insufficient number of observations. As a conjecture supported by some instances, I would suggest that these are *stretched bands* often broken off at one end, and lying parallel on the cell-wall. They are beautifully seen with careful oblique illumination under high powers.

This peculiar cell-structure which we have been describing may, then, be supposed to originate in this sort of way. In the lowest cell-layer of epithelium, there are found the newly grown, long, vertically placed

Fig. 2. —Conjoined Epithelium.—1,000 Diameters.

cells, side by side in contact. When these have a somewhat permanent character, as in many fishes, the next layer of cells consists of spheroidal cell-forms which have resulted from division or budding, and consequent "fissiparous" multiplication or budding of a *new* progeny. In all this there is a tendency of dividing cells to remain, at points, united by threads of formed material of hard cell-wall; e. g., amongst these very layers are often found large and branched pigment-cells united by long delicate threads. Thus I imagine the cells of rete mucosum, in multiplying originally by subdivision, retain numerous points of incomplete severance, and these points of cohesion are dragged out and become the uniting bands. These, when severed by any accident, assume the characteristic form of "prickles". In the normal ascending series, these cells, becoming older and flatter, lose all surface-connection, and in the cuticle are simple polyhedral horny blocks. The uniting agency of these cells is a firm one; for in a scraping from a tumour-section, as noticed by Ranvier, they almost always hold together strongly in groups. It is a firmer union than I should expect from any interlocking teeth, but of course one which would naturally result from uniting bands.

Lastly, as to the pathological anatomy. The primary meaning of the presence of these cells is an abnormal formative activity of the lower cells in the rete mucosum; and the occurrence of rib and prickles may be taken as indicative of this structure having become involved. In epithelioma occurring in connection with *flattened* epithelium, both lobular and tubular, they mostly occur. Their development seems to be in direct ratio to the vigour of growth present, and accordingly they were very large in granulations snipped from a perineal fistula. Papilloma and rodent ulcer afford fine specimens; and probably always the best occur in diseases of the transitional epithe-

lium extending from the lips to the cardiac orifice, and on the conjunctival, anal, or preputial epidermis. I have found them unusually fine in a section of preputial chancre. I believe it to be the opinion of Professor Lister, who discovered these cells independently, and named them "echinate", that rodent ulcer, when they are present in it, should be considered as allied to, if not identical with, epithelioma. The presence of prickles-cells in cylindroma leads me strongly to doubt the origin of that form of cancer from the sudariparous glands, according to the received notion. But, as I indicated at first, the real meaning, for medicine and surgery, of these curious cells, remains to be investigated; and it is necessary that some one should do that for their origin, varied forms, monstrosities, and pathological distribution which has been so laboriously accomplished for their anatomy in fishes and amphibia by Professor F. Schultze. My present attempt has been, so far, merely to see more of the true character of their intimate structure, and, if possible, to determine the true mode in which they are united together.*

ON THE STRUCTURE OF THE OVARY IN RELATION TO CERTAIN FORMS OF DISEASE OF THE ORGAN.†

By JAMES FOULIS, M.D., Edinburgh.

IN 1872, Waldeyer published at Leipsic his beautiful work on the development of the ovary. Waldeyer described the ovary as arising in connection with the Wolffian body on its median side. He showed that the Wolffian body at an early stage of its development is invested by a layer of columnar epithelium. Very soon there appears a thickening of this columnar epithelium on the median side of the Wolffian body, and in a short time a small outgrowth rich in cells projects from the interstitial tissue of the Wolffian body beneath the thickened epithelium. The thickened epithelium investing this outgrowth gradually forms the rudiments of the Graafian follicles and ova, and of the subsequently appearing epithelium of the ovary, whilst the outgrowth itself is destined to furnish the vascular stroma of the ovary.

The thickened epithelium he called the *germ-epithelium*.

According to Waldeyer, the further development of the ovary depends upon a peculiar mode of growth of the germ-epithelium on the one hand, and of the subjacent vascularised stroma on the other. Certain more or less delicate processes of connective tissue from the stroma now shoot forth, whilst at the same time the epithelium increases by the continued production of new cells. The processes then penetrate between the epithelial cells, enclosing a variable number of them, which thus by degrees come to be more and more embedded in the vascular stroma. The connective tissue stroma between the embedded masses of epithelial cells constantly undergoes increase. As to the development of the ova and Graafian follicles, Waldeyer goes on to state: "Some, and sometimes very many, among the embedded cells become conspicuous by their size and the size of their nuclei, while other cells remain of small size, and surround the larger cells as a kind of epithelium. Connective tissue of the stroma then grows in between the larger egg-cells, enclosing them with their epithelial investment in separate capsules or meshes of the stroma. In this manner, each mass or ball of the embedded germ epithelial cells is divided by these ingrowing processes of vascular stroma into as many follicles as it contains large egg-cells. These last formed meshes are the primordial Graafian follicles." In describing the development of Graafian follicles from the Valentin-Pflüger tubes, Waldeyer remarks, "in the case of new-born children, one sees long branching structures in the form of tubes anastomosing with each other, as Valentin first described, and lying separate from each other at considerable distances. Upwards they pass with narrow mouth openings into the germ-epithelium, and appear as direct tubular gland-like processes of it".

"Follicles are formed from the tubes directly through the growth of interstitial tissue. At the lower end of the tubes, interstitial tissue grows, as may be well explained from the absence of a membrana propria in the tube, into the epithelial groups in the tubes, and encloses individual egg-cells along with a portion of the not fully developed epithelial cells which surround them as a kind of epithelium; and in this way primordial follicles are produced."

In concluding his remarks on the development of the ovary and ova,

* Four situations may be recommended specially to those who wish to study these cells. 1. The lip of the sturgeon. 2. The cornea of the pig. 3. Preputial chancre. 4. Epithelioma of the lip.

† Read before the Medico-Chirurgical Society of Edinburgh on the 3rd February, 1875.

Waldeyer thus summarises: "As the chief result of my investigations, it must be stated that both the ova and epithelial cells of the Graafian follicles are derived directly from the germ-epithelium. There is a reciprocal growth of vascular stroma and germ-epithelium, in consequence of which, large and small roundish masses of the latter become embedded in the stroma of the ovary. The embedded cells present a variety, some of them by simple increase in size grow into eggs, viz., primordial eggs, while others keep to their original size, and by numerous divisions, at least as it appears to me, produce still smaller cells, viz., the follicular epithelium-cells. *A genetical distinction between primordial eggs and follicular epithelium-cells has consequently no existence; the germ-epithelium is the common source of both.*"

I have thus tried as shortly as possible to place before you the main points in Waldeyer's description of the development of the ova, Graafian follicles, and follicular epithelium; and I do so, because his views during the last few years have been taught in most of the schools on the Continent and in this country; and I shall now very shortly lay before you the result of my own investigations on the development of the ovary and Graafian follicles.*

I have been able to trace that, by the growth of vascular processes of connective tissue from the stroma, between the germ epithelial corpuscles which invest the foetal ovary, round and oval-shaped masses of the germ epithelial corpuscles become embedded in the stroma in the manner described by Waldeyer; but I hold that every embedded germ-epithelial corpuscle is potentially an ovum, although many never reach that stage of development. For the formation of the membrana granulosa or epithelial lining of the Graafian follicles, we must look to the stroma of the ovary. My investigations show that the follicular epithelium-cells are formed from the connective tissue corpuscles in the stroma of the ovary, and not from the germ-epithelial cells, as Waldeyer stated.

The stroma of a foetal ovary of seven months consists almost entirely of well developed connective tissue corpuscles, intermingled with which are delicate fibres. Such a young ovary is extremely vascular, the walls of the smaller blood-vessels appearing to consist of fusiform connective tissue corpuscles. As soon as the masses of germ epithelial corpuscles become embedded in the stroma as above described, delicate processes of the young stroma grow in between and around individuals of the mass. As the vascular processes gradually thicken between the embedded germ-epithelial corpuscles, these become separated from each other, and at last included in separate meshes of the stroma; these last formed meshes are the primordial follicles. Each germ-epithelial corpuscle, when first embedded, consists of a nucleus surrounded by a small quantity of protoplasm. During its development in the stroma, the nucleus of the germ-epithelial corpuscle becomes distinctly vesicular, and within it is seen one or two germinal spots, and around it, in close contact with its membranous wall, is gradually produced that protoplasm which later constitutes the yolk of the ovum. As the processes of stroma grow in between the young developing germ-epithelial corpuscles to shut them in separate meshes, it can always be seen that fusiform connective tissue corpuscles, parts of the stroma, lie in contact with, and often indent, the yolk or protoplasm, which is being produced round the nucleus or germinal vesicle of each young ovum. In all parts of the ovary this remarkable sight can be seen. Wherever protoplasm or yolk is being produced round the nucleus or germinal vesicle of the young ovum, connective tissue corpuscles are found in contact with the protoplasm or yolk in each case; and in the primordial follicles, when first formed, the included ova are found filling up the whole cavity, no space existing between the young ovum and the wall of the follicle. In the development of the membrana granulosa, the connective tissue corpuscles which lie in contact with and indent the yolk of the young ova swell up, and the nucleus of each undergoes division, and at last a perfect capsule of connective tissue corpuscles surrounds the ovum. The nucleus of each connective tissue corpuscle becomes distinctly vesicular, and is surrounded by a small quantity of protoplasm. The membrana granulosa when first formed thus consists of a capsule made up of little vesicles, each having round it a small quantity of protoplasm which holds them together in the form of a membrane. Immediately outside this capsule the wall of the Graafian follicle becomes fibrous in its structure.

From the above description, it will be seen that, while all the ova are developed from the germ-epithelium on the surface of the ovary, the Graafian follicles and follicular epithelial cells are part of the stroma of the ovary. The Graafian follicles are simply egg-containing meshes in the stroma, and the follicular epithelial cells are formed from connective tissue corpuscles, which are parts of the stroma, and lie in contact with the yolk of each young developing ovum.

With regard to the Valentin-Pflüger tubes, I may state that I have examined carefully the ovaries of most domestic animals, such as cats, dogs, sheep, calves, rabbits, and the human child, but I have failed to see the formation of Graafian follicles from such structures in the manner described by Waldeyer.

In most of the above-mentioned animals, when thin sections are made through the foetal ovary, round and oval groups of partly imbedded germ-epithelial corpuscles may be seen still communicating superiorly with the germ-epithelium on the surface of the ovary. Such appearances are like blind tubes of the germ-epithelium passing downwards into the stroma of the ovary; but careful examination of such structures, not in the ovary of one animal, but in many, shows them to be appearances of tube-like structures made by the knife passing down through round and oval-shaped groups of the germ-epithelial corpuscles which are partly imbedded in the stroma of the ovary, but not yet completely shut off from the germ-epithelial layer superiorly. In the human foetal ovary, similar appearances are seen, and also long tubular structures are observed, passing down into the substance of the ovary, which are lined with germ-epithelial corpuscles. These latter are appearances produced in sections made when the knife has passed vertically downwards through furrows and depressions which lie between the prominences so numerous on the surface of the human foetal ovary; the prominences themselves are produced by the expansion outwards, under the germ-epithelium, of the masses of imbedded germ-epithelial corpuscles. Between two or more neighbouring expanding groups of germ-epithelial corpuscles, furrows and depressions are produced, such as lie between the convolutions of a brain; sections through these give the appearance of tubes. All through my investigations on the development of the ovary, I have failed to discover any real tubular structures from which Graafian follicles are produced.

At birth, the human ovary contains not fewer than 30,000 eggs, and around each of these the membrana granulosa is produced in the manner I have described. As development goes on, the membrana granulosa thickens by the multiplication of its cells; these increase rapidly by division; and, at last, the follicular space is formed by a breaking down and solution of certain of the cells. When the secretion from the follicular epithelium cells becomes excessive, then the Graafian follicle becomes a pathological cyst.

The observations which I have made during the past three years on the growth of cystic tumours of the ovary, lead me to conclude that, in most cases, over-distension of the Graafian follicles is the starting point of the disease, but that, when the disease has once begun, there is a production of new cystic formations which may go on to an unlimited extent. In almost every multilocular tumour, if sections be made through the walls which separate the larger cysts, numerous minute cysts are seen in the substance of those walls; such little cysts may be found in all stages of development.

The minutest cysts first appear as little aggregations of small corpuscles very similar to the little heaps of corpuscles seen in the human foetal ovary, which are undoubtedly produced by local proliferation of connective tissue corpuscles. In the midst of these little heaps of cells, a cavity soon appears, and into this the secretion from the cells is poured; the little cells increase rapidly by division and budding, and a cell-wall rises off the surface of the nucleus in each case. In the small cysts, the epithelial cells appear columnar in form, but, as the cysts expand, the epithelial cells become flattened out, and present a beautiful paved appearance. Many little cysts in the walls of parent cysts can be traced in their development in this way. After a careful examination of the development of the minutest cysts, I am led to the conclusion that the epithelium of such cysts is derived from connective tissue corpuscles in the stroma of the ovary, in a manner very similar to that in which the epithelium of the healthy Graafian follicles is produced. I do not intend in this paper to discuss the whole question of the origin of new cystic formations in the ovary. All I wish at present to insist on is, *that in the diseased as well as in the healthy ovary, the epithelium lining the cystic formations is derived from the connective tissue corpuscles in the stroma.*

Now, the epithelium lining of the cysts, as well as the connective tissue corpuscles in the stroma, may, by excessive proliferation, give rise to sarcomatous growths, which in the ovary must certainly be classed as malignant forms of disease; and I shall now read the histories of two cases of such growths, to show how important a part is played by the epithelium and the stroma itself in the production of these forms of malignant ovarian disease.

CASE I. In the beginning of last October, an Irish lady consulted Dr. Keith about a tumour in her abdomen. On examination, Dr. Keith discovered a tumour of a semisolid nature, occupying the lower part of the cavity of the belly; surrounding the tumour was a large quantity

* Graduation Thesis, 1872; and paper "On the Development of the Ova and Structure of the Ovary in Man and other Mammalia", communicated to the Royal Society of Edinburgh by Professor Turner in November 1874.

of ascitic fluid. A few days after this, Dr. Keith tapped the abdomen, and drew off a large quantity of ascitic fluid. This was allowed to stand for some hours, and the deposit was carefully examined with the microscope. It contained a number of red blood-corpuscles, and numerous large round cells with bright sharply defined oval nuclei with nucleoli. On placing a drop of the thicker part of the sediment on a glass slip for examination, I saw with my naked eye many small white bodies varying in size from a pin's head to mere specks. These, under a power of four hundred diameters, were found to consist of groups of cells in all stages of development. Each little body was a mass of cells, proliferating in an extraordinary manner. At the margin of each mass, large cells with bright nuclei were seen projecting, and were exactly similar to the large free cells which I noticed first in the sediment. From a minute solid-like nucleus invested with protoplasm, up to the large free nucleated cells, all stages of cell-development could be seen in each mass. Once seen, such an appearance could not be easily forgotten. Having often examined the youngest cysts in an ordinary cystic tumour of the ovary, and having traced the development of the epithelial cells, I could not help observing how very similar were the appearances presented by these little masses of cells to the growing epithelium in the young cysts; and I at once concluded that the cellular masses consisted of fragments of developing epithelium derived from burst cysts, which fragments, floating free in ascitic fluid, were sprouting in an extraordinary manner. I accordingly sent in the following diagnosis to Dr. Keith. "Ovarian tumour, some of the cysts burst, epithelial cells and fluid from burst cysts free in abdominal cavity, setting up peritoneal irritation." On the strength of this diagnosis, and as the patient had greatly improved in health, Dr. Keith determined to operate. When the abdomen was opened, what appeared to be a semisolid tumour surrounded by ascitic fluid was exposed. Owing to numerous adhesions in the pelvis, the tumour was much broken down in its removal, and when the ascitic fluid was all removed, a large fungous mass of the size of a hen's egg was found growing to the right wall of the pelvis; and, on looking at the peritoneum, mesentery, etc., many minute white nodules were seen studding these structures. An examination of the tumour showed that it was a large vascular, fleshy-like mass, very friable, and on its surface several small burst cysts were found, and in these were numerous large nucleated cells. A portion of the tumour contained a number of small cysts, but more than two-thirds of it was of a solid fleshy consistence. Under the microscope, its structure was found to consist of connective tissue corpuscles, and small round cells in a state of excessive proliferation. The whole tumour was larger than an adult head. The small nodules on the peritoneum were sarcomatous in structure. The patient died sixty hours after operation. (Careful drawings of the little masses of proliferating cells found in the ascitic fluid were shown to members of the Medico-Chirurgical Society at the meeting.)

CASE II.—A woman about thirty years of age, on the 4th of September last, consulted Dr. Keith about a tumour of the abdomen. Her belly was greatly distended, and Dr. Keith discovered a large multilocular tumour surrounded by much ascitic fluid. As the patient was suffering from breathlessness, Dr. Keith tapped the belly and drew off three gallons of ascitic fluid, and he then discovered that the right pleural cavity was full of fluid; three days after this, he tapped the right chest, and drew off a hundred and twenty-seven ounces of serum. This greatly relieved the patient, and from that moment she began to improve in health.

I examined carefully the sediment from the abdominal fluid, and discovered in it a number of cells which, from previous experience, I knew to be of ovarian origin, and I accordingly diagnosed: "Burst ovarian cyst. Fluid and cells from cyst in the peritoneum setting up irritation." On the 3rd of October, Dr. Keith again drew off from the belly thirty pounds of fluid. The sediment from this was carefully examined, and, on placing a drop of it on a glass slip, for microscopic examination, I saw with my naked eye many small white bodies, which I have already described as having, a few days later, found in the ascitic fluid in the Irish lady's case. At this time, viz., October 3rd, the Irish lady had not appeared, but, in the course of the next three weeks, her case had been well considered, and after operation and death, copious notes of *post mortem* appearances had been made. On October 28th, Dr. Keith again tapped the patient's belly, and drew off thirty pounds of fluid; and, also during October, the chest was again tapped and eighty-seven ounces of fluid removed from it.

I examined the fluid last removed from the abdomen, and discovered in it a great quantity of the little masses of proliferating epithelium. After this tapping, the patient improved so much in health, that Dr. Keith began to think of operating in spite of the presence of the proliferating epithelial masses in the abdomen. I had an opportunity of showing these epithelial masses to Dr. Matthews Duncan and Professor

Sanders, who both took a grave view of the case. At this time—viz., the end of October—the patient was so well that, whenever she was asked as to the state of her health, she always replied, "Oh, I feel quite well now". But in the beginning of November she began to suffer much from irritation of the bladder, having frequently to rise as often as a dozen times during the night.

There was no enlargement of the glands in the groin, and she did not show externally any signs of internal malignant disease. On November 27th, her abdomen was again tapped, and the fluid emptied into a large foot-pan. In the course of a couple of hours, the deposit was an inch thick. Some of this I took home and examined. Now, here is the remarkable point in the whole of these observations: the little masses of sprouting epithelium had increased so enormously in quantity, that half the deposit in the footpan consisted of them. I may safely say, without exaggeration, there were thousands of such little masses.

Dr. Keith now felt convinced this was not a case for operation, notwithstanding the cheerful condition of the patient; and, soon having to proceed to Italy, he informed the patient to that effect. The poor woman was much affected, and made up her mind to go to Perth, where her mother lived. On December 28th, I received a telegram from Dr. Absolon, stating that our patient had died suddenly that morning. Dr. Absolon made a careful examination of the body, and very kindly sent me the whole tumour, in addition to notes taken at the *sectio cadaveris*.

The whole peritoneum was everywhere studded with white nodular growths, some of the size of a pigeon's egg. The tumour was adherent in the pelvis, and large masses of soft friable material were broken through in removing it. The tumour itself was of the right ovary. The right Fallopian tube was drawn out to the extent of twelve inches along its right side. The whole mass weighed about twelve pounds. It was made up of a number of cystic growths, varying in size from a marble to a child's head, all held together and united by a material of a semisolid nature. The cysts were hard and resistant; and, on cutting into them, their walls were found enormously thickened, and the internal surface of each was rough from cauliflower-growths. In the centre of the tumour was a semisolid mass of the size of a seven months' foetal head. An examination under the microscope showed the tumour to be of a sarcomatous structure. It may be said that this patient's belly was full of such sarcomatous growths. Besides the tumour itself, there were thousands of little masses of proliferating epithelium floating free in the ascitic fluid, settling down everywhere on the peritoneal surface, taking root, and giving rise to little nodules of sarcomatous growth; and yet this patient had no external signs of such extensive disease existing internally.

I have given these two cases somewhat in detail, because I wish to direct attention to these little masses of proliferating epithelium in ascitic fluid as a means of diagnosing malignant peritonitis and malignant ovarian disease. (Since this paper was read, I have discovered them in two additional cases; and, although I have not seen either of the women personally, I have no hesitation in saying that malignant peritonitis and malignant ovarian disease exists in both. The two cases are being carefully watched, and the results will be faithfully recorded.)

On reading over the list of cases operated on by Mr. Spencer Wells, Dr. Keith, Dr. Atlee, and others, for the removal of ovarian tumours, one cannot help remarking how common so-called cancer of the ovary is; and it appears to be a fact that, of patients who have recovered after the operation for the removal of an ovarian tumour, some, it may be in the course of weeks, months, or years, return affected by malignant peritonitis. Have we not an explanation of this in the peculiar anatomical structure of the ovary, and in its liability to take on disease by excessive proliferation of its structural elements; and in the fact that, in many forms of ovarian disease, these structural elements, escaping from the diseased ovary and lodging in the peritoneal cavity, take root, and sooner or later give rise to exhaustive peritonitis?

It is well known, as a pathological fact, that the cysts of an ovarian tumour frequently burst and liberate their contents into the abdominal cavity. Ascitic fluid is then generally poured out; and the intestines and peritoneum in such cases frequently present a marked granular appearance.

If it should happen that epithelial elements have been derived from the epithelium of cysts which is in a thickened and villous condition, then it is very likely that such epithelial elements will proliferate and produce nodules of a sarcomatous nature on the surface of the peritoneum at a future date. The whole tumour may be removed, apparently; but the seeds have been left behind, and time only is necessary for their growth into nodular masses on the peritoneum, which, by constant irritation, will ultimately exhaust the patient.

I have seen cases in which, on examination of the tumour after removal, I discovered the epithelium of the cysts in a thickened and villous condition. If the cysts of such a tumour have remained whole, and there has been no escape of epithelial elements from it into the peritoneum, then there need be little fear of malignant peritonitis arising in that patient in the manner we have described.

We make it a rule now to examine very carefully the sediment obtained from ascitic fluids, never mind what the nature of the tumour may be. Malignant ovarian tumours are in most cases surrounded by ascitic fluid; and if, in ascitic fluids, such little masses of proliferating epithelium as I have described are found, then in these cases we may, I hold, with certainty diagnose malignant peritonitis.

Dr. Keith long ago arrived at the conclusion that a burst ovarian cystic tumour should be removed as quickly as possible; and, as the result of pathological inquiry, it would seem that such procedure is to be strongly recommended.

INTRATHORACIC TUMOURS.*

By J. W. F. SMITH-SHAND, M.D.,

Physician to the Aberdeen Royal Infirmary, etc.

I.—PRIMARY CANCER OF THE LUNGS.

I GIVE the following cases as a contribution to the history and diagnosis of intrathoracic tumours. Notwithstanding all that has been written about them, they still too frequently baffle the diagnostic skill of the physician, and often the exact nature of the malady is only first revealed at the *post mortem* examination. But, as observations of these cases are multiplied, the difficulties connected with them will disappear. As Dr. Graves, in his Clinical Lectures, observes about a case of cancer of the lungs, which during life was a mystery and puzzle to himself and Dr. Stokes, "rare cases should not be looked upon as mere matters of curiosity, but should be attentively studied, with the view of enabling us to recognise the true nature of similar cases when they again occur. Were the history of diseases at present reputed to be extremely uncommon published by all those who meet with them, facts now apparently single and insulated would serve as nuclei round which future experience and observation might cluster together similar facts in groups sufficiently numerous to illustrate and explain each other." It is with this object that I record the following cases; and I take this opportunity of expressing the great pleasure and instruction I derived from the perusal of Dr. Risdon Bennett's Lumleian lectures on the Natural History and Diagnosis of Intrathoracic Cancer, as published in the *BRITISH MEDICAL JOURNAL* for 1870.

CASE I.—The first case that I shall lay before you is that of Anne Mackie, domestic servant, aged 36, who was admitted into the Aberdeen Royal Infirmary on May 18th, 1869, complaining of cough and loss of power in the right leg.

Previous History.—The patient stated that, having previously enjoyed good health, she had for the last six months been troubled with a cough, with slight expectoration, which had on two or three occasions contained small streaks of blood. Any pain that she occasionally felt in her chest was easily removed by the application of a mustard poultice. About five weeks previously to admission, on coming downstairs one morning, she felt her right foot slip out behind her, but she did not fall; and since then the loss of power in the leg had increased. She was treated with cough mixtures, and a liniment for the supposed sprain, but without benefit.

Condition on Admission.—The patient was of spare habit of body, with dark hair and muddy complexion, and an anxious expression of countenance. When walking, she dragged her right foot behind her, with the toes touching the ground, and, on examining the leg, it was found that she had no power of moving in any way the toes or ankle. Sensation was not much affected, except to a slight degree over the dorsum of the foot. Her voice was weak and husky, and had altered in character since her illness commenced; but she said that she had not lately had any sore-throat. On examining the chest, the superficial veins of the left side were seen to be enlarged. The left thorax looked fuller and more rounded than the right, with entire absence of movements of expansion or elevation on that side. Percussion, dull all over the left side, was normal on the right. On auscultation, there was entire absence of respiratory murmur over the left lung, except behind, on a level with the spine of the scapula, where tubular breathing was heard over a very limited space. Vocal resonance was diminished, and vocal fremitus was absent on the left side. The breath-sounds over the right lung were puerile. The patient had a rather frequent dry

hollow cough, with scanty frothy expectoration. She complained of no pain in the chest, and could lie on either side. There seemed a general impulse or heave over the cardiac region, but no apex-beat could be felt. A soft systolic murmur was heard in the region of the aorta, loudest behind and over the first bone of the sternum in front. Pulse 104, small. No palpitation was complained of. The tongue was furred; the appetite fair; but there was dysphagia. Bowels regular. The urine was acid, of specific gravity 1030, with a slight trace of albumen. Menstruation was regular, but the last period was missed; and she had been troubled with headaches since that time.

Treatment and Progress of Case.—May 19th. She was ordered five grains of iodide of potassium, in a mixture, three times a day.—May 25th. The patient reported herself much the same; but, on careful examination, it was found that the symptoms of hemiplegia had increased, as the tongue was protruded to the right side, the right orbicularis palpebrarum was affected, and there was loss of power in the right hand. The pupils were movable under the influence of light, but the left pupil was more contracted than the right.—June 3rd. Pain was to-day complained of in the right side, and the existence of pleuritis was ascertained by the usual physical signs. Under this fresh attack of illness, she rapidly sank, and died on June 6th.

Post Mortem Examination.—I am indebted in great part to Dr. J. M. Bruce, house-physician at that time, and now of the Charing Cross Hospital, London, for the following observations. A large soft cancerous tumour was found on the left side of the chest, consisting of the lung of that side. It was adherent to the pericardium, completely surrounded the great vessels at the root of the neck, and compressed the left vagus and recurrent laryngeal nerves. The lung, weighing 78 ounces, was perfectly full of soft cancer, and the bronchus was plugged with an encephaloid mass growing into it. In the right pleura, there were found recent pleuritic adhesions and 20 ounces of effusion. The right lung weighed 22 ounces. The heart was normal; there was no valvular disease. There was slight atheroma in the aorta. The liver weighed 53 ounces, and was fatty. Both kidneys were fatty; the right weighed 5½ ounces, the left 6 ounces. The spleen weighed 6 ounces, and was healthy. The brain weighed 43 ounces, and contained deposits of soft cancer in several places: 1. On the inner surface of the left process of a cerebello ad testes; 2. On the left pes hippocampi; 3. On the right hippocampus minor; 4. On the right Sylvian fissure. The optic thalami and corpora striata were healthy. A few more spots of soft cancer were scattered through the cerebrum, especially in the posterior lobes, one side not seeming to be more diseased than the other.

REMARKS.—This is a good example of that rare disease, primary cancer of the lung. As a secondary affection, it is more common, and, in that case, a diagnosis may often be formed with absolute certainty; but the primary form, as Dr. Biegel says in the article on Cancer of the Lung in Reynolds's *System of Medicine*, in the majority of cases, admits of no diagnosis.

On examining the patient, it was evident to me that I had not to deal with an ordinary case of chest-disease. The full and more rounded appearance of the left thorax, together with the enlargement of the superficial veins and the absolute dullness on percussion, led me to conclude that there was pleuritic effusion, and also intrathoracic tumour. At the same time, the presence of paralysis, the history of sore-throat, the husky voice, and the general appearance of the patient, made me ascribe a syphilitic origin to these symptoms, and accordingly I treated her with the iodide of potassium. Impressed with this idea, the probability of carcinoma, I must confess, did not enter my mind.

There are many points of clinical interest about this case. The heaving impulse over the cardiac region, and the aortic murmur (which was probably caused by pressure, as there was no valvular disease), and the contracted pupil, might have given rise to a suspicion of aneurismal complication. It is difficult to say why, with such a large mass occupying the left thorax, the heart did not appear displaced to the right side. It may have been on account of the intimate adhesions between the pericardium and the cancerous mass which surrounded it. But, if it had been, it would have been almost impossible to doubt the existence of a large pleuritic effusion. Dr. Risdon Bennett, in his Lumleian lectures, mentions a case which occurred in the practice of his colleague Dr. Sutton, where there was great dyspnoea and lividity of countenance, with the left side of the chest bulged, absolutely dull before and behind, respiration inaudible and heart displaced. The patient, aged 11, was repeatedly examined by Dr. Herbert Davies and others, and all decided that the chest was full of fluid. Thoracentesis was twice performed, but nothing issued, except a little dark blood. The patient died some time afterwards, and the left side was found to be entirely occupied by a mass of medullary cancer, the left lung being collapsed and pushed backwards. The dysphagia complained of by Mackie was doubtless the result of the compression of the vagus nerve; but it was

* Read before the Aberdeen, Banff, and Kincardine Branch.