On the nature and development of cystic tumours of the breast / by James F. Goodhart.

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Publication/Creation

Edinburgh : Printed by Oliver and Boyd, 1872.

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ON

THE NATURE AND DEVELOPMENT

OF

CYSTIC TUMOURS OF THE BREAST.

BY

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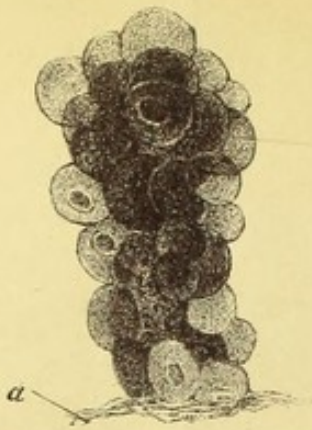
READ AT A MEETING OF THE SUSSEX MEDICO-CHIRURGICAL SOCIETY AT BRIGHTON, 1ST FEBRUARY 1872.

EDINBURGH:
PRINTED BY OLIVER AND BOYD, TWEEDDALE COURT.

MDCCCLXXII.

REPRINTED FROM THE EDINBURGH MEDICAL JOURNAL FOR MAY 1872.

Fig. 1

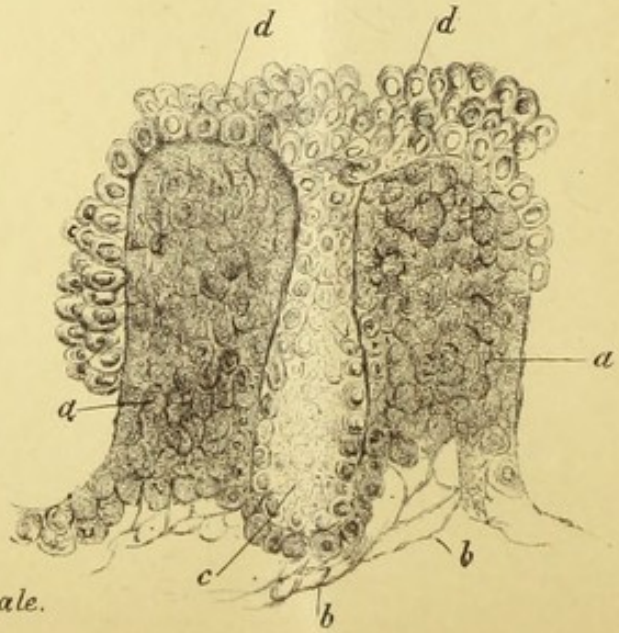


Scale $\frac{1}{1000}$ *in.*

Fig. 2

Scale $\frac{1}{1000}$ *in.* 1-375

Fig. 3



$\frac{1}{5}$ *inch object.*
Not drawn to exact scale.
Rather reduced.

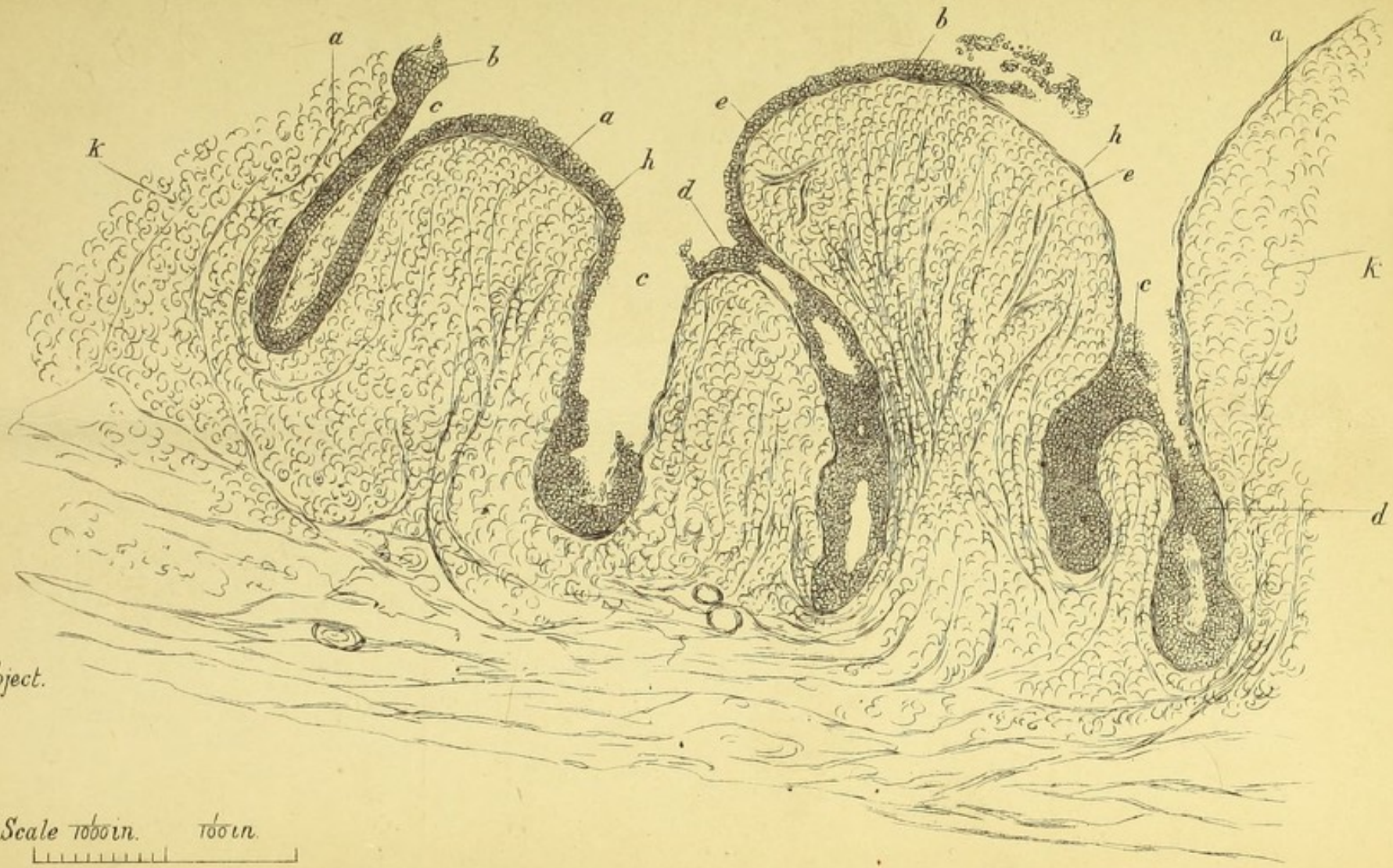
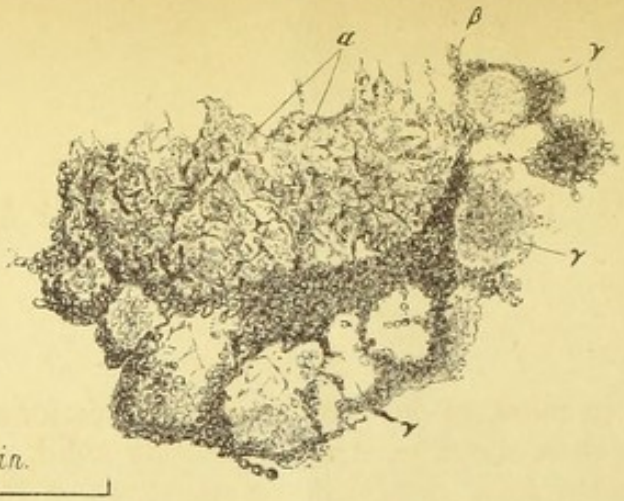


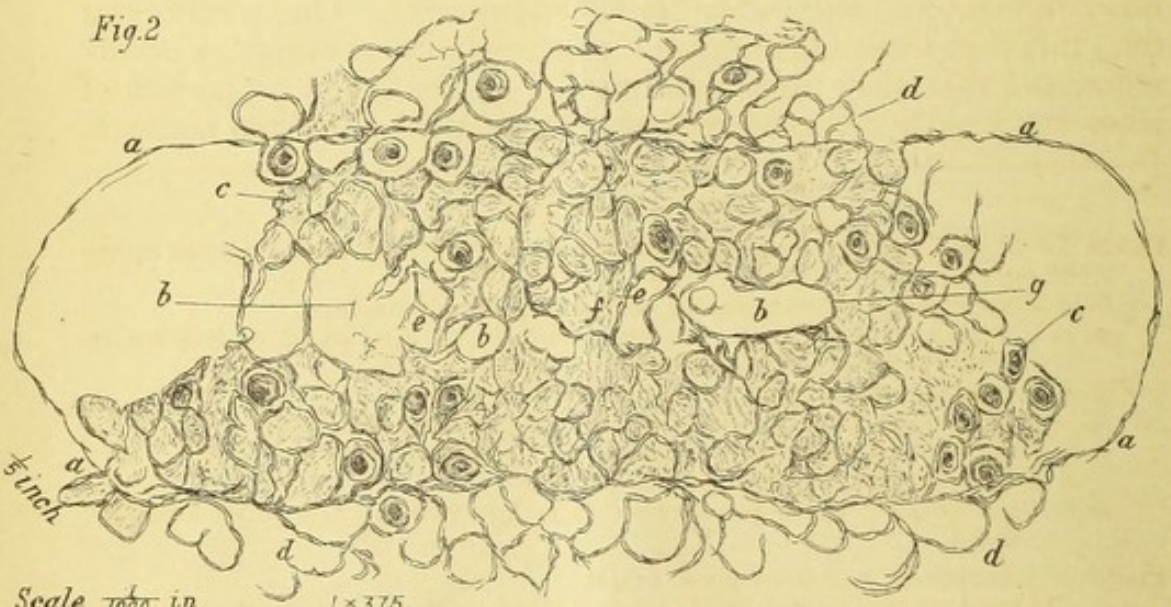
PLATE II

Fig. 1



1 inch object.
Scale $\frac{1}{1000}$ in $\frac{1}{100}$ in.

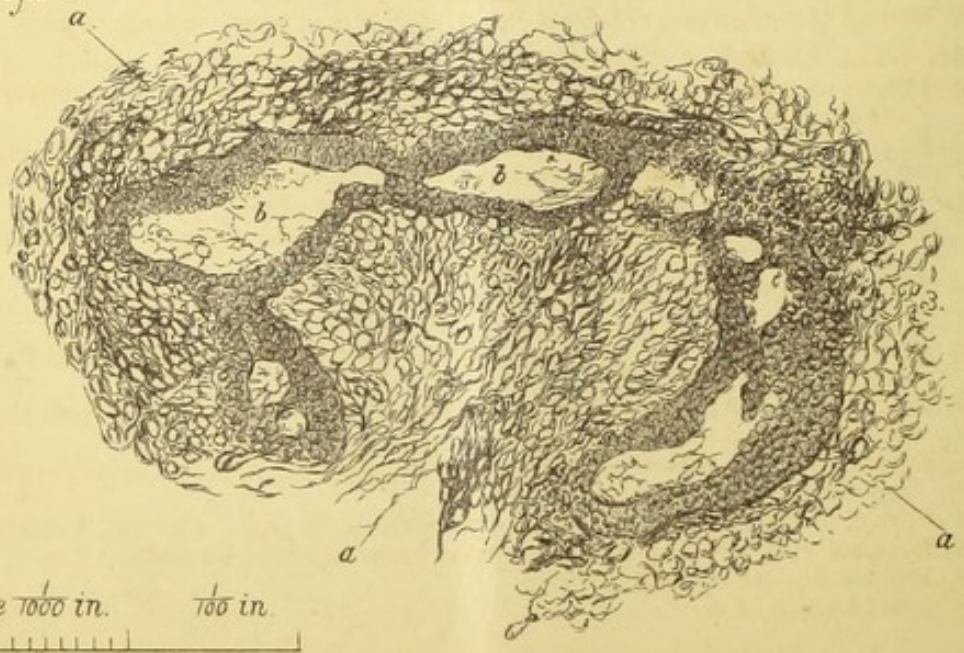
Fig. 2



$\frac{1}{4}$ inch

Scale $\frac{1}{1000}$ in. 1×375

Fig. 3



Scale $\frac{1}{1000}$ in. $\frac{1}{100}$ in.

CYSTIC TUMOURS OF THE BREAST.

In many, if not in most, of our pathological collections, tumours of the breast, other than scirrhus, whether wholly solid, partly cystic, or cystic with endogenous dendritic growths, are, with few exceptions, catalogued under the heading Adenocele, or under one of the numerous equivalent titles suggested for it, such as chronic mammary tumour, and with which it is synonymous. One would infer from this that these tumours are a matter of almost everyday occurrence, and that they must constitute by far the larger proportion of what are usually accepted as innocent growths about the mamma.

Description of Plates.

Plate I.—Figs. 1 and 2.—Papules from the wall of an intra-cystic growth in the breast.

The large rounded cells are shown with a large single nucleus.

a, *a*. Flattened cells of wall. No connective of any kind could be detected in these growths. Fresh specimen. Camera, 1 × 375.

Fig. 3.—Papules from an intra-cystic growth in the breast.

a, *a*. Two papules formed of rounded cells with distinct nucleus.

b, *b*. Cells have escaped, leaving stroma only of delicate fibrillæ.

c. Follicle formed between the two papules.

d, *d*. Cells heaping up on the surface. Fresh specimen. 1 × 375 Camera reduced.

Plate II.—Section of wall from cystic breast.

a, *a*, *a*. Large papules formed by (?) gradual fusion of many smaller ones.

b, *b*. Epithelium.

c, *c*. Follicles formed by an approximation of the papules.

d, *d*. Cysts forming by an obliteration of the mouth of the follicle.

e, *e*. Small vessels cut across.

h, *h*. Membrana limitans, as plainly seen under 1 inch objective.

k. Stroma of connective, not filled in. Chromic acid prep. 1 inch objects.

Plate III.—Fig. 1.—Section of tertiary papilla, from cystic disease of breast.

a, *a*. Stroma of papilla as seen under a low power. Its centre contained numerous cavities, and was much more rarified than the circumference.

β. Agglomeration of cells to form pseudo-limiting membrane upon which other papillæ, γ, γ, γ, have formed, and are already becoming converted into cysts.

Fig. 2. "Kyste lacunaire," formed by papillæ now fused above.

a, *a*. Elongated cells and connective, arranged in a linear manner, showing the external limit of the original papilla.

g. Limit of epithelium.

b, *b*. Cyst cavity.

c, *c*, *c*. Epithelium, composed of rounded cells, each of which is surrounded by a ring of connective fibres.

d, *d*. Connective of the papilla proper, showing it directly continuous with that running into the epithelial layer.

e, *e*. Extension of threads across the cyst cavity, showing how this is obliterated and a solid growth formed.

f. Perfect obliteration of cyst cavity. Chromic acid prep. Camera, 1 × 375.

Fig. 3. Lacunar cyst, forming secondary cysts by adhesion of its walls.

a, *a*. Stroma beneath epithelial lining.

b, *b*. Cysts formed in it.

Such an inference would, however, hardly be in accord with most recent pathological opinion and observation, which would seem to indicate that adenoid growths in the breast are an insignificant minority compared with sarcomatous, fibromatous, and myxomatous tumours, more especially the first of the three, which are much more common. I do not propose to quarrel with this distinction on the whole, founded, as it probably is, upon the examination of large numbers of cases; on the contrary, I believe it to be strictly correct, but only so far as the bare histology of the tumours carries us. No doubt, many of the growths examined in the breast are formed of young tissue, which, not so very long ago, would have been called fibro-cellular. But now, they have arrived at a further stage of vocabular differentiation, and are split up according to consistence, shape of cell element, and character of connective, into the various groups just named. A classification such as this, however, while adding a certain correctness of detail, is hardly an unmixed good, since it separates from each other growths which have at any rate certain rough features in common, and which, as far as their *true* nature is concerned, are probably not placed far outside their proper confines when looked upon in the light in which they have long been regarded as adenoceles.

The discussion of this subject thus embraces, it will be seen, two perfectly distinct questions, the microscopical characters of certain structures, and their proper position in any system of classification; in other words, their composition and nature. The former, simply one of fact, is easily decided by the examination of specimens; while the settlement of the latter can only be arrived at by inference after the consideration of their mode of development.

In regarding many of these tumours of the breast as glandular, I would not be understood to say that they are all formed of racemose gland structure; the term is applied here, as it is in our museums, to tumours having a foliated arrangement of their tissues, and which, in by far the greater number of instances, have cysts throughout them or in some part of their substance. The name "adenocele," thus interpreted, will include two histologically different forms of growth, the one tubular, like unto the breast itself, and the other made up of distinct acini in small proportion—which, indeed, may not be present at all—and in greater part of embryo gland-cells lying in the meshes of a delicate connective tissue; a growth, in fact, which, in strict pathological language, more nearly resembles the large round-celled sarcomata, Plate III. Fig. 2. Many cases, no doubt, are really made up of sarcomatous elements, and I only class the two forms together as practically one disease, from the study of their mode of production, which leads me to think that both are evolved in a similar manner. For this reason I shall venture here to describe them in common.

This distinction conceded, I have no hesitation in saying that tubular gland growth in the breast is decidedly rare, and what are

often loosely called sections of tubes are not so at all, but are really sections of cysts in a young gland tumour, and the mode of formation of which I shall attempt to describe immediately. Whether these cysts be not an abortive formation of tubes and true breast tissue is another question—very probably they are.

I need not dwell long on the *rough* characters of these adenoceles; it will be sufficient to recall to mind, what is already well known to all who are familiar with pathological preparations, that a very large proportion of them are cystic; that all have a peculiar foliated or arborescent arrangement—said to be due to the clustering of cæcal acini round a main tube—and that nearly all when fresh are largely colloidal in their nature.

Their almost constant association with cysts is a point which will be dwelt upon hereafter in relation to their *raison d'être*. Of the small group uncomplicated with cysts—comprising the true adenoceles of recent authors—it may be said that the involuted type of the cystic form is still present in most of them, and I therefore think it fair to infer that the absence of cysts is in reality due to their obliteration by growth, or apposition of their surfaces through absence of secretion, rather than to the formation of tumour quite apart from cyst.

Starting now on the investigation of the minute structure of these growths, a primary or parent cyst may be, of course, formed in the gland by many modes, most commonly, however, we may suppose, by the blocking up of a duct and the formation of a retention cyst. Any one of the tubules of the gland may thus easily form a parent cyst which becomes filled with secretion. An examination of this shows it to be nearly always viscid and mucoid in its character, and composed in great part of fattily degenerating rounded cells, containing, if not obscured or broken up by granular changes, a single large nucleus.

If the wall of the cyst be examined, it will, even to the unaided eye, often appear velvety in look, sometimes all over, at others only in patches. A thin section made vertical to the surface of the cavity at one of these spots, and examined microscopically, shows a cellular lining attached to the parent wall, irregularly proliferating and heaping up into papillæ, at first of every variety of shape, but ultimately of very regularly truncated ovoid form. Some of these appearances are shown in Plate I., Figs. 1, 2, 3, and Plate II., and the papillæ may, in many cases, be perfectly well seen by the naked eye.

The epithelium of the walls of the cyst puts on every variety of form. It may be columnar or tesselated, or both together, the latter condition being very common; in which case the superficial cells are generally columnar, while the deeper ones are rounded. The most frequent of all, however, is the shape depicted in Plate I., Figs. 1, 2, 3. In rare cases, ciliated epithelium is found on the walls of the cyst. It is difficult to say what, if any, are the varieties of condition which determine this difference in

form; I am almost disposed to think that it is in great measure dependent on pressure, amount of secretion, or closeness of connexion between neighbouring cells.

Pari passu with this heaping up of epithelium, delicate thread-like filaments shoot out from the wall of the cyst, and gland tissue beneath, between the cells on the surface. Thus, as the papule grows, it forms a connected whole, and this is further soon strengthened by the projection into it of a capillary loop from beneath. A rounding off of the papule appears to come about by the gradual flattening and elongation of the outermost cells, or those farthest from the original growth. Under a low power (1 inch), a very distinct limiting membrane is apparently present, but under higher objectives this cannot be made out, except in rare cases, and no obvious distinction can be detected between the outside compressed cells and the central well-shaped ones; moreover, in the majority of instances, the former do not form a continuous layer, but gaps are found all along at irregular intervals. However, membrane or no membrane, each papule becomes distinctly limited in its regularity of form by some restrictions, and its external boundary then allows of a secondary growth taking place from its surface, just as the papilla we have traced thus far did from the wall of the primary cyst or tube. This process may take place a second, a third, and, for ought I know or see reason for doubting, any number of times. Plate III., Fig. 1, is taken from a papilla in which this process had gone on for four generations. As also no distinct separation exists between the cells of the centre of each papilla and those of its circumference, so in like manner, as soon as the cells again heap up on its surface can no separation be defined between the new tissue and that of the parent wall on which it formed. A thin section of a growth at this stage shows a series of papules covered with epithelium, and forming follicles between them, such as is shown in Plate II.

Now, it is obvious that if these small masses of cells protrude evenly all over a cyst whose cavity is small, the papules may so press upon each other that a solid growth will result; other conditions will also tend to ensure this, such as an absence of secreting properties on the part of the cells, and a tight capsule, which would hinder the cyst from expanding. Moreover, the pressure to which the whole new growth is subjected would naturally be unfavourable to the surface-growth of new cells, and therefore, in many of these small solid (or true?) adenoceles, we have a true limiting membrane formed; according to others, this is the containing membrane of a gland acinus. This, however, is not a very frequent termination, the solid growths being in very small proportion; two other processes are, of the three, much the more probable. Of these, one will still produce a solid growth, the other a cystic one; the solid form is, however, truly a cystic one, and only becomes solid after the production of the cavities. In both cases, neighbouring papillæ,

lined all round their exterior with gland-cells or epithelium, meet at one spot (Plate II., *d*, *d*). By their union, a space is formed with its walls, covered by cells, endued with the power of secretion. This cavity may now go on to one of three terminations: (1.) If it be small, the gland-cells may join across between the opposing surfaces and form, to all intents and purposes, a gland acinus, many of which, if they occurred, would cause the solidity of growth just now mentioned; (2.) If of fair size, papillæ of epithelium may again form in its interior on the type of its own formation, and thus give rise to fresh follicular pits and cysts, to growth within an intra-cystic growth; or, (3.) The epithelium may become fatty, and simply die off into the interior, and form much of the mucoid fluid, so commonly present in this class of tumours. These facts are, I think, a sufficient explanation of the difference between the solid and the cystic forms.

But there are other varieties of development which also require a notice. A cyst of good size having formed by the approximation of neighbouring papillæ, its walls may become pouched-in at various places towards its own cavity, by pressure of other growths and cysts outside it. In this way, many follicles are formed inside a single cyst, and these, by union of opposite walls and angles, may divide one large cavity into three, four, or five smaller ones, all still lined with cells, and able either to secrete or to grow. These are the "kystes lacunaires" of Continental authorities (Plate III., Fig. 3); and they present an appearance, when perfectly subdivided, not unlike the sections of tubes before mentioned.

Lastly, we have cysts formed by a process of softening within a papilla, the central part of which disappears, the walls becoming lined with epithelium like other cysts. Part of this process is shown in Plate III., Fig. 1; but it is, I think, better studied not in the breast but in allied tumours of the testicle, such as glandular enchondromata—if one may be allowed to use such a term. In these, the cartilaginous papules, almost as soon as formed, undergo this change, the cartilage cells first disappearing when the matrix becomes discoloured, and faintly fibrous in texture, and ultimately softened down by fatty changes; lastly, the cavity thus produced is lined by tesselated or columnar epithelium.

Now, there can be no doubt, I think, that the tumours here all described as glandular, would be set down by others as varying in their nature, if judged alone by their histological elements. MM. Cornil and Ranvier are most explicit in their statement that the adenomata "do not contain lacunar cysts, so that their presence, far from characterizing adenoma, completely excludes it."[1] They say that where these exist, solid growths outside have pouched into a *duct*, of which the epithelium undergoes proliferation, and the duct then dilates.

My reasons for dissenting from their interpretation of the facts are, that the epithelium in the spaces is not an ordinary duct epithe-

[1] Manuel d'Histologie Pathologique, p. 292.

lium regularly arranged; and that, in place of being separated off by a basement membrane, as it would be from a growth pushing the duct before it, it cannot be distinguished from subjacent layers, or by any very distinct characteristics, from the very centre of what would be, according to their view, the growth proper; further, that this very duct epithelium, if so it be, becomes speedily incorporated with the tissues beneath, by the shooting up into the layer of delicate filaments of connective.

In the fibrous and other forms these changes are difficult of recognition, and unless the specimen be perfectly fresh, it is impossible to make out much of the real nature of these growths. The hardening process to which they are submitted renders the surface-cells of the papules granular, and detaches them from the parent mass, which then appears as a naked papilla, with here and there fatty-looking debris attached to it. It may, however, even at this time, be seen that the most external part of the mass is more homogeneous, and formed of younger tissue, than that of its base; in some cases, where an apparently distinct basement membrane exists, this is stained more deeply by reagents than the rest of the papule, indicating rather that it is not a part of a primarily-formed and involuted membrane, but that it is younger in point of time than the subjacent tissues.

The papules here described have been, as has been said, very generally looked upon as follicles lined with epithelium. This is probably not a correct view of their nature, since a network of connective runs through them, and capillary loops ramify within and not over them. All things considered, therefore, I prefer to say that they are surface-growths, whose stroma is formed, perhaps round the capillaries, from the centre of each papilla towards its circumference, and that the lacunar cysts are in many cases certainly not dilated ducts, but are newly formed cysts, produced in the way that has just been described. From this it will be seen that any attempt at gland-growth is outside any pre-existing tissue, or rather is always on the free surface of older growths, whether this be truly outside such previous formation or upon the surface of a space within it. Repeating once again, that no matter what the nature of the growth, all are formed on the same plan by the development of papules, and all has been said that need be said on the mode of production of these tumours.

In the next place, it will be well to strengthen the position just taken up by referring to what has been made out in cystic disease of the ovary, in which organ many of the growths are, as is now well known, produced by the same heaping up of cells from the wall of a cavity, by the same production of papules covered by epithelium or glandular cells, and by the ultimate union of these papules to form cysts.

The same stages obtain in the case of the ovary as in that of the breast; but for fuller information as to this point in ovarian

pathology, the reader is referred to a paper in the Medico-Chirurgical Transactions of 1864, by Dr Wilson Fox, who first showed the true nature of such growths. Dr Braxton Hicks also, towards the close of 1864 (Guy's Hospital Reports), pointed out the similarity which exists between ovary and breast in regard to growth. Dr Hicks, however, describes the papules found in the ovary as all becoming follicular by a softening down in their centres, and compares their development with that of adenocele, which, he says, is known to be formed in the same way. Herein, then, I differ from him in saying that, in the majority of cases, the follicles of the latter are not formed inside the papilla, but outside it, by the help of others; inside it the vessels run, and the septa of the growth are formed.

If, then, these cystic tumours in the ovary are glandular, as many of them are allowed to be, it is hard to see why the presence of cysts in the breast should preclude the possibility of the presence of gland structure, as MM. Cornil and Ranvier would have us believe.

Analogous formations are also met with in the lip, scalp, intestine, and some nasal polypi, as described by Billroth. Except in the latter case, it is also important to note that the tumours are usually solid and not cystic: the bearing of this upon the question of growth will be touched upon again shortly.

Now, in all these regions, one constant condition exists in the presence of cavities or tubes of gland structure. What, then, is the relation between tube and cyst, and what that between cyst and growth? Taking the latter part of the question first, we may refer to the fact, that one of the greatest obstacles to growth is continuous pressure; we may then not unfairly infer the exact converse of this, and say that one of the greatest incitements to growth is the existence of space in which to grow. This, indeed, is a physiological axiom, which hardly needs to be stated. Every one has noticed the behaviour of granulations on a free surface, or that of new growth towards natural cavities, such as the bladder or vagina. Surely the unrestrictedness of these is due to their freedom from surrounding hindrances; and though such instances can only be adduced as evidence of unlimited extension when once the process has commenced, still, what is favourable to a colony as a whole, must be favourable to a majority of the individual units; and therefore it may be argued that cysts, constant as I believe them to be in the earlier stages of these tumours, act as incitements to growth. The fact that they always occur about gland tubes suggests how the space which is necessary is obtained. One can hardly imagine any condition more likely to be constantly affording temporary or permanent occlusions of ducts, and therefore cysts, than the ramifications of tubular glands and their terminal cæca. Mr Birkett[1] gives details of one case in which a dilated

[1] Guy's Hospital Reports, 1855. Art. "Adenocele."

duct was traced, and a growth found on its wall. This, however, can rarely be done; and I have never seen this the first step, though, from the investigation of the later stages, I have no doubt of its occurrence. It is not, however, necessary for the argument that a duct should first become dilated, because any cyst, whether formed by or independently of a tube, if in the neighbourhood of gland, is likely to become lined with epithelium and take on a pseudo-secretive action, and so to produce growth; but, in saying this, I rather anticipate what follows.

In thus thinking that there is a causal relation between space and growth, I differ from Dr Hicks, who, in the paper before mentioned, argues that, inasmuch as all such growths are not cystic, therefore the cysts cannot be an essential element with them, and probably the two are only accidentally associated. But I have already shown how, a primary cyst being formed allowing of growth, it may be quite possible to get this obliterated without the production of fresh spaces containing fluid. I have now only further to say, that these tumours are much more unlimited in organs such as the breast and ovary, where there is a presence of conditions which ensure secretion, and therefore the distension of any cysts that may be formed—and, as a consequence, where freedom of growth is allowed—than in those glands, such as the sebaceous, whose secretion is more inspissated, and which is not so well adapted for distending without obliterating an obstructed duct.

In saying thus much of the relation which possibly exists between cysts and new growths, any conception of the first beginnings of tumour has been carefully avoided. It would indeed be fatal to the extension and main purport of this short paper, if we were to carry away the idea that any conditions before mentioned could be of themselves sufficient to produce new growth; they are, after all, only extrinsic adjuvants, and hardly touch the question as to why it should originate. It is not that there is a space ready in which cell-proliferation may take place; something must be behind and within each cell, fitting it to take advantage of conditions ready to its hand—and as to the nature of this something, we now pass on to say a word.

First of all, then, the mere fact of the presence of gland implies, one may say, under favourable conditions, the probability of growth, in that glands are largely formed of embryo cells, which are somewhat removed from the restrictive developmental influence brought to bear upon other parts where new tissues are interwoven with the old.

Let me explain:—In an ordinary fibrous tissue, let us say, nuclei of young material, or engaged in forming young tissue, are scattered here and there, completely surrounded by more formed substances. These young germs are therefore naturally thrown, so to speak, into good society, and, in somewhat homely language,

may be said to be well brought up. This is hardly so in a gland, where a number of germinal elements are thrown together, and are not so overpowered by the tissue around as to forbid an independent action. What wonder, then, if at times they act out of harmony with the parent stock, and live a life of their own? Thus much may be said of any gland, but I take it that there are additional reasons in the case of one such as we are now more especially concerned with. In this case, they are subject to periodical excitements—to times when they are, we may suppose, supplied with increased nutriment and augmented force, which, if it be not supplied with an outlet, will likely enough lead to mischief from a clinical point of view, and this mischief will, as I think, probably be new growth. Why this should be so is, in a measure at any rate, explained by a hypothesis which the development of these tumours warrants us in making, viz., *that growth and secretion are to be looked upon merely as a common force finding its expression in different ways.*

In the early history of gland life, the force which the part has supplied to it, in common with the other regions of the body, is registered in growth and development. At a particular period, again, in its existence,—partly, no doubt, owing to calls that are made upon it, and partly also to a tendency long inherited to take on a definite action at a definite time,—the gland leaves off growth and takes on the capability of secretion, and thus is provided an outlet for its energy. Supposing now that, in the full tide of this developmental activity and high nutrition, a part of its secreting surface becomes shut off, or knocked and excited when its dormant power and longing cannot find equilibrium in secretion, what more likely—if, indeed, it be not just what we should expect—than that it should go back to its prior formative processes, and commence again to grow? Is not this physiologically sound? At any rate, presumptive evidence in its favour is afforded by the fact that these tumours are most common in young unmarried or sterile women; in other words, in those in whom secretion is in a state of nascent activity. Give this no outlet, and new growth will very possibly result, but, more than this, growth of such a kind as shall be a fair index of developmental tone, and of an otherwise healthy state, viz., a fair substitution for healthy gland structure. The representation will not be a perfect one, because it is not now as it was prior to the time when the gland first became able to secrete, when with undivided aims it was wholly occupied in development; now it is partly occupied in forming gland and partly in holding itself in readiness for secretive action, and the developmental process, at any rate, is not furthered by this subdivision of labour.

Diverging for a moment from the limits imposed upon our subject by its title, let us carry this idea of correlation to the other pole of gland life, and work it out to its conclusion. We shall then be on the wane of gland activity, a period when secretion is

somewhat rudely stopped, often after having been in active use for years. The organ still has to dispose of force, all the more, probably, in that it has become accustomed to action, and for which reason a large amount of blood still reaches it, and now, while the mould is still present, giving its rough characters to the mass, a something is wanting—developmental *tone*, as we in our ignorance have ventured to call it—which in earlier days might probably have sent it on its way as a simple glandular tumour: a feeble copy of the original is present, it is true, but the idea and spirit of the master-hand are absent. Now there is no cohesion between the constituent elements; there is an individual as opposed to an inter-dependent life, and each cell lives through its stages absorbed in its own immediate ends, influencing rather than influenced by the still healthy structures, and quite regardless of the wants or interests of the organism on which, like a parasite, it may be said to feed.

Still, physiologically, this abnormal growth is an outlet for force, and the correlative of former service. As such, it must be looked upon as a most unhappy attempt, as far as we can see, to remedy an evil.

Various objections to the theory of correlation between growth and secretion have been made, two of which it will be well just to notice here. 1*st*, It is said that were the hypothesis a true one, many women at the end of the period of lactation would become the subjects of adenoceles, whereas the very opposite is notoriously the case. I cannot, however, think that this conclusion is a sound one; for, in the first place, at the termination of a long period of action, the gland itself may be said to be exhausted. In the second place, the whole amount of force throughout the system is obviously reduced, and every tissue in the body is making equal, if not greater, demands upon the common pabulum, from which alone the organ in question can derive its energy; while it may not unreasonably be supposed, that, by the time the whole body has regained its wonted status, the breast has returned to its state of nascent activity, in great measure habitual to it—to a state of *action*, in reality made manifest by its very quiescence.

2*d*, The theory of correlation would apply equally to cysts in all glands, and not to those in special ones only. This, however, is not so. In estimating the likelihood of a new growth occurring in any given cyst, these cavities may be divided into two grand classes—serous cysts, and mucous or glandular cysts; the one containing, as the names imply, a serous fluid, the other a colloidal or viscid matter in greater or less proportion. The former class, illustrated best by kidney cysts, never take on growth, but remain secretive all through their history; while the latter, though not always, by any means, giving rise to endogenous growth, are still at any time very likely so to do. In both these instances, cyst is common to them; gland influence and structure are in a measure common to

them; secretion is common to them; and practically, both may be looked upon as excretive, so that in relation to ultimate ends, both would seem to be very similar in purpose. In what, then, do they differ? Only in this, that while the products of one are watery, those of the other are colloidal. I have no doubt that this is an essential point of divergence, but if so, it is only to give a result for the cause, if we go no further. What is the reason of this difference in the consistence of the products? It is to be found in this, I believe, that serous secretions are formed by membranes, or at any rate by glands which have close analogies with secreting membranes, while mucous fluids are formed by glands proper. If the analysis of the difference between gland and secreting membrane be carried yet further, it, I apprehend, resolves itself into a matter of difference in the amount of work done, and a difference in the number of working agents. To explain: A secreting membrane consists of basement layer and one or more layers of cells, while a gland is formed by a crowd of cells all huddled together in a bag or network. The more the workmen the more the work, or, expressing this in terms of secretion, the greater the number of cells secreting fluid, the greater number of cells will there be in that fluid; for secretion is, I take it, only a discharge of material, together with the bodies which obtained this from the blood or tissues. To pursue this line of thought only one step further; as has been said before, the more cells in any secretion, the more the likelihood of growth taking place.

In addition to this, it has been suggested that in their earlier stages gland cells have impressed upon them an errand of formation, and it is only when other forces come into play that this is converted into a secretive errand; they have, in fact, been bred up to growth, and to this they repair when functional life ceases. But in the case of membrane, this is not so; their elements were never formed for building up gland, and so they cannot revert to a craft of which they may be said to be utterly ignorant; they have no alternative action, and therefore cannot do otherwise than continue to secrete.[1]

But some one will say, "This connexion between growth and secretion is all very well if it can be supported by facts; but this is

[1] The distinction here drawn between gland and secreting membrane elicited some criticisms at the time of reading this paper as to its reality in fact. It would, I think, rather strengthen the theory brought forward did such a distinction not exist. This, however, is not so; for whether my reasons for making it be deemed satisfactory or not, we can hardly get over the pathological fact, that cysts, membranes, or glands—of which I quoted the kidney as a typical example—whose secretion is serous, are hardly ever liable to growth within their cavities. I can neither find recorded, nor have I seen in museums, a cystic kidney giving rise to papular growth from any of its surfaces, and the pathology of renal cysts is probably, therefore, simply one of tubular dilatation, and not one of new growth. The fact that the kidney is frequently the subject of cancer is hardly a case in point, seeing that there is no evidence of the growth commencing in the tubules, and it is equally probable that it may originate outside them in lymphatics or elsewhere.

not so; you are obliged to admit that the majority of these tumours are not gland formations but something else." Now, while allowing that in their somewhat matured condition, a fibroma, sarcom, or myxoma in the breast, may be distinct enough in its nature; I am far from thinking that this is so in the earlier stages of its growth. A gland is further a compound structure, made up of gland cells, connective and fibrous tissue. If there is a growth of the cells, one would expect also an increase of the fibre, and this is what actually occurs. It, then, is quite possible that the growth of connective or fibre may be under more advantageous circumstances than those under which the cell elements exist; this being so, the former would increase at the expense of the gland tissue, the latter become crowded out, and the whole formation practically, as described, sarcomatous or otherwise. This is the more likely when we remember, that supposing, as we must in any part of this compound whole, a variety of tissues to be stimulated to growth, each element would hardly start fair in the race. In the one case, we have to do with cells whose life, as far as we can judge, is much shorter—if, indeed, what would be regarded as a degeneration in other structures be not their essential function—with elements that will rapidly proliferate and as quickly die, and this on the smallest exciting cause; in the other case, we have to do with a tissue less isolated in action, and therefore less prone to rapid change, and not so obnoxious to altered conditions. But to say this much is not to deny a glandular *nature* to many of these formations. This question of cell life is a fascinating one for unlimited speculation, more especially if pushed into the region of malignant and recurrent growth. Upon this time and space forbid our entering here. One may, however, before closing, just diverge for one moment to point out that these remarks, both in relation to innocent and cancerous tumours, seem to illustrate a pathological law, which teaches that if a growth occur in any part, it will, with but few exceptions, take on the form of such part in more or less perfect manner; and thus we find, in the case of the breast, a certain resemblance between cancer and other tumours. A very practical point is embodied in this, which, as every worker with the microscope in the field of morbid anatomy knows well, still needs reiteration. How often, to such a one's very great perplexity, morsels are sent to him, of which, perhaps, he knows nothing beyond the bitter fact that he is expected to express an opinion on the question of its recurrence. If our observer is wise, he will keep to a bare statement of description, and leave recurrence to futurity, which cannot fail him; but, unfortunately, such a barren announcement is generally very little consonant with the surgeon's hopes or fears; he cares little to be told that his knife has removed a lymphoma or rapidly-growing adenoma or what-not; he associates often gland tumour with innocence, and cancer with its surgical opposite; while the pathologist, as I say, knows well, that only in exceptional cases can it be said that such-

and-such a growth is a *cancer*, while many most harmless-looking tumours rapidly recur. I am inclined to say for myself, that an answer to the question of recurrence is much more surely indicated by naked-eye appearances and experience, than by any histological inquiry.

Lastly, as to the light which these observations throw upon gland development, it may be remembered that I expressed a doubt whether these new formations were ever produced by the involution of a simple tube, while the formation of papillæ inside cavities is very general in what appear to be attempts at gland growth in many regions of the body. This uniformity of action in different parts cannot, I think, be a mere result of chance. Again, it seems very improbable that there should exist one developmental law for an early period of life, and another for adult age or senility, while no one, I suppose, now holds that new growths are omnipotent in their freedom from all law. Whatever, then, the name by which we characterize that force which ends in tumour, most will probably be ready to admit that it cannot be other than that same force which was impressed upon the one cell at its first beginning, and which sent it on its road of evolution; and we may, upon this, not unreasonably ground the assumption that the developmental processes gone through in the formation of glands in intra-uterine life, will be very closely imitated in extra-uterine formations; in other words, the clue to the nature of these pathological structures must be looked for in the field of normal embryology; and if so, then, by providing specimens easy of access, both by their numbers and size, morbid anatomy will, in its turn, react upon the latter, and facilitate a study at present surrounded by almost insuperable difficulties. This line of inquiry has indeed already made much progress through the able researches of Müller, Billroth, and others.

PRINTED BY OLIVER AND BOYD, EDINBURGH.