tures in surgery, made many operations feasible which had previously been condemned, and has proved a help of extreme value in the diagnosis of disease.

Furthermore, one of the scientific descendants of Hunter, deeply imbued with his spirit, transcendently patient and painstaking in detail as was his master, as minute an observer of Nature's ways, and as careful an experimenter, after much trying and much thinking, has realised, in the discovery of the methods of antiseptic surgery, a benefit to mankind which only surgeons can to the full appreciate. What was hazardous before is now rendered safe, what was accomplished with pain and suffering is now free from both. There is scarcely a limit to what might be said in praise of this great work. The name of Lister, like that of John Hunter, will stand forth in the records of scientific progress as one who has immeasurably benefited humanity, and as the author of the means whereby surgery has been mainly enabled to make that marvellous progress of which we are all so proud. This is recognised throughout the world, and were I not convinced that our science has fresh achievements in store, I should say that Lister had finally crowned the edifice whose corner-stone Hunter laid. Of all the great minds which have illuminated the scientific world and guided its destinies, John Hunter's is the one which first directed surgery into the pathways of science, and, dying, left to surgeons a future in the memory of his past. He is the one great man without whose aid it is impossible to imagine surgery all that it now is; we cannot take his influence away and yet retain all that we now possess. Our science might have spared some other workers, but it could not have become the science we know without John Hunter.

CLINICAL NOTES UPON THE RECTAL CONTOUR AND CONSISTENCE OF A THOUSAND PROSTATE GLANDS.*

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ON no question in urinary surgery are opinions so apt to differ as upon the condition of any given prostate gland, as estimated by digital examination of the rectum.

Valid reasons exist which condone this variance of opinion. There are even reasons which render it unjust, I submit, to criticise too narrowly any statement which has been made by any consultant or practitioner, concerning the size, consistence, and rectal contour of any given enlarged prostate gland. I will briefly touch upon these reasons.

It is believed that the sense of touch varies most in acuteness of all the senses in different individuals. Certain it is that, unless guided by the additional sense of sight, few will agree, from touch, as to the size of any individual body. Again, digital examination of the rectum is undertaken but rarely. It irks us, it annoys the patient, and we only insist upon it when symptoms of prostatic trouble are present. Of the consistence and of the contour of the prostate in health, therefore, few of us really know anything.

But more than this, the prostate may differ most remarkably in size in the course of a few days, even a few hours. One day it may be normal, the next it may have increased to one-third again the size from subacute inflammation or congestion. The enlarged prostate differs in shape and in tenseness under the influence of ether, during sleep, after coition. Its shape changes in various positions of the body, and in different degrees of bladder distension. Moreover, like the uterus, the prostate suffers from minor degrees of prolapse—even rotation—and its tenseness is often influenced by the brace-like action of its muscular sling, the levator ani. Many other conditions mask its consistence and actual size entirely. Thus, swelling of the mucous membrane of the rectum, soft carcinoma of the post prostatic pouch, even urine in an atonic bladder will cause its boundaries to be obscured. Were I to prove these statements to you, I should weary you needlessly, and fill the entire time which I wish to devote to a considera-

tion of those special points in the contour of the prostate which will, I trust, aid you in the diagnosis and treatment of urinary disease. "To learn," however, as has been truly said, "is not the passive of the verb to teach"; you must seize every opportunity of educating your own fingers.

METHOD OF COLLECTING FACTS.

Twelve years ago I suddenly realised that I knew nothing about the feel of the prostate gland *per rectum*, and the literature gave me absolutely no information. I started laboriously to collect facts about its size and shape in health and disease, in the hope that I should at last be able to recognise certain fixed conditions which might prove important atoms in the molecule of urinary diagnosis. In order to educate my sense of touch and to obtain a record of my cases I started modelling my patients' prostates in clay,¹ just as, later, in order to teach my eye in electric cystoscopy I found myself forced to model in coloured wax² the various appearances I saw with the cystoscope.

Both were tedious, time-absorbing methods and I do not suggest that you should follow them, although they proved of great teaching value to me personally. I mention them merely to show that an earnest endeavour has been made to collect accurate details. Later on I had not the time or the need to model. By rough diagrams I was able to preserve a record of the conditions I wished to bear in remembrance, and it is upon these diagrams and my notes of them that my lectures are based.

At first all was chaotic; many a time I felt hopeless, for the prostates of healthy men appear to differ in contour almost as much as their noses or any other facial lineament; but gradually matters shaped themselves. Moreover, by examining year by year the same prostates, and by drawing them I have realised some of those progressive changes which disease was producing in their consistence and contour.

HOW TO EXAMINE A PROSTATE OR BLADDER BASE.

The patient empties his bladder as far as he can, and bends over a couch or stool, so that his body forms a right angle with his legs. Always make this your routine position, and in your notes draw attention to the position by the figure 7.

If you wish to realise the necessity for this precaution, take a patient with a soft, much enlarged prostate. Examine him in the routine position. Now make him kneel face downwards, and draw his head well towards his knees; the prostate will be found bulging towards your finger, tense, and much larger. Let him now lie upon his back, separate his legs, and again examine his prostate. It will be found higher up in the pelvis, its elasticity will be diminished, and its size decreased. Now give ether, and examine the patient again upon his back; you will be surprised to find the prostate still smaller, higher up, and less elastic. Your calculus sound, which before had probably to be greatly depressed between his legs in order to be introduced fully, now rides in easily, showing that the prostate gland has rotated back on a transverse axis. Now select a healthy young male. Your finger recognises on entering the bowel that the outlines of the two lobes of the prostate are equal, that their consistence is firmish, that their contour is a little prominent, and that they are separated by a fine groove—"the interlobar sulcus." Accustom yourself to detect that sulcus, especially the upper part; it is the most important of urinary landmarks. Now pass your finger beyond the transverse line where the prostate merges into the bladder base. The bladder muscle is now felt smooth, soft, and even. You do not often feel the vesiculæ seminales mapped out, as you are led to expect; you rarely will. If you do, there is a block at their orifices, or an inflammatory thickening, or a tuberculous deposit in their walls.

THE URINARY DISEASES WHICH CAN BE SUSPECTED OR RECOGNISED BY RECTAL EXAMINATION.

I propose taking the diseases you may suspect or recognise on rectal examination of the prostate and bladder base in their order of clinical importance. I have no difficulty, or even hesitation, in selecting that which should be considered first. It is urinary tuberculosis.

No surgical disease of the urinary tract will so mislead you by its vagaries, or so baffle you in your well-meant efforts to

* First lecture of a series upon The Value of Rectal Examination in the Diagnosis and Treatment of Surgical Urinary Disease, delivered at the London and St. Peter's Hospitals, session 1897-1898.

relieve its active phases, or so fiercely resent your instrumental interference, as urinary tuberculosis. No disease demands greater judgment in its treatment, none obtains less.

The reasons for all this obscurity rest in the insidiousness of the onset of the disease, in its marked susceptibility to septicity, and in the power which it possesses of imitating every other disease of the urinary tract. With the exception of the enlarged prostate of old age, I know of no disease of the urinary tract, from urethritis to renal carcinoma, which this arch mimic does not simulate, and that very closely. But a clue can be obtained by rectal and testicular examination in a large percentage of the cases in the very earliest onset of the symptoms. In 157 male patients with urinary tuberculosis who have been under my care, a typical deposit was found on their first visit in the epididymis in 33 cases (21 per cent.); in the epididymis and prostate coincidentally in 38 cases (24 per cent.); in the prostate and seminal vesicles in 5 cases (3 per cent.); in the prostate alone in 6 cases (3 per cent.); in the prostate and bladder (the latter cystoscopically) in 10 cases (6 per cent.). If we add these together, it will be seen that a deposit could be detected by the finger in 58 per cent. of the cases on their first visit.

During the course of the disease the chance of its detection by the finger is still further increased, for 80 per cent. finally present tangible evidence of tubercle in the lower genito-urinary organs, and in only very few instances does the patient pass through all the stages of the disease and die, without the epididymis or the prostate becoming affected. A careful examination of these organs is obviously therefore of the utmost importance.

WHAT ARE THE FORMS WHICH THE PROSTATE ASSUMES IN TUBERCLE?

I regret to assert that our textbooks are either indefinite or inaccurate upon this point. Some teach you to expect "shotty" prostates; that is, the feeling of small shot-like hardness over the prostatic surface. It is rare indeed to find this condition (3 per cent.), and augurs badly for the patient. Others describe massive indurations of the prostate and vesiculæ as being common. This is another infrequent stage in actual work (5 per cent.), and may be taken as indicative of septic inflammation in addition to tubercle. Others again point to the vesiculæ seminales as being most often infiltrated. This is perhaps truer, for the vesiculæ may become affected before the prostate has become implicated (14 per cent.); but it is not common in the early stages.

The cause for this variety of opinion is clear to one watching and examining the same case or cases year after year. Such a one will realise that the deposit passes through a variety of stages, as it does in other parts, and that according to the stage so is the character and contour of the deposit in the prostate, vesiculæ, and epididymis, and that the conditions just enumerated are merely stages in the life-history of the deposit. Let me illustrate. Perhaps it will enable you to follow me more closely if I sketch rapidly those changes which are noticed in the contour of the prostate during the life-history of a tuberculous deposit.

Tuberculous deposit is met with in the prostate under three clinical conditions. In young males who merely ask your opinion about the nature of a lump which they have noticed in one epididymis or the other; or in young males who consult you for the relief of symptoms similar to those produced by stone in the bladder; or in the adult male who complains of symptoms like those of stone in the kidney. Let us glance at a couple of examples.

Class 1. Tubercle appearing coincidentally in the Prostate and Epididymis.—Take an uncomplicated case first. A young man, aged 17 to 20, with no history of masturbation or venereal disease, who has never been sounded for stone, or catheterised or cystoscoped. Such, clinically, is a virgin case. He presents himself with a painless, rounded, marble-sized lump in the lower end of one or other epididymis. In the corresponding lobe of the prostate you will probably find an exact counterpart of this boss, partially buried in the upper third or middle third of the lobe near the sulcus (Fig. 1). This roundish hard body is insensitive; the rectal mucous membrane covering it glides over it healthily. You need have no

hesitation in diagnosing it as tubercle. Every lump in the epididymis is not necessarily tubercle; but such an isolated

Fig. 1.—Diagram of deposit of tubercle in left epididymis and left lobe of prostate.

knot in a prostatic lobe is tubercle if it accompanies a knot in the corresponding globus minor. With these conditions you may have no symptoms; they will develop in due course, months, even years, after.

Class 2. Tubercle appearing coincidentally in Prostate and Bladder.—Take another virgin case, a young man, aged 17 to 20. He comes complaining of pain at the end of his penis after urination, undue frequency of that act, and occasional attacks of hæmaturia; the urine, when bleeding is absent, being lightish and murky from pus. On examining *per rectum* you find a hard knot buried in one of the lobes of the prostate (Fig. 2). This is tubercle, and the cystoscope will

Fig. 2.—Diagram of tuberculous deposit in the right lobe of prostate. demonstrate the bladder base to be affected as well. The corresponding epididymis will become in time the seat of a similar indolent knot. Such prostatic deposits may remain indolent, or cretify, or become absorbed.

TUBERCLE STARTING IN INFLAMED STATES.

But suppose this indolent epididymal knot becomes inflamed, or suppose it was actually started by an acute inflammation, such as that produced by gonorrhœal or traumatic epididymitis, in a man with strongly marked tuberculous

Fig. 3.—Diagram of acute tuberculous right epididymitis with massive swelling of right prostatic lobe. V vas; S sinus where abscess-burst. No urinary symptoms.

tendencies. Do you find a small buried knot in the corresponding lobe of the prostate? Not often. In such a case the prostate generally assumes a condition similar to that in the epididymis; and if you examine when the inflammatory condition of the prostate is at its height, you will be surprised at the resemblance. The deposit is large, irregular, and tender. It causes the entire prostatic lobe to project sharply on the rectum, so that the finger detects it at once (Fig. 3). The mucous membrane of the rectum may become adherent to it, puckered, or even softened at one spot (Fig. 4.)

Fig. 4.—Same case a few weeks after; recession of epididymitis, but softening of prostatic deposit and perforation of rectal mucous membrane marked by unshaded centre.

The inflammatory wave may even spread on the corresponding vesicle, and the united mass of indurated exudation forms a thick projecting cake on one side of the bladder base. Remember that inflamed tuberculous deposits are always the most difficult to diagnose, and that it would be wise for you to hesitate before pronouncing such a condition as definitely tuberculous. I may here say, parenthetically, that years ago it seemed to me that these inflammatory cases would run a much more rapid course, for I argued that septicity must carry the essential elements of the disease far and wide. I now see that this view is incorrect. I am inclined to believe that the inflammatory exudation retards the progress of the disease, for it often erects a wall of dense material round the tubercle, and I submit the same effect is produced by that tough inflammatory exudation which we sometimes encounter around a tuberculous kidney.

THE ABSORPTION OF TUBERCLE IN THE PROSTATE, VESICULÆ SEMINALES, AND EPIDIDYMIS.

I may be stating an already accepted fact when I assert that well-marked tuberculous deposits in the prostate and vesiculæ become absorbed and disappear, especially if they have been inflamed, or if the bladder has been absolutely stripped of its mucous membrane. If such a termination is acknowledged it should be more widely known and taught, for it introduces a great difficulty in diagnosis.

As an illustration I choose the following out of twenty

Fig. 5.—Diagrams of right epididymal and right prostatic deposits in November, 1886.

others. A young man, aged 23, a virgin case, consulted me in 1886 for tubercle of the right epididymis. There was a knot in the upper third of the right prostatic lobe (Fig. 5); no urinary symptoms. In 1889 the epididymis had changed its contour, and I found that the knot in the prostate was feelable in the lower third (Fig. 6). I have noticed that the knots appa-

Fig. 6.—The same in November, 1889.

rently change position; probably the wave passes steadily through the lobe.

In March, 1890, he had right renal colic and hæmaturia when in Australia. In 1892 the prostatic deposit was minute (Fig. 7).

Fig. 7.—The same in 1892.

In October, 1897, the deposit in the prostate was pin-head, but the base of the left vesicle had become involved (Fig. 8),

Fig. 8.—The same in October, 1897.

and now bladder symptoms have at last become apparent.

Such deposits rarely, I believe very rarely, suppurate on their own initiative; much depends on how they are treated. But here are two important points. The prostatic contour and consistence are altered greatly by the absorption of deposits; the lobes become flattened, their consistence leathery, and their outlines confused; the sulcus, moreover, often deepens into a trough. Many of them feel like a sheet of thick parch-

ment. Hence it is that we may examine a given prostate and say that there is no tuberculous deposit to be felt in it. But it may have been there, and only practice and observation will enable you to suspect that you are touching a prostate which has been severely invaded. You are often helped to an accurate conclusion by the nodule in the epididymis, which does not become absorbed like that in the prostate.

The second important point is this, and I regret to have to record it. If tubercle has once infiltrated the prostate, it is generally relentless. We may take comfort to ourselves when it has become absorbed, and we may assure our patient that he is cured; but this is not so. Clinical work teaches us that the disease has gone on to invade other areas beyond our finger's reach, spreading along definite tubercle routes, and that it will appear in due course in the bladder or kidneys. The expectation of life, however, can only be calculated after the implication of the mucous membrane.

Before indicating the highways and byways of tuberculous invasion, I must ask you to notice how my statement of the progress of a prostatic deposit explains the textbook differences in the description of its contour. Stress should be laid upon the fact that these differences merely represent stages in the progress or life-history of the deposit. But this is not of much account. What you need to know as practitioners is, What is the form most commonly met with?

The form I have most frequently encountered is that of an irregular knot of the size of a toy marble or a cherry-stone, partially buried in the substance of the lobe, and easily defined; it is dense but not stony hard. I have met with this condition in 62 per cent. of my cases.³

ROUTES TAKEN BY URINARY TUBERCLE.

Urinary tubercle invades the different sections of the urinary tract along certain regular highways. It commences most often in the epididymis (33 cases in 158). It is next found in the corresponding lobe of the prostate, next in the base and around the urethral orifice of the corresponding side of the bladder; and, lastly, in the middle and lower third of the corresponding kidney near the pelvis. Thus the "rule of the road" is that a right epididymal knot leads to a right prostatic knot, to a loss of surface around the right urethral orifice; and, finally, to a deposit in the right kidney. An epididymal knot sometimes short-circuits to the kidney of the same side along the lymphatic tract (?) of the spermatic and perirenal veins. No matter whether the deposit absorbs in one place, the wave travels persistently on to implicate another area, and it usually keeps to the side it started on. The advantage of this to the clinician and operator is great. If a patient who has no venereal history, who has never had any difficulty in micturition, and who has never had any urethral instrumentation, complains of pain in one kidney, and you find an indolent knot in the epididymis, or a buried knot in the prostatic lobe of that side, you diagnose tubercle of the kidney, and seek confirmation of this in the urine.

BY-PATHS.

In addition to the main route taken in the above case, there are, of course, two by-paths of invasion. There is one running from the right prostate to the left prostate or left vesicle, and to the left testis, and another passes up along the other ureter to the other kidney if the patient lives long enough.

Let us formulate the rule. Usually the kidney first attacked in ascending tubercle is the one on the same side as that in which the deposit first appeared in the epididymis or prostatic lobe. Supposing the tubercle first starts in the kidney, does it follow the down route on the same side? Usually it does; for instance, right kidney, right urethral orifice; right prostate, right testis; or the short cut, right kidney to right epididymis.

CROSS-ROUTE TUBERCLE.

But this rule of the road is too absolute. It does not, unfortunately, hold in every case. In 18 cases out of 100 the tubercle appeared to cross over, for some unexplained reason. Thus the deposit might be in the left testis and in the right kidney, or in the right testis and left prostate. Remember, then, that in a small proportion of cases (18 per cent.) tubercle crosses.

PRACTICAL COMMENTS.

Before you entertain the idea of employing an instrument of any description or of giving any sort of diagnosis in the urinary disease of an adult, you examine the testis, the prostate, and the bladder base *per rectum*. Suppose you detect a tuberculous knot in the prostate. The frequency of micturition, the penile pain at the end of the act, and the intermittent admixture of blood in the urine are all fully explained by your discovery. Control your diagnosis with a bacteriological examination for the bacillus. Lay it down as a hard-and-fast rule never to wash out the bladder under such circumstances, although the presence of pus in the urine may tempt you strongly to do so. Washing out the bladder daily with any form of sterile fluid, be it water, boric acid, or iodoform wash, will relieve in the early stages, but the patient pays dearly for his relief. You cannot fail to introduce septic matter, and the conditions for the colonisation of the microbes you introduce or awake to activity are most favourable: a congested or ulcerated mucous membrane very susceptible to invasion, a neutral or faintly acid urine, and a small amount of residual urine.⁴ I say definitely, after fifteen years' study, a patient with a tuberculous bladder, who is washed out as a matter of routine, has his kidney destroyed sooner and more thoroughly than he whose bladder is left alone.⁵ Again, you may be so misled by the symptoms as to believe your patient has stone. If you find a tuberculous knot in the epididymis or prostate, do not sound. I will admit that you may not harm the patient, but you will do him no good, and your procedure will cause him unnecessary and intolerable pain.⁶ I have had excellent opportunities of examining patients with the electric cystoscope shortly after they have undergone the operation of sounding and of sucking with Bigelow's evacuator for suspected stone. Patches of deep red infiltration (traumatised areas) are seen over the base and sides of such bladders. Theoretically such injuries should favour the spread of tubercle.

Lastly, a certain small proportion of patients suffering from tuberculous prostates complain greatly of difficulty of urination and of narrowness of their stream of urine. This is due to prostatic swelling, but it tempts you to try the urethra for stricture. If you must pass a bougie, let me advise you to use a solid aseptic steel, No. 10 E., with all possible gentleness. My reason for this is, if you employ an elastic bougie in such a case it will probably be abruptly stopped at the opening of the membranous urethra, for the tuberculous deposit in the prostate and bladder warps the deep urethra, and it also induces a veritable spasm of the constrictor urethræ, which the point of the bougie aggravates. Such an obstruction will confirm you in your belief that the case is one of stricture; but the prostatic knot negatives this view.

A RESERVATION.

I have said that obscure renal pain is sometimes explained by finding a tuberculous knot in the prostate, and that, given such a knot in the epididymis or prostate, and a fixed pain in the kidney, or a renal colic⁷ of the same side as the knot, that kidney is tuberculous, if the patient has never strained to urinate, and no instrument has traversed his urethra.

The kidney may not be tuberculous if the patient has strained repeatedly to pass urine, or has had his bladder washed out. If he has strained repeatedly to pass water, one ureter and its renal pelvis may have become slightly distended by backward pressure, and this in itself causes an aching kidney. If washed, mild ascending pyelitis or patchy nephritis of ascending microbic infection may be present without tubercle. Such septic conditions cause aching kidneys.

NOTES AND REFERENCES.

¹ Clay and Wax Modelling of the Living Prostate, *BRITISH MEDICAL JOURNAL*, May, 1887. ² Electric Illumination of the Bladder and Urethra, 2nd edition, p. 85, *BRITISH MEDICAL JOURNAL*, January 5th, 1889. ³ There is a great diversity of opinion as to which part of the urinary tract is most often affected by tubercle first. After eliminating most sources of error in my own cases, I believe the tubercle first made its appearance in the following sites: Kidney and ureter, 25 cases=16.8 per cent.; bladder, 56 cases=35 per cent.; prostate and epididymis coincidently, 38 cases=24 per cent.; prostate, 6 cases=3 per cent.; epididymis, 33 cases=21 per cent. ⁴ This route, from one lobe to the base of the opposite vesicle, is not uncommon in the most protracted cases of indolent tuberculous. ⁵ The other forms were: Swollen single lobes, 2 per cent.; shotty surfaced prostates, 3 per cent.; enlarged gland at upper angle of lobe, 3 per cent.; massive prostates (the blending of vesiculæ and prostate into an indurated cake), 5 per cent.; early tuberculous vesiculæ seminales, 14 per cent.; absorbed parchment-like prostates, 22 per cent.

cent.; small half-marble deposits in one or both lobes, 62 per cent. ⁶ All tuberculous bladders after the first year are slightly atonied, and contain a drachm or more of irritating puriform urine. ⁷ I may remind the reader that there are single ulcers of a non-tuberculous character that are benefited by washing or curettage, but these are only really diagnosable by the cystoscope. Author: BRITISH MEDICAL JOURNAL. The Clinical Significance of the Simple Solitary Ulcer, BRITISH MEDICAL JOURNAL, May 6th, 1896. ⁸ There is no urethra so hypersensitive or so intolerant of instrumentation as the tuberculous prostatic urethra. ⁹ The pain is fixed in the kidney in 80 per cent. of kidneys affected, and the pain is a true renal colic in 20 per cent. of kidneys affected by tubercle. The difference depends not so much on the thickening of the ureters as on the blockage of this narrowed channel by slough or mucus or phosphatic debris.

ON THE ETIOLOGY OF CANCER, WITH A NOTE OF SOME EXPERIMENTS.

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IN May of 1896 I brought before the Medico-Chirurgical Society of Edinburgh some cases of inoperable carcinoma of the mamma, which, for reasons fully given at the time, I had treated by removal of the uterine appendages combined with the administration of thyroid extract. Those who saw the cases were satisfied that the progress of the carcinoma had been affected in a way that was contrary to the general experience of that disease. Since then the procedure I advocated has been put to the test by others, and their published cases go to confirm that the course of carcinoma in the mamma is materially affected by oophorectomy and the administration of thyroid extract. Such a condition of matters is important from a therapeutic point of view, but it is equally clear that such cases have a special interest, as bearing on the etiology of carcinoma.

When I read my paper in May, 1896, the explanation that I ventured to put forward in reference to my cases was that in the process of development and specialisation of the ordinary cells of the body, these cells do not lose the reproductive or proliferating power which in the early days of embryonic life they undoubtedly possess, but that it is kept in check by the control of the healthy ovaries. Should this control be in any way interfered with by changes in the ovaries leading to altered secretion on their part, or possibly to the migration of ovarian cells, then any part of the body affected by the irritation of this pathological secretion or by the presence in it of a migrated ovarian cell, might resume that early reproductive power that was merely in abeyance, and thus come to display that proliferating power which is not only characteristic of germinal epithelium, but is also the distinguishing feature of carcinoma.

At first sight this might seem to be a return to the old theory of spermatogenic influence as explanatory of the origin of carcinoma; but it really is not so, and it is important that this should be clearly understood. The theory of spermatogenic influence as enunciated by the older writers assumed a conversion of the normal tissue of the part affected into tumour tissue; in other words, that there occurs what is known as metaplasia, or a transformation of the cells and intercellular substance of a tissue into cells of a different kind. This it is now generally admitted does not occur, and the only metaplasia of epithelial cells that we meet with is the occasional transformation of one form of epithelium into another, just as is seen in papilloma of the bladder, where the usual transitional epithelium of the mucous membrane is replaced by stratified columnar epithelium.

I do not think that in carcinoma we have any conversion of the cells of the part affected into cancer cells. My opinion is that the distinguishing cells of a cancer tumour are not the normal epithelial cells of the part converted into malignant ones. These latter differ so entirely from normal epithelium in their shape, size, mode of growth, and power not only of penetrating into neighbouring tissues but also of destroying them, that I cannot altogether bring myself to accept this explanation. Further, the transition stage of normal epithelial cells into cancer cells has never been clearly demonstrated. I can show sections where the cancer cells may be seen in active growth and the adjacent epithelium taking no active part in the process and even disappearing, a condition of things which would not present itself if normal epithelium became converted into cancer tissue.

This being so, what is the origin of the cancer cells? I am inclined to think that we must apply to our primary carcinoma what we see happen in the case of a secondary metastatic deposit. When this latter occurrence takes place, everyone admits that the resulting tumour is composed of cells which are the progeny of the original cells or cells which hived off from the primary growth and took up their abode elsewhere. There has been in this case no conversion of the surrounding cells into cancer cells. In the same way, I believe that primary cancer has its starting point in a special cell or cells of the part affected, and the cells that go to make up an epithelioma of the lip are not the normal epithelial cells of the part changed into malignant ones, but they are the offspring of one or more epithelial cells that have gone wrong, and have taken on the indefinite proliferating power that is the characteristic of carcinoma. That it is a cell of the part affected that begins the pathological process is rendered clear by the fact that in secondary tumours we have a repetition and imitation, often in minute detail, of the primary growth. This was very well exemplified in a case of carcinoma of the rectum that I had last year under my care. Previous to my seeing him, the lower portion of the rectum had been excised. After a time this was followed by a reappearance of the disease, and when I first saw the case there was protruding from the anal region to the extent of 2 or 3 inches a mass of what seemed merely granulation tissue. When a portion of this was examined microscopically, not only did it show cancer cells, but these were so arranged that they had taken on completely the structure of the part even to the extent of displaying the follicles of Lieberkühn in a modified form.

It may very reasonably be asked, Are there in different parts of the body and in the various organs any special cells that may be affected in the manner suggested? I am unaware that we have any positive proof of such, but Cohnheim's theory of embryonic remnants has undoubtedly support from the phenomena exhibited by some kinds of tumours; while Goodsir's nutritive centres with their special cells are possibly less problematical than we think. Then, if Ribbert's theory of growth liberation with its separated groups of cells, all ready to proliferate under certain conditions, be correct, we have another possible source of such cells.

Granting, however, that my surmise is a correct one, and that through any or even all of the above channels initial cells are available for the commencement of a carcinoma, what is the influence that first calls into activity the cell proliferation, so that these primary cells divide and subdivide, and eventually produce a countless host of descendants? The correct answer to this question would give the clue to the real etiology of carcinoma, and all we can do at present is to investigate every line of thought that offers a solution of the matter.

It may be that the theory of traumatic causation is the correct one, or that in the parasitic or infective theory we have the true exciting cause, but as yet certainly this has not been proved. No doubt trauma and long-continued irritation with its accompanying chronic inflammation are powerful factors, and even adjuvants, in this disease, but they do not seem to furnish the special fructifying influence that leads to the generation of true cancer cells. Working on the view that I have already enunciated in this paper, as suggested by what was seen in the behaviour of cancerous tissue under oophorectomy, I thought it was possible we might have in the germinal epithelium of the body—that is, in the ovaries and testicles, healthy or diseased, the true exciting cause of carcinoma. Accordingly I performed some experiments in this direction, the results of which I wish briefly to record.

My first experiment consisted in placing in the subcutaneous tissue of the dorsal region of a rabbit a portion of the right testicle of the same animal. This was done on July 3rd of last year, and four months afterwards the animal was killed. Examined after death, only a faint induration could be felt at the site of the implanted tissue. The area was excised and sections cut. Microscopically it consisted mainly of fibrous tissue, cicatricial in character, with very few cell elements. At one part only there was a very limited area of small-celled infiltration, the cells being lymphoid in character. No actual remains of the implanted tissue could be found, and in other respects the animal was healthy.

The second experiment consisted in placing in the subcuta-