first intention, no deformity or depression, and merely a longitudinal, linear, undepressed cutaneous scar. No drainage-tubes were used.

The large abscess-cavity in connection with the necrosed symphysis pubis extended outwards as far as the iliac crest, and was nearly as wide. It was supposed, when sent to me, to be an inguinal hernia. I slit it up, scraped out its lining thoroughly, and closed it in with sutures which passed from side to side beneath its floor, but not through the skin; it was thus reduced to a long narrow and shallow groove. This I closed with superficial sutures. The deep sutures held on till the depth of the cavity was obliterated by the healing process. At the lowest angle of the wound, a drainage-tube was passed straight down to the small cavity from which the necrosed symphysis had been extracted.

In no cases have I found these sutures more brilliantly successful than in dealing with sebaceous cysts of the head. Having dissected out three from the scalp of a gentleman, I obliterated the remaining cavities by two buried sutures in each, passing them well beneath the floor of each small wound. No cutaneous sutures were used at all; the skin-wounds did not gape. Over the wounds was placed a coat of salicylic acid dissolved in ether, as well as a little powdered salicylic acid. No bandages were used. The patient went daily to his work at Somerset House, attended a garden-party in the meanwhile, and, a fortnight afterwards, washed the salicylic scab, as it might be called, off three sound linear cicatrices. It is important to say that he was not allowed to brush his hair during the treatment; it was kept both tidy and aseptic by occasionally sponging with a wash containing spirit, corrosive sublimate, and rose-water.

In conclusion, I have to say that it is only in strictly antiseptic surgery I would venture to recommend the use of these sutures; but that, in the case of all surgeons who have faith in antiseptic theory and practice, they will find in buried sutures an effective and beautiful addition to their methods.

THE PATHOLOGY OF RODENT ULCER.

By F. T. PAUL, F.R.C.S.,
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WRITINGS on the microscopic characters of rodent ulcer may be said to have originated in the well known monograph by Thiersch, on epithelial cancer, published in 1865. Anterior to this, the clinical features of the disease had been very carefully studied and described by Jacob, Paget, Hutchinson, and Lebert; and though they recognised its distinct identity as an infiltrating and ulcerating growth of a specific nature, a better knowledge of its minute structure was required to avoid the very natural difficulty of confounding it with lupus, syphilis, tuberculosis, or epithelioma. Thiersch's contribution is in every way worthy of the position which it occupies, and the illustrations accompanying the text show the author's clear conception of the histological features of this disease, which he described as flat epithelial cancer, in contradistinction to the ordinary infiltrating form of epithelioma. Though regarding rodent ulcer as a variety of epithelioma, his researches encourage the opinion that it has a special origin in the sebaceous glands. Other observers soon followed, and their writings are without exception the result of careful and thorough investigation, becoming more and more valuable as the work of the microscope has become more and more perfect. In 1867, Mr. Moore of the Middlesex Hospital, published his pamphlet, in which he described rodent ulcer as a form of epithelioma. In 1871 and 1873, Mr. Hulke expressed similar views at the Pathological Society. In 1872, Dr. Collins Warren, in his Boylstonian prize-essay, maintained the opinion that the growth commenced in a small-cell exudation, which developed under the influence of the rete Malpighii; this, of course, must be regarded as a variety of the epithelioma view. In 1878 and 1879, Dr. Thin, at the Pathological Society, originated and supported what has since been called the sweat-gland theory. In 1879, Drs. Tilbury and Calcott Fox, at the same Society, read their paper in support of the opinion that the growth started in the root-sheath of the hairs; Mr. Butlin, in the discussion which followed, supported the sebaceous gland theory of Thiersch. In 1882, Dr. Sangster, at the annual meeting of the British Medical Association, read a paper also in support of the root-sheath view; and an additional paper, tending in the same direction, has since been published in the BRITISH MEDICAL JOURNAL, by Mr. Hume, of Newcastle.

There has then been a considerable diversity of opinion concerning the true nature of rodent ulcer, since the appearance of the writings of Thiersch. They may be classified as follows.

1. As a variety of epithelioma—Moore, Hulke, Collins Warren; and as depending upon the nature of the soil in which it grows—Hutchinson.
2. As a carcinoma of the sebaceous glands—Thiersch, Butlin, and others.
3. As a carcinoma of the sweat glands—Thin.
4. As a carcinoma of the hair-follicles,—Tilbury and Calcott Fox, Sangster, and Hume.

The present communication is based upon the microscopic examination of twenty-two cases, in all of which the entire growth has been excised with the knife, and placed in my hands for investigation. Twenty of them were clinically unmistakable, the other two were doubtful. A few more cases of chronic epithelioma of the hand were clinically regarded as allied to rodent ulcer; but, since their structure is distinctly epitheliomatous, they are not included, though it is quite possible that they may have equal claims to be. It would occupy too much space to describe the cases individually; and I shall, therefore, be content with generalising some of the broader clinical facts, asking that the diagnoses may be accepted as correct, on the ground of the clinical experience of the observers, confirmed, if you will, by a personal examination of the specimens, as there are microscopical preparations here from every one of the cases.¹

The strange observation that rodent ulcer is, with very rare exceptions, limited to the face, is borne out by these cases, as all occurred in the skin of the face. Seven were on the cheeks; seven on the eyelids (the two doubtful ones both on the upper eyelid); three on the forehead; three on the side of the nose; and two in the skin of the lips, one the upper and the other the lower, but both quite away from the red border. Sixteen occurred in males and six in females, bearing out the general opinion that the disease is more common in men than in women. The average age of commencement was 50, varying from 35 to 72; the earliest cases being in women. The great length of time occupied by an ordinary rodent ulcer in attaining a sufficient degree of severity to awaken any apprehension in the class of people who are usually attacked by it, is such as to mislead us to a certain extent as to the age when it commences; and I am sure that it ought not to be regarded as a very uncommon occurrence in the fourth decade of life. The average duration of the disease before operation was six years, varying from six months to fourteen years. This fact is, of course, of no great value, as the disease varied proportionally in extent, except that it is in accordance with the usual experience of the chronic nature of the growth. Those ulcers which were of short duration were small shallow sores, covered with a scab, and showing the characteristic pale raised border of infiltration; while in one case the growth was a mostly subcutaneous nodule in the loose skin of the lower eyelid. The older growths had all the usual rodent characters, destroying the skin, muscle, eye, bone, etc., just as they happened to fall within the area of infiltration.

The specimens have generally, and always recently, been prepared by hardening the tissue in bichromate of ammonia, and subsequently in spirit; the sections have been cut by Bevan Lewis's microtome, stained in logwood and eosine, and mounted in Farrant's solution. The sections have, of course, always been taken through the growing margin into the surrounding skin, which has in all cases been carefully examined.

It is not necessary, at the present time, to say anything in reference to the purely carcinomatous type of the disease; that is admitted on all hands. I have, therefore, directed my attention entirely towards elucidating to what variety of carcinoma rodent ulcer belongs; or, in other words, of what epithelial tissue it is an atypical form. In some cancers this is a point which is easily decided; for instance, in epithelioma, cylindrical epithelioma, and some thyroid, hepatic, and other cancers. In others, it is equally difficult. Take, for example, an ordinary scirrhus of the breast. This is so mildly typical of breast-tissue, that most pathologists, even now, regard a scirrhus of the breast as a type of cancer which may occur at any part of the body, when it cannot possibly bear any other relation to a primary cancer of another organ, than that they are all epithelial new growths. Rodent ulcer also is so slightly typical of any epithelial cutaneous structure—or, rather, it is so liable to show relationship with all the dermal epithelial evolutions, that great difficulty is met with in attempting to class it satisfactorily.

It being accepted that rodent ulcer is a carcinoma of the skin, we have to decide whether it must be regarded as a carcinoma of the entire skin,

¹ The specimens, which were shown in the Section of Pathology at the annual meeting of the Association in Belfast, were obtained as follows: five from Mr. Bickersteth; two from Mr. Reginald Harrison; two from Mr. Mitchell Banks; three from Mr. Rushton Parker; two from Mr. Shadford Walker; two from Mr. Edgar Browne; one from Mr. Puzey; one from Dr. Little; and four were my own.

or, only of one of the dermal appendages; and if the latter, whether it is always an atypical growth of the same appendage, or whether it should be subdivided into carcinoma of each variety of appendage. With these difficult questions in view, I propose to consider:

1. The minute structure of the growth;
2. What normal skin-elements, or other skin-growths, show any relationship to this;
3. Whether it has any special affinity for, or tendency to spread in one particular skin-structure rather than the rest;
4. Whether its remarkable localisation to the skin of the face bears upon its origin;
5. Whether any microscopical evidence can be obtained as to its earliest formation—that is, the primary growth, not the marginal increase.

1. *The Minute Structure of Rodent Ulcer.*—Carcinoma, in whatever organ it develops, is liable to vary in its minute structure. In one typical form, the epithelial elements are arranged in acinous groups; in the other, in duct-like columns of cells. The former is usually designated acinous cancer, the latter tubular cancer; and although, for purposes of classification, it is convenient to make this a clear distinction, it is really only an artificial one. For instance, in a series of cases of cancer of the breast, I find a large majority of specimens of acinous cancer, and very few of pure duct-cancer, and an intermediate group passing from one to the other. The same condition certainly holds good in carcinoma of the liver and prostate, and, probably, of all other acinous glands; but in strictly speaking tubular glands, such as those of the intestine, the carcinoma is almost constantly tubular. It seems not unlikely that this difference in structure depends upon the degree of evolution attained by the carcinoma under examination. A tubular growth is more embryonic than one that has attained to an acinous development. Thus a tubular epithelioma is one which consists solely of epithelial cells, resembling those of the rete mucosum. An acinous epithelioma, on the contrary, shows horny and nested cells—that is, the highest evolution of epidermal cells. A duct-cancer of the breast resembles the immature tissue of the virgin gland, an acinous cancer the fully developed organ of pregnancy. Rodent ulcer follows this general direction. It is sometimes absolutely tubular, sometimes transitional, frequently entirely acinous. Taking the two extremes, it is difficult to recognise them as being the same class of growth, but the chain of intermediate cases is so complete, as to leave no doubt of their association.

Beginning in the skin, the various forms of rodent ulcer extend, after the manner of epithelioma, in all the elements of the skin itself, and in all the adjacent tissues; avoiding only that which is so readily infected by other kinds of carcinoma, namely, the lymphatic system. In the acinous variety, the groups of cells are strikingly disposed like those of epithelioma; and, also like them, the marginal cells are cubical or cylindrical, and placed vertically upon the surrounding layer of connective tissue. The bulk of each acinus is made up of elongated cells, often very irregularly arranged; their disposition has been very aptly described by Sangster as though disturbed by opposing currents. Those which are next to the marginal layer have frequently their long diameters disposed at right angles to the cylindrical cells; but there is no constancy in their manner of arrangement, nor indeed in their character as cells. The marginal cells are usually epithelial like, smaller and more delicate than those of the rete Malpighii, or of an epithelioma, but distinctly the same variety; whereas the intermediate cells are very sarcoma-like, or remind one very strongly of the spindle-shaped cells in an embryonic hair-bulb. Frequently, however, they are rounded or irregular in shape, but always much smaller than in epithelioma. The central portion of the acinus is yet more variable. Very large acini usually contain only a little central debris, which falls out in the section; others are filled with a delicate mucous tissue very poor in cells; and the remainder—no inconsiderable number of the whole—with nested cells; nested cells which are sometimes the result of a central aggregation of degenerated cells, unstainable, and therefore forming soapy-looking pseudo-pearls; or the result of endogenous multiplication, when the cells are large, epithelial like, and stain brightly. In size, the acini are often the equivalent of those of sebaceous glands, sometimes they are smaller than this, often many times larger. The central structure, when myxomatous, not unfrequently breaks up the mass of the acinus into a network of epithelial cells, supported by mucous stroma. I have specially noticed this in deep infiltrations in the orbit.

Tubular rodent ulcer is far less common than the acinous variety. Perhaps it is never absolutely pure, though occasionally the structure appears almost uniform throughout. The most pure tubular structure was met with in a very small rodent ulcer of the nose. It consisted of columns of cubical cells, in some parts almost exactly

like a sweat-gland; in others the lumen was filled with spindle-cells, which here and there so distended the tubes as to resemble an acinous development; but there was no central aggregation of cells into a pseudo-pearl, nor any central debris, nor other specialised tissue. The intermediate cases resembled generally the acinous variety, but in some parts fell off into a more or less perfect tubular structure. In no variety of rodent ulcer can the epithelial cells be said to attain to a distinctly horny character, nor to show the typical prickles of the cells of the rete mucosum like epithelioma; but the occurrence of nested cells is certainly not uncommon.

In addition to what may be called the normal varieties of rodent ulcer, the twenty-two cases include two distinctly aberrant forms of growth; one occurred in the upper lip of a woman, aged 58, quite away from the red border, as a thick infiltration, ulcerated in the centre. It had existed three years, and was considered by Mr. Bickersteth to be a rodent ulcer. Throughout almost the whole of the growth, the infiltration consisted of large spherical acini of uniform appearance, almost touching each other; each acinus consisted of a marginal layer of elongated cells, all the remainder being composed of similar round sarcoma-like cells, giving the microscopic appearance quite a different effect from ordinary rodent ulcer. An exact counterpart of this structure was met with in a multiple adenoma of the sweat-glands of the face; and I should have considered it to be an ulcerated adenoma, had not I found, near the ulcerated margin, a marked reversion to the ordinary type of rodent ulcer. The other aberrant case occurred in a man, aged 63, as an ulcer perforating into the nasal cavity, and it also had an unusually thick border of infiltration. It had existed for twelve or fourteen years, and was regarded by Mr. Bickersteth as an undoubted rodent ulcer. Here the cells were like the rete mucosum, the only case in which this was noticed; but, instead of being arranged as in epithelioma, they formed very long straight columns, of only one or two cells deep, penetrating far into the subcutaneous tissue, and perfectly uniform throughout the whole growth. This might be called a tubular epithelioma, if regarded entirely from the histological point of view; but, clinically, it could only be spoken of as a rodent ulcer, and, until the minute anatomy of the growth is more clearly recognised than at present, the clinical features have the first claim in establishing a diagnosis.

In the foregoing description of the minute structure observed in a number of cases of rodent ulcer, it has been easy to describe the remarkable variability of the growth, and the different types and characters to be met with; no doubt, it reads as though few cases resembled each other, nor do they entirely, but there is a subtle, almost indescribable, uniformity of type traversing most of these varieties, which enables a practised histologist to at once recognise the nature of the growth under the microscope.

As in all other new growths, every variety of rodent ulcer extends in mutual relationship with a small-cell infiltration; but whatever interdependence exists is capable of a temporary abrogation; and, quite in conformity with the chronic character of the growth, the small-cell infiltration may develop into normal granulation-tissue over the surface of the sore, and may, for the time, allow cicatrization, although it is invariably followed very shortly by a renewed activity on the part of the epithelial elements, at the margin and base of the growth.

2. *What normal Skin-Elements or other Skin-Growths show a Relationship with Rodent Ulcer?*—Innocent epithelial growths usually closely resemble the tissue in which they grow. For instance, an adenoma of the breast, or a papilloma of the skin, shows the same relationship with the parent-tissue that we observe in the case of innocent connective tissue-growths, such as lipoma, exostosis, fibroma, myxoma, etc. In the same way, malignant epithelial tumours are stamped with the nature of the parent-tissue, though, on account of their imperfect development, they never attain to the precision of structure met with in the innocent tumours. This resemblance of carcinoma to the organ in which it originates is much more striking than is generally admitted, or even supposed. It is such that the tumour can very frequently be referred to the parent-organ through its structural similarity; and I have met with numerous examples, apart from epithelioma and cylindrical epithelioma, of cancers of the breast, liver, prostate, kidney, nasal mucous membrane, thyroid body, etc., in which anyone could at once recognise their special identity. But the evolution of carcinoma is commonly imperfect; and, in the embryonic stages, no one can gather sufficient information from the appearance presented by the malignant tissue to indicate its identity with the normal tissue. An absolutely embryonic condition of the growth is not likely to pervade the whole tumour, nor to be marked in many consecutive cases; so that, in taking a considerable group of

any one class of new growths, we may feel pretty sure that the parent-tissue will be distinctly indicated in some of them, even though the indication may very likely have to be traced through the known structural evolution of that parent-tissue.

It is unfortunate that, amongst all the carcinomata, rodent ulcer shows the least striking resemblance of any of them to a normal tissue, and what resemblance is to be traced is not constant. For instance, while one specimen may show a tubular structure, and be referred to the sweat-glands, another has cells of a character and arrangement which point towards an affinity for hair-follicles. The resemblance in the former case, when present, is marked, but in the latter can only be traced through the character of the cells forming the acini; thus, the marginal layer resembles the columnar cells of the root-sheath more than those of the rete mucosum, while the spindle-shape and whorled arrangement of the intermediate cells may indicate an abortive attempt towards the development of embryonic hair-bulbs. Sebaceous glands being only diverticula from hair-follicles, it seems probable that any cancerous development related specially to them would be a variety of the hair-follicle type of growth. The large fatty pseudo-pearls sometimes met with in rodent ulcer may mean a sebaceous transformation of the central cells of the acini. The only other epithelial tissue of the skin is the epidermis itself, the atypical formation of which is, without question, epithelioma; and that there are cases of epithelioma which have the clinical characters of rodent ulcer, such as chronic growth, rodent ulceration, and absence of glandular infection, every one must admit. At present, such cases are only distinguished from the rest after a microscopical examination; but it is questionable whether the clinical line of demarcation between epithelioma and rodent ulcer is not more correct than an artificial separation based entirely upon minute structure. I was prepared to rely more upon a relationship between the minute structure of rodent ulcer and some normal skin-element, than upon any other point, in determining its origin; but a very careful and impartial examination of these twenty-two cases has led me to the conclusion that, if it can be said to be an atypical formation of any epithelial cutaneous tissue, it must be regarded as being equally associated with all the dermal appendages, and I think that it is. Apart, then, from other considerations, there are some grounds for assuming—though they are less clear than in other varieties of carcinoma—that, on this account, rodent ulcer may be described as a chronic carcinoma of the skin, showing very abortive attempts in its evolution towards the development of the dermal appendages.

Innocent glandular growths in the skin are not of common occurrence. It is not without importance that they are met with, like rodent ulcer, almost exclusively upon the face, with the exception of some sebaceous formations which do not belong to the class of adenoma. My own experience is limited to six examples of solid glandular tumours in the skin; one multiple, occurring all over the face and spreading into the scalp, one near the eyebrow, two on the cheek, one on the nose, and one in the scalp. In only the first could the distinct origin of the growth be traced. The patient was under the care of Mr. Rushton Parker, and he removed a large cluster of tumours from the forehead, together with the skin to which they were attached. In the latter, microscopic tumours were found, which clearly showed that the primary changes occurred in the sweat-glands. A young growth consisted of spherical acini of small round cells with bright nuclei and indistinct cell-wall, and a marginal layer of elongated cells. The acini were surrounded by a fairly distinct basement-membrane, and were separated by very little connective tissue. Between them duct-like structures were seen at intervals, lined with cubical epithelium, and also portions of sweat-glands. In older growths many of the cells had undergone a sort of colloid change, which had quite a clear fatty appearance, but was unaffected by osmic acid. This is the case of adenoma, which has been alluded to as being exactly like the infiltration in one of the cases of rodent ulcer. It strongly confirms the relationship with sweat-gland tissue, which is indicated by the structure of the tubular variety. One, at least of the remaining cases of adenoma, a tumour of the cheek of twenty-five years' duration, is certainly based upon similar structure; but the others, which were of more recent growth, consisted of epithelial cells, infiltrating a myxomatous matrix, and reminded one strongly of the familiar adenomyxoma of the parotid. Whether these adenomas originated in sweat or sebaceous glands, I cannot tell, the one from the scalp was certainly thought to be of sebaceous origin; but, be this as it may, they are all very much like the deep infiltration of rodent ulcer, which has been referred to as a network of cells in a mucous stroma, so much like, indeed, that in many parts one cannot be distinguished from the other.

3. *Has Rodent Ulcer any special Affinity for, or any special Tendency*

to spread in, one Skin-Structure more than another?—Much stress has been laid by all recent writers upon observations intended to determine the mode of growth of rodent ulcer, particularly in reference to its tendency to infiltrate certain epithelial skin-structures; and, having decided which structure is most commonly affected, they have at once concluded that the primary growth originated in a similar tissue. Thus, one investigator finds that changes are to be observed in the surrounding hair-follicles, and concludes from this that rodent ulcer is a carcinoma of the hair-follicles. Others hold similar opinions, based upon similar grounds, respecting the sebaceous and sweat-glands. But even though rodent ulcer does involve these structures, and it certainly does, the fact really proves nothing as to its origin. An epithelial growth may always implicate neighbouring epithelium, and though a primary cancer of a glandular organ often shows a special tendency to convert the epithelium of that organ, yet its normal mode of extension is entirely independent of it; while it is also true that a secondary growth may possess the same influence on the gland-epithelium. The mode of increase throws no light upon the minute origin of rodent ulcer, and, as a matter of fact, when a sufficient number of examples are examined, it soon becomes apparent that the growth in its extension constantly involves all the dermal appendages, one as much as another, but not all of them put together one-tenth nor one-hundredth part as much as the usual mode of growth in the connective tissue spaces of the skin, in relationship with a small-cell infiltration. Exactly the same holds good of epithelioma. I have specimens in which it infiltrates sweat and sebaceous glands and hair-follicles: but this does not affect its undoubted origin in connection with the rete mucosum, though it is no unusual thing to find this latter—here admittedly the parent tissue—lying in close proximity to the growth, and yet affected by it in no way, except perhaps by pressure.

4. *The Localisation of Rodent Ulcer to the Skin of the Face.*—The disease is probably not entirely localised to the face, but it is a remarkable fact that sores of the same clinical characters situated elsewhere have almost, without exception, a genuinely epitheliomatous microscopic structure. The adenomata of the skin appear to be very much limited to the same region, while papilloma, like epithelioma, may be met with anywhere. If we had any reason to believe that the origin of rodent ulcer was connected specially with sebaceous glands, then their luxuriance in the skin of the nose and cheeks, and in the large Meibomian glands of the eyelids, might account for these parts being its favourite sites. But there is no sufficient reason to associate rodent ulcer with sebaceous or Meibomian glands, while the usual adenoma of these situations is probably of sweat-gland origin. However, the localisation of rodent ulcer and skin-adenomata on the face is, to my mind, the strongest piece of evidence that I have met with, in favour of associating the origin of the former with the glands of the skin.

5. *Is it possible to obtain Microscopic Evidence of the Commencement of a Rodent Ulcer?*—Somehow or other, it seems to be taken for granted that the first step in the direction of the formation of a new growth involves only the most minute area of tissue, and that, therefore, a rodent ulcer in the first instance is evolved from a single gland or hair-follicle, and not from an appreciable tract of skin. On the other hand, the areas of irritation, which we are justified in regarding as the source of some other new growths, appear to undergo a malignant transformation over a space much more than microscopic from the first. An ordinary epithelioma, or a sarcoma following injury, might either of them be taken as examples. We are so much in the habit of regarding epithelial developments as budding from germs, that it seems only rational to suppose that a carcinoma has budded from some little spot that is diseased, perhaps from only a single cell. But as far as we know it, the first stage of every postembryonic new growth is a condition of irritation and inflammation; a condition which may remain unaltered for an indefinite length of time, and which, but for some specific influence, might have returned to a normal state; though under this influence it becomes transformed into an innocent or a malignant growth. The primary tract of irritation, however, in both its simple and its transformed conditions, involves an appreciable area of tissue, of a size, I have no doubt, large enough to be capable of occasional detection and examination in all the stages of its existence.

The microscopic changes which take place during the transition from subordinate inflammation to independent new growth in a tract of irritated tissue can be only a part, and an insignificant part, too, of the whole story; unless, indeed, the presence of a pathogenic organism were to be revealed, which is perhaps improbable. It is, however, quite worth while working out the steps in the transformation as far as they can be seen with the microscope; and it is at least of much importance to be able to identify them, as far as may be, with the normal processes of inflammation and growth. This much seems to me to be clear, that all postembryonic new growths have a common

origin, of the nature of inflammation; that their subdivision into innocent and malignant tumours depends upon the specific infecting or non-infecting character of the inflammation; and that their mature structure develops entirely under the influence of the tissue first affected, so that the tumour is always an imperfect edition of the parent-tissue. Now it is supposed that, if the skin as a whole suffer a chronic irritation, such as that produced by soot or a clay pipe, in certain people the rete mucosum will take on an independent growth, resulting in an epithelioma; but that if the primary irritation affected only a sweat-gland, hair-follicle, or sebaceous gland, the growth would be a rodent ulcer. That an epithelioma commences in an irritation of a patch of skin or mucous membrane is undoubted; it remains, however, an open question whether rodent ulcer has a more limited origin.

In dealing with specimens of pre-cancerous formation in the skin, it is, of course, impossible to be certain as to the correctness of the diagnosis; but surgeons of large experience not unfrequently excise conditions of warty or other alterations in the skin which have become irritable, because, in their opinion, such a state may go on to the development of a carcinoma. It is very probable that, in such cases, the opinion is often correctly formed, and sometimes it is proved to be so by the earliest cancerous changes having actually commenced. I have had several times the opportunity of examining such portions of skin, and the microscopic changes present in them have been uniform and simple. There is an area of increased vascularity, over which a dense infiltration with inflammatory cells is seen, placed just beneath the epithelium. The latter is thickened, the superficial cells being piled up in warty form. The cells of the rete mucosum are evidently undergoing rapid multiplication, the lower layers being often crowded, and sometimes appearing as a mass of nuclei. It seems, at this stage, as though the epithelial cells ceased to be able to pass upwards in normal rotation; and one finds instead that, throughout the area of warty thickening, there are buds of rete mucosum penetrating below what is still easily recognisable as the old line of the basement-membrane into the dense inflammatory infiltration, and then it seems as though the epithelial cells, being really the reproductive layer of the rete mucosum, and being now surrounded by an embryonic tissue, become independent, and henceforward grow with the characters of malignancy.

On only two occasions have I had the opportunity of examining tissue which, it was supposed, might have become rodent ulcer; both were from the upper eyelid. One case was that of an old lady, in whom a small tract of warty growth appeared upon the upper eyelid, and was removed by Mr. Shadford Walker, because he considered it an early condition of rodent ulcer. It showed exactly the same pre-cancerous changes as have been described as occurring in epithelioma. The other occurred as a small papule on the edge of the upper eyelid of a gentleman, aged 47. It had been coming four years, and I snipped it off, as it was irritating the cornea, without excising a portion of the eyelid. The growth in this case was of the nature of a congenital mole; that is, the lymph-spaces of the connective tissue were full of epithelial-like cells, though he was not aware of its congenital origin. The base remains still in the eyelid, and will be excised and examined if independent growth at any time assert itself. The smallest rodent ulcers that I have examined, and some have been very small, even before ulceration had commenced, have yielded no evidence as to their minute origin, since, in all of them, the growth had gone entirely over to the cancerous stage. Under the head of minute origin, then, I have not much evidence to offer as to the primary changes in rodent ulcer; but, what there is, points in the direction of its probable origin in the skin, as a whole, and does not tend to associate it with any particular dermal appendage.

While one follows with the microscope the visible changes which accompany the first steps in the formation of a new growth, one seeks, and seeks in vain, for the presence of a motive power. Whether the excitant is engendered by a chronic irritation of the part, or whether it is only rendered locally active by it under certain constitutional conditions, are questions which remain at present unsolved. But the degree of evolution to which a new formation may attain, must plainly depend, to a large extent, upon the nature of this excitant. The more it resembles the normal stimulus to growth and development, the more perfect and limited will be the development of the new growth, as obtains in a fibroma or a papilloma. The more intense the excitant, the more embryonic and unlimited the growth, as in sarcoma and carcinoma. But if it may be that, in some cases, there are local or constitutional conditions, which can weaken the effect of the excitant, then it seems possible that what would otherwise have been an epithelioma, might become a rodent ulcer. For many reasons, I would have preferred to believe that rodent ulcer was a specific variety

of carcinoma, and there is much to be said in favour of its association with the glands of the skin; but I am not at all clear that we have any evidence to show that the carcinoma of any anatomical region is susceptible of specific subdivisions in its origin, although it certainly may attain to very different degrees of evolution. For the subjoined reasons, I incline to regard rodent ulcer as a form of chronic carcinoma of the skin, rather than as a carcinoma of any special dermal appendage.

1. Because its structure varies greatly, and because in normal development the rete Malpighii produces very various epithelial structures.

2. Because there are to be seen appearances in the minute structure of certain rodent ulcers, which resemble some points in the evolution of the several dermal appendages.

3. Because, also, there are points of resemblance between certain rodent ulcers and the innocent epithelial growths of the skin.

4. Because the general arrangement and type of the growth is like a slow growing epithelioma.

5. Because it passes insensibly into epithelioma.

6. Because its minute origin, so far as it can be surmised, is the same as in epithelioma.

THE EMPLOYMENT OF THE ELECTRO-MAGNET IN OPHTHALMIC SURGERY: ADDITIONAL CASES.

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THE value of the electro-magnet in ophthalmic surgery has been now practically tested, its merits have been demonstrated, and the subject occupies a recognised place in all recent text-books on diseases of the eye. This being the case, I do not propose to add much here to what I have said on previous occasions (*BRITISH MEDICAL JOURNAL*, 1881, vol. i, p. 843, and 1883, vol. ii, p. 957; and *The Electro-Magnet, and its Employment in Ophthalmic Surgery*, Churchill, 1883) as to the manner, etc., of using the electro-magnet, but rather to place on record additional cases, in which its employment has been of service.

A point, however, which it seems desirable to notice, on account of its great importance, is that, in most cases, to be used with the best success, and to be most favourable for the preservation of vision, the interval between the receipt of the injury and the operation for the removal of the foreign body must be short. In many of the cases coming under observation, the eyeball had been seriously disorganised, before an opportunity was afforded for using the electro-magnet. The instrument¹ used in all the cases is the same as previously described by me. Increased experience has rendered more positive the opinion before expressed, that it meets well the objects we have in view.

CASE I. Conjunctiva.—On January 25th, 1884, a young man applied at the Sheffield General Infirmary. A week previously, he had been struck, whilst at work, by a piece of steel on the left eye. On the outer side of the eyeball, at a little distance from the cornea, there was now noticed a dark mark under the conjunctiva. This was thought to be the chip of steel, over which the wound had closed. The electro-magnet, with a stout needle attached, was held over the situation of the fragment, touching the conjunctiva, and a few times withdrawn a little distance. After a short time, the piece of steel was found to be coming through the conjunctiva, at the old wound, and was withdrawn attached to the magnet. The patient did not appear again. Vision was perfect ($\frac{3}{8}$), and there was no deep wound. The fragment was a minute round piece, weighing $1\frac{1}{2}$ milligrammes (0.023 grain).

CASE II. Conjunctiva.—Thomas B., aged 25, a mill-wright, came to the Sheffield General Infirmary on May 2nd, 1884. He had been engaged "shafting a hammer," and, in knocking the shaft out, he struck the head of the hammer with his own hammer, and a splinter, flying off, had hit his left eye. On his applying at the infirmary, some effusion of blood was noticed on the outer side of the sclerotic; no foreign body was then detected. On May 6th, when seen by me, a small black speck was noticed deep under the conjunctiva. On applying the electro-magnet, it was observed to move. A small incision was made, and after a little difficulty the fragment, a narrow rod-shaped piece, was removed with the magnet. It was situ-

¹ Made by Cubley and Preston, High Street, Sheffield.