A COURSE OF
LECTURES ON SURGERY,

DELIVERED IN THE

MEDICAL SCHOOL OF CAMBRIDGE.

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LECTURE XXIX.

MALIGNANT TUMOURS OR CANCERS.

Definition of the term malignant as applied to tumours ; general characters of malignant tumours ; contrast between malignant and simple tumours ; some points of relation between the two : microscopic characters of malignant tumours ; fibrous stroma and cancer-cells ; different proportions in which they coexist : either may exist alone ; relation of the fibrous stroma and the cancer cells to the natural structures ; effects of cancer upon the adjacent tissues, producing atrophy of some and hypertrophy of others ; the latter exemplified by thickening and ossification of periosteal fibres, by osteoids, by thickening of the muscular coat of the intestines, &c. Explanation of the common absence and occasional presence of capsules around malignant tumours ; softening ; ulceration, &c. ; characters of cancerous ulcers ; their difference from phagedenic and scrofulous ulcers.

THE "malignant tumours," or "cancers," for we will regard the terms as synonymous, constitute one of the most important classes of disease that can occupy the attention of the pathologist, both on account of their frequent occurrence and their baneful effects. The investigation of them is attended with many difficulties, because all the other morbid processes we have been considering are involved in them to a greater or less extent, and serve to complicate their pathology, in addition to the new and striking features which they present. These latter have, perhaps, attracted rather too much attention in recent as well as in more ancient times, and I cannot help thinking that many of the erroneous views which have been promulgated with regard to the nature of cancers, are due to the disproportionate stress generally laid upon its *peculiarities* ; probably a nearer approximation to truth will be attained by allowing the *similarities* of cancer to other morbid products to occupy a larger share of our study.

It will not be in my power even to allude to many of the various theories which have been and which are now maintained upon the subject of cancer. I can only pretend to give you the general deductions I have formed from a good deal of observation, reading, and reflection. Those deductions are not meant to be final conclusions either for yourselves or for me ; they are merely observations made in passing over a wide and intricate tract of pathology. You must go as far as you can over the same ground and form your own opinions for yourselves. One of the first difficulties that meets us in our progress is the signification of the

term "malignant," and the necessity of defining what kind of disease should be included under so ominous a name. Upon this point a vast deal has been written and a great many opinions expressed ; nevertheless it would seem that, in reality, most pathologists and surgeons are very nearly agreed as to the practical meaning of the term. Perhaps if the word "destructive" be substituted, it will give you a clearer notion of the qualities essentially characterising a malignant tumour. We call a tumour "malignant" because it is destructive, that is to say, because it annihilates or destroys the natural tissue of the part in and near which it grows—the original tissue is lost and a new structure is substituted for it ; it is still further destructive, inasmuch as the new or substituted tissue is peculiarly liable to decay, and, in consequence, ulcerates or mortifies, causing breaches or chasms in the frame which may increase to a very great extent. These two qualities may be said to constitute the leading features of malignant tumours or cancers ; first, the destruction or degeneration of the natural tissues in and near which the tumour grows ; secondly, the tendency to decay of the tumour itself. The degree in which these two qualities are manifested varies much in the different varieties of malignant tumours, indeed it would be asserting too much to say that they are altogether confined to the members of this class ; but without question they are so generally evinced in a marked degree by cancers, and are so little displayed by any other kind of tumour, or indeed by any other kind of disease, that we may fairly make them the tests by which this class of morbid products is to be distinguished.

I cannot help thinking that in the present state of our knowledge we shall do more wisely in classifying morbid products according to the general characters they present, and their obvious influence upon the surrounding tissues, than according to their intimate structure as revealed by the microscope, or according to any theories deduced therefrom as to their mode of development and growth. Doubtless it will be found, indeed it has already been found to a considerable extent, that a certain uniformity of structure pervades the different members of this and the other classes of morbid products which are allied by their general features and their progress ; and we gladly call in the aid of the microscope to carry our investigations beyond the bounds which the ordinary means of observation enable us to attain ; but the many difficulties and sources of error necessarily intertwined with the science of microscopy, should warn us against too implicit a reliance on the results which it has hitherto afforded in morbid anatomy. I do not wish in the slightest degree to derogate from the usefulness of this new appendage to our science. It has already done wonders, and to it probably we must look, in great measure, for the further advance of pathology and anatomy ; it has come to our assistance just at the time when our former means of observation seemed to have done their utmost. But it is quite possible to over-estimate the value of its present results, and I think we do so in making them the basis of our classification.

If a disease presents the usual general features of cancer, if it exhibits a tendency to assimilate and destroy the adjacent tissues, and to undergo spontaneous ulceration itself, surely we ought not to reject it from the family of cancer because its minute anatomy does not appear to correspond exactly with our observations of the other members of the class.

There are several other peculiarities observable in malignant tumours of no less practical importance than the two features just specified; but they are less constant, and therefore less strictly to be regarded as characteristic. Such are their frequent appearance in the internal and more highly organized, as well as in the external and simpler structures; their common occurrence in several parts and in various structures of the same individual, as well as their liability to return after complete extirpation, from which we infer that some particular constitutional condition, some "dyscrasy," is associated with them, either as cause or effect; their determined progress, which is for the most part rapid, steady, and uncontrollable, terminating only with the life of the patient; their want of resemblance to any of the natural structures of the body, and the general uniformity of their appearance and progress in whatever part of the body they are found.

These features of malignant tumours become most striking if you contrast them with those commonly observed in simple tumours. The latter, with few exceptions, have their seat among the ordinary tissues; very seldom are they found in the internal organs, or in structures of high organization, and they commonly bear a more or less close resemblance to the tissues in which they are found, being composed either of fat, cellular or fibrous tissue, cartilage, or bone; they increase slowly, are scantily supplied with blood, and attended with little or no pain; they do not, except by their mere bulk, interfere with the movements of a limb, or modify the nutrition of surrounding parts. In the majority of cases their limits are well defined, and they may be removed without the loss of any appreciable portion of the natural constituents of the frame, and with little fear of a return of the disease, while the chance of their appearing in any other part of the body is so slight as scarcely to form an item in the calculations relative to an operation. They are compatible with perfect health, and do not commonly shorten life, or indeed exert any evil influence on the person or the part in which they occur; neither do they, as a general rule, exhibit any inherent tendency to decay. When softening does take place it is often the result of some accident; or if it be spontaneous, it is attended with no mischievous results; on the contrary, it may lead to the disintegration of the entire mass and its elimination from the system, so inducing a cure. Lastly, simple tumours often remain quiescent for years; sometimes they waste away, or undergo calcareous degeneration. How different is the account we have to give of scirrhus or encephaloid tumours. Affecting every organ and every tissue almost indiscriminately, they preserve their peculiar characters wherever they occur. Bone, muscle, tendon, gland,

and skin, are involved and destroyed by the all-prevailing and all-assimilating mass; the natural and morbid structures become blended together, so that their respective limits can scarcely be discerned, and the one cannot be removed without interfering with the other; functions are suspended, and the movements of the part impaired. These tumours, for the most part, grow quickly, are freely supplied with blood, and are attended with a good deal of enlargement of the neighbouring vessels. They are often very painful, and if the general health has not been impaired in the first instance it is soon found to suffer, more particularly when they begin to soften and ulcerate. The breaches caused by ulceration are hardly ever closed; and while the softening and ulceration proceed from the centre, the disease invariably advances at the circumference. Thus the work of destruction goes on from point to point till the functions of an important organ is arrested or the patient sinks under the continual discharge and pain. The difference between these two classes of disease are, it is clear, from this short summary, decided enough to warrant their being designated by the respective terms "simple, or innocent," and "malignant."

Nevertheless, these diseases, so different and widely removed from in one another in the various and important features just specified, have their analogies and their points of contact. Indeed there are members of the two classes approaching so nearly to one another as to have occasioned a perplexity with regard to their proper position; and some pathologists have endeavoured to get rid of the difficulty by instituting a third and intermediate class under the name "canceroid" or "semi-malignant." I do not think that any advantage is gained by this further sub-division. It has rather the effect of thrusting the two classes more widely apart, instead of assisting us to view them in their relation to one another. Some of the most remarkable instances to which I now more particularly allude, as in some degree forming a connecting link between simple and malignant disease, are furnished by the cutaneous warts. In them it is not easy, either practically or pathologically, to draw the line of demarcation between simple hypertrophy and genuine cancer; and they present, therefore, features of peculiar interest, by studying which we are perhaps more likely to obtain a correct knowledge of the pathology of cancer than in any other way. Your attention will accordingly be directed in an especial manner to them, as well as to certain other instances which seem to occupy a somewhat similar position, for there are many other examples, besides those furnished by the cutaneous disease, of a hypertrophic condition of one or more of the natural constituents of the tissues forming an important element in cancer.

Having said thus much to give you a general idea of the characters of those tumours to which the term cancer is usually applied, I will now enter more closely into the details of their anatomy and pathology.

The appearances which cancers present to the eye vary a good deal, and will be described more particu-

larly when we come to speak of the several species of the class. It is generally acknowledged that these appearances are not sufficiently definite to permit even the practised eye to decide with certainty whether a tumour be simple or malignant. The application of the microscope to pathology has, therefore, been regarded, and doubtless rightly regarded, as affording another and a surer test. It is a test that cannot be relied on till the observer has given much time and attention to its use, as those know best who are most experienced in it; and we must not be led into the error of assuming that there is only one structural type of cancer, and that all specimens are to be rejected from the family which do not come up to that standard. At present the science is too much in its infancy to admit of our dogmatising upon the information it affords without giving their legitimate weight to other considerations; with this warning I will give you, as far as I can, the general results obtained by those who have paid most attention to the subject.

It is commonly agreed that the greater number of cancerous growths consist of a fibrous stroma, disposed in meshes which contain nucleated cells, nuclei, and granules, together with a thin serous or gelatinous fluid. The proportions in which these three elements are combined, vary greatly in the different species of cancer. In the scirrhus or hard cancer, for instance, the fibrous structure predominates; in the encephaloid or soft cancer the cells are more abundant; and the colloid or gelatiniform cancer is composed in great measure of jelly-like fluid. Neither of these elements examined separately are found to exhibit any decidedly distinctive characters, the peculiarity of the cancerous growth consisting not so much in the materials of which it is composed, as in the mode of their arrangement.

The fibrous basis of cancer resembles much the common areolar or fibrous tissue, being made up of bundles of compressed wavy filaments, intermixed with which are often to be seen well developed curled filaments of elastic tissue; these filaments are supposed to be formed by the process of cell-development, in the same manner as the natural fibrous tissue, and fusiform corpuscles, apparently undergoing the changes tending to this result, are occasionally seen intermixed with the filaments. In some cases, however, this fibrous basis cannot be shown to possess so distinct a structure; it may present only a dense amorphous appearance, not unlike coagulated fibrine or lymph; or the growth may be composed of a mere jelly-like substance, traversed by a few delicate fibres, and interspersed with granules and nuclei, the fibres being formed through the intervention of the nuclei without there being a trace of any intermediate development of cells. This last condition has been observed more particularly when the tumours were recent, of rapid growth, and of soft structure. The cells just spoken of as constituting the transitional stage between nuclei and fibres, are supposed to be quite distinct from the so-called cancer-cells presently to be described. Sometimes the fibrous structure of cancer presents very much the appearance of unstripped muscle. The mode of arrangement of

the fibres varies a good deal; not unfrequently they exhibit nearly the same general disposition as that of the fibrous or areolar tissue in the part where the tumour grows, but in many cases we cannot discover any relation of that kind. In cancer of the liver they are often seen to form tough coarse bands radiating from the centre to the circumference of the tumour, and in the gelatiniform cancer they are disposed as membranes enclosing roundish spaces, in which the jelly-like fluid and the cells are contained.

It is a question of much interest in reference to the real nature of cancer, whether this fibrous element is in reality, as generally supposed, an entirely new production, or whether it is the result of some change—some morbid hypertrophy, or chronic inflammatory process—taking place in the natural cellular and fibrous tissue of the part affected. The observations made in the last few lectures with reference to the origin and mode of growth of simple tumours, warts, &c., will have prepared the way for a favourable consideration of the latter view, and there are many facts yet to be adduced in its support; at the same time it must be granted that there are some difficulties in the way of accepting it entirely. The arguments in favour of both these views will appear as we proceed.

The cell element of cancer has naturally proved an object of much interest, inasmuch as the essence of the disease would seem to be almost concentrated in it, the rapid growth and self destructive or decaying tendencies of cancer being to a great extent proportionate to, if not dependent on, the quantity of cells developed in the meshes of the fibrous stroma. Pathologists hoped, therefore, to find some distinctive structural peculiarities attaching to these cells whereby the nature of the disease might be recognised at once and with certainty. This expectation has not however at present been confirmed by observation: it is the opinion of those best qualified to judge that cancer cells do not present any decidedly characteristic peculiarities, that they vary in appearance a good deal, that in each of their different forms they resemble some of the primary cells of other tissues, and that in the form, which from its frequent occurrence in specimens of well-marked malignant disease might be taken as the type, they are not to be distinguished from the cells of cartilage or the cells composing the deeper layers of epithelium. Indeed some of the structures which present in a sufficiently well-marked manner the practical tokens of malignancy, do not appear to contain the cancer-cell at all as an ordinary constituent; such are some of the varieties of cancer of the skin and cancer of the muscular coat of the intestinal canal. The cells commonly found in cancers, which may be seen in the fluid scraped from a section of the morbid mass, and to which the name, "cancer-cells" has been applied, are larger than blood-globules, of about the same size or rather larger than pus-globules, composed of a tolerably well-defined cell-wall, with one, two, or more nuclei, in which nucleoli may be often seen. The cell-wall is rendered transparent or dissolved by acetic acid, the nuclei being unaffected. The cells vary a good deal in shape, being round or oval, or

elongated at one or both ends into a caudate or spindle form, or they may send out processes from various parts of their circumference. It is the general opinion, that they do not, at least ordinarily, advance beyond the cell-stage of organization, that they are not transitional to any other form of structure, but that having attained to a certain size they are disintegrated, and their constituent atoms are returned to the fluid from which they were derived; or by a process of endogenous growth they may become the parents of other secondary cells formed in their interior; that is to say, their nuclei and nucleoli enlarging and converted into cells may fill up the interior of the parent, and at the period of its dissolution may become set free and undergo like changes in their turn, the materials for the growth of their nuclei being furnished by imbibition through their walls. Some authors have described the cells to increase by fissiparous gemmation, and Dr. Bennett speaks much of their occasionally undergoing a retrograding process; the nuclei disappearing instead of enlarging, the cell-wall shrinking, collapsing, becoming infiltrated or intermixed with oil, and ultimately resolved into fragments and granules. He finds the yellowish masses often seen in cancerous tumours to consist in a great measure of cells thus altered.

With regard to the nature of these cancer-cells, and their physiological relations to the fibrous element and to the natural tissues of the part affected, it is not easy to form an opinion. By some authors they have been looked upon as independent existencies, like entozoa or fungi, growing in the body and propagating themselves to distant parts through the medium of the blood by sporules which find their way into the circulating current, either through the delicate walls of the capillaries, or through openings in the small vessels. It seems to me on the whole most probable, that they are the result of some peculiar influence exerted upon the nutritive elements of the blood effused among the tissues by an altered or morbid state of the nutrition of the part, being in this respect, to a certain extent, analogous to pus-cells, which they also resemble, in their incapacity to undergo further organization; and in their being in terminal, not transitional, stages of development. The two morbid products differ, however, in the important particular that the cancer-cells possess the property of self-multiplication, absorbing and assimilating the elements of the blood, whereas the pus-cells are dependent for their increase on the continuance of the inflammatory process causing fresh exudations, endued with similar tendencies to those from which they sprang themselves. There are some circumstances, such as the accumulations of pus in certain cavities or abscesses, which render it probable that even the pus-cells exert a certain assimilative influence upon the fluid or even the solid lymph effused in their immediate proximity, but they do so only in a slight degree, and with a force scarcely comparable to that of the cancer-cell. This point of difference between the products of inflammation and the elements of cancer, is of great importance, and constitutes one of the most marked features of their distinction.

Besides the cells just mentioned, there are commonly found floating in the same fluid nuclei and granules, with perhaps other cells, such as those which are in process of development into tissue, pus-cells, &c. Oily matter, in the form of minute globules dispersed through the mass, is also a very usual constituent; and there are commonly found many elements not belonging to the cancer itself but to the structure in which it is produced, such as striated muscular fibre, fat, glandular tissue, &c. The blood-vessels are often of large size, and very numerous; they are generally admitted to be derived from an increased growth of the vessels naturally supplying the affected part.

It should be observed here of the two chief elements of cancer, that they are not only intermixed in very different proportions, but that they do not invariably coexist. In some few instances the cells alone are present, being infiltrated among the tissues of the affected organ, or they may be intermixed with lymph effused in consequence of inflammation taking place in a person who is the subject of malignant disease, or in whom the cancerous diathesis is strong. So on the other hand cases now and then occur in which a tumour, consisting only of fibrous stroma, without the intermixture of any cancer-cells, and resembling, therefore, a fibrous tumour, may exhibit the destructive and inveterate qualities of malignant disease. As a general rule, the rapidity of growth and the tendency to decay in a tumour are proportionate to the quantity of cells developed in it; they are greatest in encephalona, less marked in scirrhus, and least marked of all in those specimens of scirrhus where the fibrous element constitutes the entire mass.

The relation which the cancerous elements bear to the natural tissues, and their effects upon them, are points of so much interest, that we must again revert to them. It is evident that at first the natural and morbid structures are, to say the least, very closely connected together. Most pathologists agree that the cancerous matter is infiltrated among the original elementary parts of the parent tissues, and occupies nearly all their interstices; that in process of time the elements of the tissues become compressed, appear to be blended with the deposit into a homogeneous mass, and gradually become atrophied and disappear. Indeed the connection between the natural and the morbid structure is in some cases so intimate, the one being scarcely distinguishable from the other, as necessarily to suggest the idea that there may have been not merely a blending, but an actual transformation of the healthy into the cancerous tissue. This is particularly true in some of the glandular organs. In the liver, for instance, the first indication of the disease is commonly afforded by a mottled appearance, resulting from a slight discolouration of some of the lobules; they retain their proper shape and size, and their distinctness from the neighbouring lobules, but they are of white colour, and the natural components of the lobules are replaced by, if not transformed into, the elements of cancer. As the disease increases, adjacent lobules are affected, their structure is more completely altered, their individuality

lost, and they are fused into one mass. In the breast also the lobules which have undergone the cancerous degeneration for some time retain their natural outline, and their separation from one another by septa of areolar tissue. Even when the whole gland has become involved, we may sometimes trace the remains of the lactiferous tubes branching in the interior, and the fibrous septa penetrating the exterior of the morbid structure. It is the presence of these latter which bind the integuments down to the breast, and assist in producing the knotty tuberculated state of the surface often observed in cancer of the mammary gland; after a time both the lactiferous tubes and the intercurrent septa disappear, either wasting away, or becoming transformed into cancer, and no trace of original structure remains. I have used the word "degeneration," to express the change in these cases, because that change really seems to correspond in many respects with certain other alterations in the tissues usually described under that name, more particularly the fatty degeneration. Although aware that the best authorities are quite opposed to such an opinion, I cannot help thinking that the relation now alluded to is not one of mere coarse similarity, but that the cancerous and fatty degenerations are, to a certain extent, really allied in the mode of their occurrence.

However this may be, when once the cancerous change has commenced it is almost sure to spread. The assimilative energies of the morbid product are so intense that the neighbouring tissues yield under its superior force, their own nutritive powers are as it were prostrated, and they soon disappear in the same manner as the part first affected. Before being thus completely destroyed they are found in many instances to undergo certain alterations, such as atrophy or fatty degeneration, which indicate that their nutrition is impaired and that they are ready to fall an easy prey to the destructive influence which is encroaching upon them. Whether these alterations are entirely the result of that influence operating on them, though at a distance, or whether they are in part also the result of some inherent deficiency, which is the common cause both of the cancer and the atrophy I cannot say, but am inclined to think the latter is the case. At any rate it is a common thing to find bones affected with cancer in some parts, and atrophied or greasy at others; the mammary gland, which is the seat of scirrhus in some of its lobules is often shrunken or loaded with fat in others; sometimes you see, as in the specimen shown you on a former occasion, a small scirrhus lump under the nipple imbedded in a mass of fat, which occupies the seat and retains the shape of the mammary gland. In like manner, when a muscle is affected with cancer, the fibres contiguous to the morbid product, are often observed to be in a state of more or less advanced fatty degeneration; their transverse markings are indistinct or invisible, their nuclei imperfect, and they are pervaded with oil. Further, although the general wasting of the body, so constantly accompanying the progress of cancer may be occasioned by pain, discharge, and various accidental causes, it must be allowed that the

disproportionate quantity of fat often found in such cases, both under the skin and about the internal organs,—that fat having a remarkable deep yellow colour—is attributable to some peculiar condition of the nutritive functions dependent on, or associated with cancer.

To this general rule of the association of atrophy with cancer there is a remarkable exception which claims our particular attention. I mean the frequent manifestation of hypertrophy in those septa of areolar and fibrous tissue which have been described as surviving for a time amid the desolation induced by cancer, and which may be traced for some distance into the morbid mass. The fibrous processes passing from the skin into the mammary gland become thick, tough and contracted in cancer of the breast; and when cancerous tumours are situated under the skin in other parts of the body, they are often intersected by processes of thickened areolar tissue passing into them from the skin. The most striking examples of this change are afforded by the formation of malignant tumours between bones and their periosteal coverings. The periosteum is in such cases separated from the bone by the gradual increase of the morbid product between the two; but it for some time retains a connection with the bone by means of the fibrous filaments passing from the one to the other; these filaments traversing the cancerous substance, and stretched by it, become greatly thickened, and for the most part are ossified, in course of time giving rise to those plates and spicules which you may have noticed extending perpendicularly from the surface of a bone into a malignant tumour. That this explanation of the origin of the osseous fibres and plates in malignant tumours of bones is correct, was almost proved by a recent specimen which I had an opportunity of examining not long ago: it was a case of encephaloid disease of the femur in a young woman, and the several stages just described could be traced at different parts of the exterior of the bone. In one place the periosteum was just elevated from the surface of the bone; and the stretched connecting filaments, somewhat thicker and coarser than natural, were seen in great numbers passing from the periosteum to the bone through the intervening cancerous medium. In another place the separation of the periosteum was more complete, and the filaments failed to reach it; still they could be distinguished attached at one end to the bone though the other was lost in the tumour. Nearer the middle of the limb they were replaced by osseous fibres taking the same direction and evidently originating in the same manner. At a still later stage the osseous fibres would doubtless, like the other tissues, and like the bone itself, have yielded to the superior assimilative forces of the morbid product, and have disappeared. This hypertrophy and ossification of the stretched periosteal fibres, though most common in malignant tumours, is not peculiar to them. It is not found when the growth of the tumour has been very rapid, but is most marked in cases where the tumour has made comparatively slow progress, and has exhibited the other evidences of malignancy only in a moderate degree. In such a case the osseous substance

may constitute the chief portion of the tumour, forming large porous masses, which, when macerated, resemble pumice stone. The new bony matter under these circumstances is generally less dense and firm than true bone; sometimes it has scarcely the proper structure of bone, resembling rather an amorphous cretaceous deposit. It is not confined to the outside of the bone, for the cancellous texture in the interior is often solidified, and is sometimes rendered very dense and ivory-like by a similar process taking place in it. Tumours of this kind, where the osseous substance forms so large a portion, and the malignant qualities are only inactively displayed, have been described by Müller under the name "osteoid;" at least it appears to me that the tumours so named by him are of this nature. They sometimes attain to very large size and are most frequent about the extremities of bones, particularly the lower end of the femur.

Changes analogous to this hypertrophy and ossification of the periosteal fibres are afforded by certain other tissues when they are the subjects of cancerous infiltration. The lactiferous ducts already mentioned as occasionally persistent in scirrhus breasts are usually found to be increased in size. In a case of cancer of the skin described by Dr. Bennett* "the tissue of the dermis was considerably hypertrophied, consisting of curling filaments of elastic tissue, with a fibrous network, in which numerous loculi or round openings were observed. Some of these were completely filled with cancer-cells." The epidermis was hypertrophied, and the scales offered a striking resemblance to some of the forms of cancer-cell. They were, however, external to the fibrous tissue, whereas the true cancer-cells were situated within the meshes formed by it. Another very remarkable instance of the association of hypertrophy with cancer is afforded by the stomach and intestinal canal, more particularly by the muscular coat, which you may observe by examining these specimens of scirrhus disease of the pylorus. In this one the mucous membrane is a little thickened, pulpy, vascular, villous or warty, and preternaturally adherent to the muscular coat. The peritoneum is also thickened, and in like manner adherent to the muscular coat; the layers of areolar tissue between the three tunics being also thickened and indurated. The chief changes have taken place in the muscular coat, which is more thickened than either of the others. It is tough and hard, and is composed of parallel bands or fibres, of pale greyish colour, placed side by side, closely compressed together, and united by more opaque intervening septa of indurated tissue. The disease terminates abruptly at the duodenum, diminishing gradually in the opposite direction, where the fibres and bands become less thick and less adherent to one another, though they are somewhat hypertrophied throughout the specimen. This and some of the other specimens have been dissected for the express purpose of showing, which they do clearly, that the alternate pale and opaque bands, giving a striated appearance to the sec-

tion, are composed of the muscular fibres and the intervening areolar tissue, in a thickened, indurated, and compressed condition. In one instance this condition exists throughout the whole stomach; and we occasionally meet with tumours of considerable size, composed of the muscular coat thus altered and projecting into the cavity of the stomach. The physical characters of this change are so obviously such as I have described that some pathologists have found a difficulty in supposing that it can have any near relation to cancer; while others, not finding the part to possess the requisite microscopical structure, have concluded it to be a different disease. For my own part I am fully persuaded that the change in question, if not of genuine malignant nature itself, is most intimately related to cancer and entirely dependent upon it. It is almost always found to be associated with undeniable cancer in the mucous membrane or in the adjacent absorbent glands; and after a time the striated appearance is lost, the muscular and cellular structures being blended together into one homogeneous mass, which is subject to decay and ulceration in the same manner as the other forms of cancer. Moreover, well-marked cancer-cells have sometimes been seen infiltrated into the mass so formed. So far as I have been able to ascertain, this change is confined to the pale unstriped muscular fibre; I do not know of any instance in which the more highly developed form of that tissue was affected in a similar manner.

It seems to be the general result of the preceding observations that the higher or more organized tissues—the striped muscular, and the glandular—are commonly affected with atrophy and degeneration in connection with cancer, and that the more simple and less organized tissues—the unstriped muscular, the cellular, and fibrous—being less amenable to the destructive influences of cancer, are often hypertrophied or thickened by its first impression. We frequently find the two effects simultaneous in the same organ; the glandular element wasting, becoming fatty, or replaced by cancer-cells, while the fibrous element is increased to many times its natural thickness. You will not forget that the latter also does, after a time, yield to the destructive influences of the disease, being impregnated with cancer-cells, or infected with the general tendency to decay and ulceration. To what extent may not the lower tissues thus hypertrophied contribute to form the fibrous basis of cancer? At any rate the occurrence of this change in them deserves particular attention, and acquires particular interest, when taken in connection with the remarks made in former lectures with regard to the nature and origin of simple tumours.

You will understand that malignant tumours increase in size, partly by the assimilation of the neighbouring tissues to themselves, and partly by the hypertrophy of certain elements of those tissues, as well as by the development of new elements, the cancer-cells, &c., in their substance. Sometimes one and sometimes another of these modes of increase has the preponderance, which explains the fact that tumours of this species may or may not be invested with capsules. As a general rule,

* Bennett on Cancerous and Cancroid Growths, p. 15.

the cellular and other structures from which the capsule would be formed are involved and destroyed by the advancing growth; there may be no distinct line of limitation between the morbid and the healthy structures, much less any compressed layer of areolar tissue, such as we should call a capsule, separating them from one another. There are cases, however, where, owing to the immoderate cell development and internal growth in the tumour, it increases in bulk so much more rapidly than it destroys the neighbouring tissues that the latter are distended and compressed and form a capsule over it. This, of course, is most likely to take place when the structures around a tumour are loose and easily displaced, so as to offer little resistance to the expansion of the growth. Hence we commonly find that encephaloid tumours growing in the axilla, about the kidneys, and in other similar parts, are invested with well marked capsules in all respects like those which generally enclose simple tumours.

When you cut open a cancerous tubercle, you will often find that, at or near the middle, it is softened or converted into a more or less diffuent pulp; and if such a part be examined more closely, it is seen to have lost all regular structure, and to be composed of fragments which appear to be the disorganised remnants of cells and tissue. The softening depends, probably, upon a failure of the nutritive powers taking place to such an extent that the component atoms are no longer held in those structural relations into which they had been thrown, and in which they had been maintained by the vital or nutritive forces of the growth. It commences naturally at the part first formed, viz., the centre of the tubercle, and is similar to the softening that takes place occasionally in simple tumours, or more frequently in scrofulous deposits and tubercles, and is similar also to the softening and disintegration of the natural structures often induced by inflammation. Though occurring in cancers, for the most part, as a regular or natural process, it may be induced by any cause which prematurely impairs their vital energies, such as an attack of inflammation or a blow. Strange and paradoxical it seems that these same morbid products should possess such irresistible assimilative influence over the surrounding tissues, and should be so unable to maintain their own existence, so liable to decay and dissolution.

The softening may commence at one or more points, and sometimes leads to the formation of several small cavities in various parts of the mass, containing a turbid fluid which often looks like pus and may contain pus corpuscles. Indeed the process frequently resembles and is associated with suppuration; the smaller cavities coalescing into a larger one which approaches the surface like an abscess, bursts through the skin, and leaves an ulcer. When the cancer is situated near the skin, the softening commences on the superficial side, and takes place earlier than when it is deep-seated. This breaking up of the morbid mass is usually attended by some inflammation of the surrounding tissues with effusion of lymph uniting them together and rendering them a more easy prey to the ravages of the disease. At the same time the adjacent lymphatic

glands are commonly observed to become inflamed, and to participate in the malady, if they have not before done so. It is by no means uncommon for inflammation in the surrounding tissues to precede the softening of the cancer; indeed it sometimes is contemporaneous with the earliest appearance of the disease, and attends it through all its progress so assiduously that some pathologists have regarded cancer to be only one of the multi-form results of inflammation. The cavity or ulcer commencing in the manner just described continues to increase by the progressive softening and disintegration of the neighbouring cancerous tissue, so that particle after particle is separated and forms a component in the discharge; the disease still advancing in the circumference while the dissolution of the mass is thus going on at the centre. In this way huge caverns are sometimes formed, and large parts of the body destroyed. Sometimes the work of demolition proceeds at a greater rate, mortification succeeds to ulceration, and considerable masses are detached. Now and then, in consequence perhaps of a slight inflammatory attack, the whole mass appears to slough away and leave a clean surface behind; but the hopes of a cure thus excited are almost always doomed to be disappointed by the reappearance of the disease in the sides of the chasm from which the slough has separated.

The cancerous ulcer is distinguished from any other, inasmuch as it is preceded by the substitution of the cancerous structure for the natural tissue of the part affected; the substitute structure being indued with a power of growth and a remarkable assimilative influence over the adjacent tissues. Certain other kinds of ulcer, such as the phagedenic ulcers and cancrum oris, seem to approach to the malignant type in their determined progress, and in the mode of their increase; but they are not dependent, so far as we know, upon a previous structural alteration corresponding with that of cancer. In the scrofulous disease a structural alteration does often precede the ulcer, and bears many resemblances to the cancerous change; but the new product does not exhibit the evidences of an inherent power of growth, neither is it attended with any very marked assimilative or destructive tendencies. The discharge from a cancerous ulcer is thin, dirty, bloody, and peculiarly offensive. It consists of the fluid element of the growth escaping from the areolæ of the fibrous stroma, together with decaying fragments of the structure; the rapid tendency to decomposition in the latter imparting to it, no doubt, its foetid odour. It is often intermixed with blood, and occasionally with pus. You cannot usually distinguish any cancer-cells or other definite structure, because the elements of the morbid mass are, for the most part, disintegrated before they are separated. The non-existence of cancer-cells in the discharge collected from an ulcer is, therefore, by no means to be regarded as conclusive evidence of the absence of malignant disease.

Some of the peculiar appearances which the cancerous ulcer presents are due to the combination in the same structure of a tendency to grow and a tendency to

decay. In some cases the former has the preponderance, when the surface of the ulcer is raised, granular, or warty, with an everted edge; perhaps the mass shoots forth through the skin as a large and overhanging fungus, or it forms a great tumour extending for a considerable distance under the skin. When, on the other hand, the decay and ulceration proceed rapidly, a large excavation, with raised sharp edges, is the result.

ON THE EXAGGERATION OF IDEAS RELATIVE TO CERTAIN SANITARY TOPICS.

By DANIEL NOBLE, Esq., M.R.C.S.

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THERE exists a power in new ideas which, as the novelty ceases, the ideas themselves do not maintain. Let opinions or conclusions be boldly advanced and perseveringly promulgated at variance with those which, time-honoured though they be, exert but a measured and steady influence upon society, and it will be seen that, for a season, they agitate the minds and determine the actions of their votaries to a degree far beyond what is noticeable in after periods. This is the case with doctrines the truth of which becomes ultimately demonstrated; and yet to a much greater extent with the fleeting vagaries or the half-truths of successive epochs. Undoubtedly this power of novelty is a great fact in universal nature; we recognize it in all classes of phenomena; it is a fact, moreover, everywhere witnessed as qualifying physical, moral, and social agency. Look at the workings of vegetation on the final disappearance of a retarding frost; how notable is the progress when the earth and the air become newly influenced by the genial warmth of a kindly spring. See the energizing influence of great moral truths, observable in so remarkable a manner on first being realized vividly by communities or individuals. We only need for one moment to reflect upon the past history of society to perceive that all its extraordinary commotions and upheavings have been preceded by, and are traceable to, the influence of new ideas. And although this important truth is susceptible of the plainest illustration by adverting to experience on the widest scale, a careful inquiry will yet show us that, in every department of thought and action, even the most minute—the same fact exists; all things attesting, indeed, the unwonted force, the exaggerated influence of ideas in their freshness.

In all matters which involve considerations of life, health, and disease the susceptibility of mankind to the influences of novelty is very striking. Let an idea for instituting improved modes of cure, or for prolonging life, be propounded, with even moderate plausibility, and see how large numbers arise to catch at it. And no experience of the falsehoods or the mischiefs which

empiricism exhibits in its successive phases, leads to a popular recognition of its fallacies or its dangers. Each generation witnesses the rise and fall of numerous systems of quackery; yet faith revives always in the latest, and multitudes do it homage. Amulets and sympathetic powders constitute the illustration in one age, as galvanic rings and infinitesimal doses do in another. No matter for the inconsistencies and contrasts which impudently-advanced innovations present, novelty has always its charms for a time. If *brandy and salt* fail to realize the sanguine expectation of individuals, they will probably seek, with corresponding avidity, for relief in its opposite—*cold water*. And so it is ever. *Newness* strikes the *ignorance* of mankind, and *wonder* moves the world—a lever more potent than good sense, even in the nineteenth century.

A fact must here be kept in mind:—Whilst the influence of false ideas perishes very generally with their novelty, the power of those which are true for ever endures. Yet these latter display an energy very frequently in their birth which is not permanently sustained. But this phenomenon is further observed. Men becoming newly conscious of some extraordinary agency, proceed in their admiration to invest the source of it with attributes beyond those which are properly its own, just as certain nations of Pagan antiquity were led to imagine that a true divinity inhered in the visible source of light and heat. So what is true becomes overlaid and disfigured by that which is false, and in this way exaggerations arise of notions in themselves not unjust.

The exaggeration of ideas relative to certain sanitary topics, forms at the present period a striking exemplification of much that has been said. Men's minds at this time have become awakened to certain truths of importance—truths of which, twenty-five years ago, the bulk of the nation for all practical purposes was in ignorance the most profound. It must yet be acknowledged that from having, in a former era, attached little or no consideration to the physical conditions upon which health depends, the opposite error would seem now to have place. There is every disposition in the world amongst many to attribute the origin of almost every disease to some defect in the sanitary condition of the place of residence. Ailments with which, from the very nature of the thing, the mere dwelling-house, or the locality, can have had nothing to do, are ascribed very often, in accordance with the fashion of the day, to some possible fault in the drainage or the ventilation. Over-exertion of mind, depressing passions, late hours, irregularity in diet, and silk stockings, are entirely overlooked, whilst the presence of a ditch or a cess-pool, some hundreds of yards off, is keenly detected, and possibly referred to as the origin of diseases rightly attributable to the influences ignored. A merchant capitalist has his days and his nights unceasingly harassed by care and anxiety, and suffers of course in his stomach and nervous system; hereupon he persuades himself fondly that all may be remedied, and be in future avoided, by removing a few miles from the town. Fevers and other contagious diseases decimate