowed. *2nd*, An extension from the peritoneum through the lymphatics and tissues of the diaphragm. I have frequently seen this method of spread, but in such cases the parietal pleura has been more especially affected. The visceral layer can only be affected by an extension first to the root of the lungs and thus to their serous covering, or by a direct invasion by the cancer cells free in the pleural cavity. *3rd*, A distribution by the blood. The cancer cells can reach the blood only by passing along the lymphatic vessels to the lymphatic glands, where they generally remain for a long period, but after a time they make their way by direct extension into the small veins of the gland, and thus reach the systemic veins. Since the lymphatic glands act as sieves, none or few of them will be allowed to pass onwards into the thoracic or right lymphatic duct, and thus into the large systemic venous trunks. They thus reach the right side of the heart and pass by the pulmonary artery to the lungs. The cancerous emboli may stick in any part of the pulmonary capillaries, and thus form secondary nodules in the lungs, but it is to be remembered that the pulmonary capillaries are wider than those in any other part of the body, and that it is therefore possible for small emboli to pass through them, and thus reaching the systemic circulation, pass to the brain or other organs, and there give rise to the phenomena of embolism or of infarction. In this

¹ *Manual of Pathology*, 1889, p. 264.

² *British Medical Journal*, 1893, vol. ii., p. 830.

case no nodules were observed in the lung, and the cancer cells must have passed freely through the pulmonary capillaries, a course which their very small size would certainly favour. Now, it is to be noted that the capillaries of the deeper layer of the pleura come from the bronchial arteries, and, though the two systems freely anastomose, especially around the terminations of the bronchial tubes, they are not at all likely to have received such a plentiful cancerous stream from the pulmonary capillaries. This would necessitate a transportation of the cancer cells into the pulmonary veins, and thence to the left side of the heart and systemic circulation generally, when they would pass along the bronchial arteries to their capillaries. This would explain also the cancerous condition of the bronchial glands which the bronchial arteries supply. It is quite possible that the cancerous infiltration of the visceral layer of the pleura was brought about through both these channels, and that once it gained a footing it spread rapidly by continuity and by invasion of the lymphatics to bring about the general cancerous infiltration observed in that membrane. The affection of the epicardium is probably to be explained much in the same way, although its limitation is certainly curious. These membranes, the pleura and the pericardium, especially the former, are comparatively commonly the seats of secondary cancer, while it is stated by competent authorities that primary cancer does not occur. Coats, Harris, and others, however, mention cases.

The liver is probably the commonest site of secondary cancer. It is easy to understand why this should be so, on account of its double blood supply through the hepatic artery and the portal vein; and further, on account of its close contiguity to such frequent sites of primary cancer as the stomach and pancreas. In this case the infecting cells have reached it through the medium of the hepatic artery, and the appearances presented by the diseased organ are in many respects exceptional ones. The immense number and small size of all the nodules present an unusual feature, for it is much more common to find one or more of them of much greater size than the others, and this is especially the case when the primary seat is in some contiguous organ.

The failure of any of the nodules to project beyond the capsule of the organ, so that its surfaces were quite smooth, is also an unusual occurrence, which I have met with on only a few other occasions. The change of type in the microscopic characters of the nodules is another noticeable feature. It is a general pathological law that secondary cancer growths reproduce the structure of the primary tumour, even in its more minute details. They tend to imitate them in the shape, size, and character of their cells, in the amount and arrangement of the fibrous stroma, and even in the character of the vessels. It is a law not without exceptions, as the present case illustrates, and I have seen other instances of a corresponding metamorphoses. So far as primary cancer is con-

cerned, the liver is not a common site. It is, however, not uncommonly met with, and usually presents the unusual picture of a large primary and smaller secondary and separate tumours existent in the same organ.

The spleen is the rarest organ in the body to be affected with cancer. There are a comparatively few cases on record altogether, and these are mainly in connexion with cancer of the stomach, where the disease spreads into the spleen by direct implication. I have myself seen such a condition, and also an implication of the capsule invading the substance to some extent; but I have never seen anything like the general and diffuse nodular infiltration which occurred in the present case; and so far as I have yet found, no similar case is on record. The greatly enlarged condition of the organ, with a retention of its normal shape and perfectly smooth surface, are additional rare characters. I have seen a cancerous nodule existing in the centre of a large infarction in the spleen in a case of cancer in other abdominal organs, and again in a similar case an infarction of this organ which was regarded as cancerous until microscopic examination disclosed its perfectly simple nature.

Part of Dr Russell's most careful work on the fungi (fuchsin bodies) present in cancer cells was done from a study of sections of cancerous nodules in the spleen which he observed in two separate cases. It is extremely difficult to understand why this organ is so rarely affected with secondary cancer. It may be that the periodic and constant contractions of the organ prevent the settling, and further favour the expulsion of the invading cancer cells; but against this we have to place the great frequency of the occurrence of simple infarctions, the result of the impaction of other emboli in the end arteries of the organ. It cannot be said to be due to the small size of the emboli in the case of cancer, for this would be equally efficacious in preventing the occurrence of secondary growths in all other organs except the lungs; further, we may add that in this particular case the size of the cancer cells in the spleen and elsewhere was unusually small. Perhaps some explanation may be found in the peculiar vital resistance or active destroying power on the part of the splenic tissues themselves. It is well known that many organisms are destroyed in their passage through the spleen, and many septic emboli succeed in producing only simple and not septic infarctions of the organ.

I have not been able to find any authentic record of primary cancer of the spleen. Some of the reported cases were published before the time when the distinction between cancer and sarcoma was made, and others have been recorded in provincial journals in America, which I have not been able to consult. If we accept the view generally upheld by pathologists, that cancer can take its origin only in tissues derived from the epiblast or hypoblast of embryonic life, then we must deny the possibility of the occurrence

of primary cancer in the spleen, inasmuch as it is entirely derived from the mesoblast. Its occurrence might even then, however, be accounted for by the inclusion theory of Cohnheim. The spleen is developed in the substance of the mesogastrium, apparently in the same mass of mesoblast as that in which the pancreas takes its origin, but without the hypoblastic evolution of the latter organ. It is possible to assume an inclusion of this in the separation of the spleen, and that cancer might subsequently spring from this "embryonic residue." Recently an excellent paper by Harris on "Primary Cancer of the Pleura," in the *Journal of Pathology* for November 1893, supports the contention that mesoblastic cells may under certain circumstances take on the characters of those of the epiblast or hypoblast, and thus independently give rise to cancer growth.

The lymphatic glands, while they are extremely frequently the seat of secondary cancer, are in the same position as the spleen in their relation to the primary form.

The left femur was apparently the only bone affected in this case, and the condition of the upper part of the shaft presented most unusual characters. The amount and density of the sclerosis of the whole thickness of the shaft, and its periosteal thickening in this position, were most remarkable. The lower part of the shaft, with its many separate and small cancerous nodules in the marrow, afforded a familiar enough appearance, and indicated a rapid growth totally unlike that of the upper part, which was of a chronic character, and must have been of some standing. The clinical history states that for a month prior to the patient's admission to the hospital, *i.e.*, five months prior to her death, she had been unable to walk without assistance, owing to the pain in the left hip and thigh. The pathological appearances of the upper part of the bone quite warrant this age being put upon them. The frequent affection of the bone marrow by secondary cancer is curious when the close resemblance between its structure and that of the spleen is considered. Besides the bone marrow it often occurs in the cancellous tissue of the ends of the bones, of the ribs, and of the vertebræ. Erichsen gives four cases occurring after excision of the breast, and I have seen it occur also in cancer of the stomach. Primary cancer is reported by several careful observers to take its origin in bone, and quite a number of such cases are recorded; however, as bone does not contain any epithelial cells, we are met with the same difficulty as in the spleen and lymphatic glands. It may, however, be practically primary in the jaws.

Secondary cancer of the suprarenals is not uncommon. It is most often seen as a single nodular mass occupying a considerable part of the organ, with smaller nodules in its neighbourhood, and arises by direct extension from the stomach, pancreas, etc., or by secondary or tertiary infection. Primary cancer is rare. I have

seen one instance of a very large tumour of this nature, a malignant adenoma.

Secondary cancer of the kidney is also not uncommon, and generally arises through a tertiary infection. Primary cancer is rare, and when it does occur is most frequently of the encephaloid type. I have met with instances of it, of scirrhus, and of the malignant adenoma.

Secondary cancer of the stomach is extremely rare, while the primary form is equally common. Secondary cancer of the ovaries is comparatively common following upon the disease in the uterus and other parts, and is generally double, as in the present case. Primary cancer is not common.

The condition of the dura mater is a most curious and interesting one. It is rare to find secondary cancer affecting the membranes of the brain or the brain itself, and when it does so it is usually associated with the disease in the cranial bones. I have seen one such case follow cancer of the stomach. It is further interesting to find the pia-arachnoid quite free, although from the extensive infiltration of the dura-arachnoid there must have been a plentiful distribution of cancer cells in the subdural space. Primary cancer of the dura-arachnoid has been described, being of the nature of an endothelioma arising from the arachnoid layer. It is rare.

A general consideration of the distribution of the cancer in this case excellently exemplifies the belief that the sites commonly affected by secondary cancer are rarely affected by the primary disease, and *vice versa*, for the breast, cervix uteri, stomach, rectum, the lips, tongue, testis, skin, penis, prostate, bladder, and œsophagus, are favourite seats of primary cancer, and in many of these secondary deposit is unknown, and in all of them it is of very rare occurrence.

Dr Stiles said he had examined the patient's mammæ with *Dr Bramwell* last February, when the disease was not far advanced, and he had come to the conclusion that the condition was one of carcinoma. The case was certainly peculiar. He had not seen a similar one before. There were multiple nodules throughout both mammæ. When one met with a condition like this, especially in an unmarried woman, one thought of chronic lobular mastitis with small cysts rather than cancer. But there were beaded chains radiating in all directions from the mammæ, and in the axillæ there were very hard glands. He had removed one of the nodules, and found it to show the structure of carcinoma, but the cells were smaller than usual. He had also examined the mamimæ after death, and prepared naked-eye specimens by the nitric acid method, which showed the nodules, and also a fibroma. This probably was the tumour which was felt some years before. The large number of nodules in the mammæ were to be explained in one of two ways. Either one of them was primary and the others

had arisen from it by dissemination, or it was a case in which the tumours were multiple from the first. The nodules in the front of the abdomen and in the back were to be explained by the opening up of their lymphatics when the usual lymphatic channels from the mammæ became obstructed. He thought that the tumours in the internal organs could only be accounted for by a blood distribution.

Dr Alexander Bruce said he would like to express his astonishment at the condition of the spleen. It was certainly, as *Dr Bramwell* had said, an exceedingly rare thing to see cancer of the spleen at all. When it did occur it was usually an infiltration from the neighbouring organs, from the stomach towards the hilum. This was an almost perfectly unique case. He had never seen anything like it, and there was nothing in the ordinary text-books about it. The infection of the liver and spleen was more likely to be embolic than lymphatic in its spread. It was certainly possible that the dura mater of the spinal cord and brain might be involved from the lymphatic side as well as from the vascular. The infection might have run along the lymphatics of the intercostal nerves, and have entered into the spinal canal through the intervertebral foramina. Then the cancer cells might have passed up through the lymphatics of the dura mater. There was little doubt that tubercular meningitis frequently arose in a similar way from a focus of infection about the spine. With regard to the absence of pigmentation of the skin in this case, it was his experience that Addison's disease was never produced by tumours of the suprarenal capsules, but only by tubercular degeneration of them.

Dr William Russell said, as the condition of the spleen had aroused interest, he might say that he had had one case of diffuse cancer in that organ, and in which there were, so far as he could remember, multiple skin cancers. He agreed with the remarks of *Dr Bruce* regarding the points to which he had referred. Tubercular meningitis, in his experience, was commonly associated with tubercular eruption in the membranes of the cord, and the presence of a primary caseous focus in the thorax or abdomen in some of these cases had been observed, the infection spreading first to the spinal meninges. There was no doubt that it was true that even entire destruction of the suprarenal capsules by malignant disease was not associated with any discoloration of the skin.

Dr Byrom Bramwell, in replying, said that his reference to Addison's disease had perhaps given rise to some misunderstanding. His experience on the point entirely corroborated that of *Dr Russell* and *Dr Bruce*. In this case, however, there had been dense infiltration around the suprarenal capsules, which might have compressed the nerves, which it was probable were affected in tubercular disease of the suprarenals. With regard to tubercular processes in the membranes of the brain and spinal cord, he thought that the condition in the cord when it occurred was

usually trifling in comparison with that in the brain. He did not think that tubercular meningitis was usually an extension from a spinal meningitis. Dr Stiles' suggestion that in this case the cancerous cells got into the blood and produced embolic infections in the various organs was almost certainly true. It was, however, difficult to understand how the cancer cells got into the blood, and how they could pass through the lung without producing tumours there. He had seen innumerable small abscesses in the lung resulting from an abscess in connexion with the liver, and he did not know that the infective particles in the case of an abscess were more likely to stick in the lung than those in the case of cancer.

Dr Alexander Bruce remarked that melanotic sarcomas beginning in the orbit frequently occurred secondarily in the liver without occurring in the lung. In such a case the cells must have been passed through the lung. Probably the reason that the lung was not involved was that the pulmonary capillaries were very large, and therefore enabled cells which stuck in other capillaries to pass through them. In head injuries with a septic consequence there was very frequently abscess in the liver, though the lung escaped.

Dr Leith explained that in his pathological report he had not meant to convey the impression that he believed that in this case the spread of the infection was by means of the lymphatics. He merely meant to dwell on the curious condition that in the internal organs there were lymphatic injections. His explanation was the same as that of Dr Stiles. He agreed with Dr Bruce regarding the great likelihood of cancer cells passing through the lungs without lodging there.

Meeting V.—February 7, 1894.

Dr CLOUSTON, *President, in the Chair.*

I. ELECTION OF MEMBERS.

The following gentlemen were elected Ordinary Members of the Society:—Claude B. Ker, M.B., C.M., Viewfield, Crieff; William Craig, M.B., C.M., Foulford House, Cowdenbeath, Fife.

II. DISCUSSION ON INTRA-CRANIAL SURGERY.

The President made some introductory remarks, after which *Prof. Annandale* opened the discussion from the surgical aspect by reading the following paper:—

WHEN I was honoured by being asked to open the discussion on Intra-cranial Surgery I accepted the invitation with the under-