On the anatomical characters of some adventitious structures / by Dr. Hodgkin.

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with the Author's Respects

ON THE

ANATOMICAL CHARACTERS

OF SOME

ADVENTITIOUS STRUCTURES.

BY DR. HODGKIN.

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ADVENTITIOUS STRUCTURES.

BY DR. HODGKIN.

Read March 10th, 24th, and May 26th, 1829.

THE principal object of the paper, which I have now the honour to submit to the consideration of the Medical and Chirurgical Society, is the description of the Anatomical Characters of a large and important class of Structures, which, though often met with in various parts of the body, are foreign to it in its healthy or natural state, and consequently belong to those formations which are included under the general term of Adventitious or Accidental. Having for some years enjoyed the opportunity of examining a great variety of these structures, my attention has been particularly directed to the investigation of certain anatomical characters which arrested my attention, and appeared to indicate general laws of formation pervading the whole class.

Without further preface, I shall commence with

the examination of those serous membranes which are occasionally found in various parts of the body, as the result of irregular or accidental production.

The bladders, sacs, or cysts, which constitute some of the forms in which these adventitious membranes are met with, have been often confounded with other circumscribed collections of fluid generally known by the name of Hydatids, and by most supposed to be possessed of a separate and peculiar vitality.

I confess that I am myself inclined to consider the investigation of the nature and habits of these latter bodies, or vesicular worms, as they have been called, as belonging to the subject of parasitical animals.

Whether you are disposed to go with me thus far or not,—whether you admit the existence of a separate life in those perfectly detached spheroidal bladders which have been called acephalocysts, and which are possessed of such an astonishing power of multiplying their species,—or whether you prefer the opinion of those who are unwilling to concede to them the attribute of a distinct life, the importance of a marked distinction being drawn between them, and the adventitious serous cysts, of which we have now to treat, will remain absolutely the same. I am induced to lay the stronger stress on this distinction, from the cir-

cumstance that one or more distinguished pathologists, both by theory and practice, by precept as well as by example, have taught that the distinction was a mere verbal quibble. I conclude that it is needless for me here to describe the characters of true hydatids or acephalocysts, their mode of production, the changes which they undergo, and, above all, the influence which they exert on surrounding parts, in order that the Society may fully perceive and appreciate the essential difference which in all these respects there exists between them and serous cysts of accidental or adventitious production.

The adventitious serous membranes, as I have said, have been very often described by pathologists under the name of hydatids; and without at present noticing the confusion into which modern authors have fallen by the use of this term, I cannot give a better idea of the vagueness with which it has been employed, than by observing that Lecat declared that the eye was a perfect hydatid, and that an hydatid was an imperfect eye.

The membranes in question have also been designated cysts, but this term has been used in as vague a manner as the word hydatid, and though in many respects it is a very convenient one generically to express the envelops of various fluids and other matters occasionally found in the body,

still some further definition must be given when we wish specially to point out particular sacs, which owe their origin to the adventitious production of serous membranes. By some pathologists, cysts have been divided into those which are formed about the bodies which they contain, whether these bodies have been produced in the system, or have been introduced from without; examples of which kinds of cysts we see in the condensed cellular membranous envelops to true hydatids; to the masses of hair and fat formed in the ovaries; to the remains of tubercles and abscesses; and also in the capsules which shut up bullets, shot, and the like.

The other division of cysts comprises those sacs which produce, as well as circumscribe, their contents. The cysts of which I am now to speak, of course belong to the second division, but as there are also many kinds of cysts to which the definition is equally applicable with adventitious serous membranes, it will be necessary that I should exclude them from the class with which we are at present engaged.

As far as I have looked into authors who have treated on this branch of morbid anatomy, it appears evident that there has been so much confusion and obscurity connected with it, that I am convinced that it is one of considerable difficulty, and I must confess that I enter upon it with much

diffidence, lest, in endeavouring to point out and avoid some palpable errors of others, I should fall into similar inaccuracies myself. For my present purpose it will suffice as briefly as possible to point out some of those cysts, which having been brought together by some pathologists with the adventitious serous membranes, must now be distinguished from them, since they do not participate in the peculiarities which I am about to describe, but are possessed of a pathological character of their own, which entitles them to be spoken of separately.

1stly. I need scarcely remind you that the true hydatid is a sac which secretes or produces the fluid which it contains.

2ndly. Various cysts are not unfrequently met with beneath the common integuments, and are apparently very intimately connected with them, and contain a sebaceous, or meleceritious, or atheromatous, or other collection, which is at once both the product of the sac, and the cause of its distension.

3rdly. Cysts are occasionally found secreting the materials which they contain, which owe their origin to canals of which the orifices have been more or less completely obstructed: such are the cysts in the labial glands, ranula, those in the pancreas, and those which we so often find on

the surface of the kidneys, and occasionally on the liver, and which, on account of the delicacy of the structure in which they are situated, we judge rather from inference than from demonstration, to be occasioned by the obstruction of an excretory canal.

4thly. Other cysts belonging to this class, but which are not to be confounded with the adventitious serous membranes, are produced by the distension of cells naturally existing in the body, but of which the contents, from unexplained causes, have become morbidly increased, and not unfrequently at the same time more or less changed in quality. Of this description are the enlarged vesicles of De Graef, which, though probably never so much enlarged as to constitute Ovarian dropsy, as some have supposed, are nevertheless frequently met with many times larger than their natural size.

Cysts, which, from the description that has been given of them, in all probability produce as well as inclose the fluid found within them, are occasionally met with in the thyroïd gland when enlarged so as to form the disease known by the appellations of goitre and bronchocele. These cells very probably depend on the original structure of the thyroïd gland, but we know so little positively of either the structure or the functions of this body, that it would be rash to offer a decided opinion on this point.

Such are the principal forms of cysts, which the circumstance of their producing, as well as enclosing, the matters found in them, have in some arrangements been classed with the serous cysts. As it has been my wish merely to point them out on the present occasion, sufficiently to ensure the distinction which I wish to be kept in mind, I shall now proceed with the subject more immediately before us.

The adventitious serous membranes, like those naturally existing in the body, form completely shut cavities. As far as it is in our power to ascertain, they are wholly, or at least with but very few exceptions, the result of an entirely new formation dependent on some anomaly in the function of nutrition, but respecting the precise nature of which we are completely in the dark, and were I to offer any thing respecting it, I could do so only as a conjecture, which I am unwilling to mix up with the facts which it is my desire faithfully to lay before the Society. On the present occasion I shall divide the serous cysts into two classes. The first comprising those which are simple, and for the most part solitary, but which, if accompanied by one or more similar membranes, owe this association to the accidental circumstance of the same cause which produced the one, having likewise operated in its neighbourhood, rather than to the sac possessing the remarkable property

of giving origin to new growths having the same character as itself.

Respecting the first class, I shall have but little to offer. If there are any of the adventitious serous membranes which can be said to be formed from a pre-existing structure, and not to be the result of a new formation, they are to be found in this class, since it is possible that some of them may have been produced by the distension of one or more of the cells of the cellular membrane, which a partial inflammation or some other cause may have shut off from their communication with the adjoining cells. This supposition is the most plausible in the instance of the adventitious synovial bursæ, such as are formed upon the patella in persons who are accustomed to kneeling, and the ganglia formed in the neighbourhood of the sheaths of tendons.

Serous cysts of the simple class are formed in various parts of the body. Without entering into a minute description of them, I shall enumerate and describe some of the most remarkable.

Within the cranium of a female, who had not been observed to present any cerebral symptom, I noticed a thin and delicate serous cyst, perfectly circumscribed and filled with transparent colourless serum. It was about the size of a nut, and

was situated at the base of the brain, not far from the tractus opticus.

Clusters of serous cysts are often found in the plexus choroides, and notwithstanding their number, I am quite disposed to think that they belong to the class of simple cysts, of which I am speaking, since their number does not appear at all to depend on any disposition in the parietes of these cysts to produce others of an inferior order.

These serous cysts in the plexus choroides are manifestly vascular, they seldom exceed the size of small currants, and are often much smaller. Yet, Dr. Hooper has given a plate of a very interesting case of this kind, in which the vascular cysts in the plexus choroides were nearly as large as eggs. It has been supposed by some that these cysts in the plexus choroides are formed by the dilated extremities of vessels; some persons fixing on the arterial system, some on the venous, and others on the absorbent. It has even been attempted to prove this fact by blowing air into these vesicles, through the vessels in question; but were the possibility of doing so fully proved, which after all appears to me to be very doubtful, it would by no means be a demonstration of the origin which has been attributed to them, since it was long ago shewn by Meckel, that the vesiculæ seminales may be inflated from the veins or absorbents of the pelvis.

Simple serous cysts are occasionally formed in the eyelids, and since they form a very legitimate subject for surgical operation, they merit particular attention. Some are found along the edges of the tarsi, where they seldom acquire more than a moderate size, and their removal is effected with comparatively little or no difficulty. Those which are situated more completely in the body of the eyelid, and which at times extend pretty deeply into the orbit, are more difficult in their treatment, and more serious in their consequences. I remember to have seen a young woman in La Charité, under the care of Baron Boyer, who was affected with a cyst of this kind of nearly the size of a chestnut. From the depth to which it extended into the orbit, it was not thought expedient to attempt the total removal of the sac, but it was hoped that when the greater part had been removed, the remainder might be obliterated by adhesive inflammation; but instead of this result being obtained, a high degree of irritative fever carried off the patient in a very few days.

Simple adventitious serous cysts are stated to occur sometimes in the lungs. Laennec mentions one or two instances of this kind, but says that they are more frequently met with in the lungs of inferior animals, and in those of the ox in particular, than in those of man. I have never had an opportunity of witnessing a case of this kind

myself, and shall therefore not attempt to describe them.

It would appear, the female mamma is at times the seat of simple adventitious serous cysts, and that the cure of the tumours to which they give rise may often be effected by allowing the contents to escape, when adhesive inflammation, either spontaneously or artificially excited, unites the sides of the cyst, and obliterates its cavity. The most frequent seat of these cysts, and the last of which I shall here speak, is in the neighbourhood of the uterus, but more particularly in the folds of the broad ligament; or, intimately connected with the ovaries, if not imbedded in their substance.

Cysts of this kind at times acquire a very large size, and constitute one of the forms of what is commonly called Ovarian dropsy.

I shall now speak of the second class of adventitious serous membranes, or of those whose parietes present the very remarkable property of producing other cysts of a similar character with themselves, or morbid growths, which, if they do not present, strictly speaking, the character of cysts, are nevertheless referrible to the same type or mode of formation. Cysts of this kind, like those of the preceding class, are found in different parts of the body, but they are by far the most fre-

quently met with, acquire the largest size, and present the greatest variety of appearances, in the neighbourhood of the uterus, but more especially in the ovaries and the folds of the broad ligaments. I shall therefore commence by describing these, because the large scale on which they may be seen renders their structure the more easily intelligible.

Since neither the nature of this affection, nor that of the parts of which we are now speaking, as its seat, are calculated to lead to a speedily fatal termination, it rarely happens, that we obtain an opportunity of witnessing the early stages of this form of encysted dropsy ; but on the contrary, it generally happens, that the external or superior cyst has acquired a very large size, giving in some instances the most unwieldy dimensions to the abdomen ; and although the operation of paracentesis may have shewn, that the fluid by which the cyst was at first filled, was of a decidedly serous character, it is often very materially altered before the fatal termination of the case, when the fluid is often of a mucous or of a sero-purulent character, and when it frequently happens, that the cyst itself has to a great degree lost the characters of a serous membrane.

Its parietes appear to be rather fleshy, or coriaceous, than membranous; and the internal surface becomes more or less generally roughened, as if

by ulceration or abrasion. The most important feature which it presents, is the appearance of tumours and elevations dispersed more or less thickly over the internal surface, and which, notwithstanding the very great variety which at the first view they seem to present, are nevertheless referrible to one general mode of formation.

I shall commence with the description of that form which is intermediate between the two extremes; not merely because I shall more readily proceed from this as a standard to the explanation of its modifications, but also because the peculiar structure is, in this form, the most distinct and intelligible.

In this form we observe on the interior surface of the principal cyst elevations more or less rounded, and of various sizes, projecting into the interior of the cavity, and covered by a membrane, which is continuous with the lining of the principal sac.

On making an incision into these tumours, we find that they also consist of cysts of a secondary order, filled by a secretion, often serous, but almost as frequently mucous. It is not, however, merely by this secretion that these cysts are filled. On looking more minutely into them, we shall generally find, that from one or more points on the interior of these cysts there grows a cluster

of other or tertiary cysts, upon which is reflected the lining membrane of the cyst in which they are contained. Cysts of the secondary order not unfrequently afford as complete specimens of a reflected serous membrane as either the pericardium or the tunica vaginalis, the lining membrane of the containing cyst corresponding to the reflected portion, as that covering the contained bunch of cysts does to the close portion.

The proportion which the contained cysts bear to the cavity of the membrane reflected over them, is extremely various. Sometimes the fluid, especially when it is of a serous character, nearly fills the containing cyst, whilst the bunch of cysts is of very inconsiderable size. At other times, the superior cyst is almost entirely filled by those of the inferior order; in which case we may generally find, that the nodulous or tuberose elevations, which we may have observed on the exterior of the containing cyst, are occasioned by the unequal development of the contained cysts; for those which have grown most rapidly and have attained the largest size, forcibly dilating that part of the cyst which is reflected over them, produce a kind of hernia at that part. It sometimes happens, that the distension occasioned by the growth of the contained cysts is sufficient not only to disturb the even surface of the containing cyst, but actually to produce a rupture, which admits both of the escape of its fluid contents, and of the unrepressed

growth of the secondary or tertiary cysts, which took their origin from its internal surface. The inferior cysts themselves are found to contain a serous or mucous secretion, and very often to produce another order of cysts, possessing the same character with themselves. It is certainly by no means surprising that these cysts of different orders, which sometimes present the appearance of delicate and pellucid sacs filled with clear and colourless serum, and possessed of the astonishing power of giving rise to an almost innumerable multitude of cysts presenting the same character with themselves, should at the first view have been confounded with true hydatids; but it is no less surprising, that a little careful inspection did not at once irrevocably remove the delusion.

First.—Because the bunches or clusters of secondary cysts are invariably and permanently attached to and continuous with the internal surface of the superior cysts, in which they are contained; and,

Secondly.—Because delicate vessels are seen ramifying from the one upon the other.

The cysts which I have been describing as formed on the internal surface of the first-formed cyst, at times pour out a part of their contents into the interior of the larger cyst, either in consequence of an extensive rupture produced by the develop-

ment of a contained order of cysts, as I have before described, or by small apertures, which likewise appear to be the result of distension. In both these cases, but especially in the latter, the opened cysts bear a considerable resemblance to mucous follicles on a large scale, and appear to be the principal source of the very copious and rapidly produced mucous secretion, which is a characteristic feature in many cases of ovarian dropsy.

This mucus bears a very close resemblance to that furnished by the follicles of Naboth, and is frequently so viscid, that it passes with difficulty through the canula. The membranes of which these cysts, whether of the second or third order, are formed are liable to inflammation. The product of this inflammation, like that of inflammation which takes place in the serous membranes naturally belonging to the body, may either be of the plastic or of the inorganizable kind. In the former case, it leads to the formation of adhesions between the close portion of the membrane, or that which constitutes the contained cluster of cysts, and that portion which is reflected over them, forming the parietes of the containing cyst. It is the formation of these adhesions which so frequently renders it difficult to demonstrate the structure which I have been describing. When the product of inflammation is of the inorganizable kind, we find a secretion more or less puriform in its characters. This secretion is sometimes found

confined in one or more of the secondary cysts. At other times, it finds a way of escape into the interior of the principal cyst, and thus contributes to the variety in the appearance presented by the fluids drawn off in the operation of paracentesis for the relief of ovarian dropsy. This, however, is not to be regarded as the sole cause of the occasional puriform appearance of the fluid evacuated by this operation. It is doubtless in some instances to be attributed to the sort of ulceration or abrasion to which I have already alluded as taking place on the internal surface of the principal cyst, and which we find both in that part which is formed by the cysts developed in its parietes, and in that part of the parietes which happens to be free from them, though it is most frequently met with in the former situation. Such are the most striking characters of that form of cysts which, for the reasons which I have stated, we may regard as affording the type of the second class of adventitious serous membranes. The circumstance upon which I wish to lay more particular stress, is the production of more or less numerous clusters of cysts arising from different points on the interior of the superior cyst.

The cysts composing these contained clusters have neither the narrow necks or peduncles which mark one of the varieties into which this species of production declines, nor, on the other hand, those broad and extended bases, and that flat and com-

pressed form which mark the opposite variety in which the encysted form, and more particularly the disposition to produce a reflected membrane, is less easily made out.

I shall first describe that variety which is characterised by slender peduncles. This form presents us with all the gradations from the form which I have already described, down to the slenderest filaments.

I have stated, that it is at particular points on the internal surface of the superior cyst that the clusters of inferior cysts take their origin. It sometimes happens, that the number of cysts forming the cluster is so great, in proportion to the space which they occupy, that, like trees too thickly planted, they interfere with each other's growth. Their development is more or less limited to an increase of dimension in length. Yet as their free extremities are allowed to diverge, we sometimes find the slender peduncle gradually dilating into a pyriform cyst. At other times, the dilatation does not take place till near the extremity of the peduncle, and then produces a cyst more nearly resembling a grape or currant. At other times, no dilatation takes place, probably from the cavities having been wholly obliterated.

The pedunculated cysts, or the extreme of this variety in the form of filaments, are either pro-

duced singly, but in the closest approximation from a particular part of the containing cyst, or they may be attached to it by a common peduncle, from which the proper peduncle of each proceeds. These elongated productions sometimes become highly vascular, and, in the defect of an internal secretion, contribute largely to that which occupies the sac into which they project. Sometimes, on the contrary, they are very feebly organized, and appear ultimately to lose their vitality, in consequence of the kind of strangulation which they receive at the narrow neck by which they are attached to the containing cyst.

It would appear, that the pedunculated cysts and filaments which have thus lost their vitality, are a pretty frequent source of irritation to the serous membrane reflected over them, which constitutes the containing cyst; the product of the inflammation thus excited is of the inorganizable kind, and often forms a thick and grumous substance, which sometimes may be washed out from the bunches of filaments, but at other times these come away with it, in the form of shreds.

The bunches of slender pedunculated cysts, and the tufts of filaments almost resembling tassels, sometimes proceed at once from the inner surface of the principal cyst, but they are more frequently met with growing from the interior of the secondary cysts.

I shall now proceed to notice that variety, in which the secondary cysts, so far from being attached by slender peduncles, have that broad attachment and flattened form, which, without the assistance of the intermediate gradations, could scarcely be referred to the type which I have drawn. The secondary cysts in this variety, as well as in the two former, are collected in clusters on the parietes of the superior cyst, but they appear to produce a circumscribed and more or less considerable thickening of the parietes rather than a prominent tumour covered by a reflected membrane; they constitute however perfectly shut cavities, acquire at times a considerable size, contain in some instances a serous, and in others a mucous secretion, and produce in their parietes inferior orders of cysts, having like themselves broad bases and flattened forms. From the extent of their bases, the secondary cysts in this variety occupy proportionably a much larger space on the internal surface of the containing cyst, and by their development, although they increase its size, they seem more completely to encroach on its particular cavity. In cutting into a tumour composed of this form of cysts, we may find, it is true, several cavities of considerable size, but we shall probably not find the greater part of the fluid collected into one particular cavity. Hence, in this variety of ovarian dropsy, fluctuation is often obscure, and the relief afforded by paracentesis only partial and trifling. I am not aware that the se-

condary cysts, in this variety, ever lose their vitality from defect of nutrition, but if such an effect be ever produced, it cannot be the result of so limited and partial a cause as that which we have seen to operate in the preceding variety. There is another point of difference no less worthy of remark as distinguishing this variety from the two preceding, that is to say, from the standard and the pedunculated variety, which consists in the arrangement of the subordinate parts. In the two last-mentioned forms, in consequence of the limited extent of the spots, whence the secondary productions take their rise, they necessarily acquire somewhat of a radiated arrangement, whereas, in the variety with which we are at present occupied, it is difficult, if not impossible, to reduce its internal structure to any definite arrangement.

It remains for me to say a few words more respecting this form of ovarian cysts, before I proceed to speak of the serous cysts occurring in other organs. Although we may observe three well marked forms which I have described in ovarian serous cysts of the second class, and though, for the most part, each individual case more particularly affects one or other of these forms, yet it sometimes happens that two or all three may be found in the same superior cyst, yet even then one form seems to predominate. Those cysts which contain others of the third form, are the most firm and fleshy or parenchymatous.

There seems to be an hereditary disposition in some females to the production of the serous ovarian cysts. Even in these cases they are mostly unaccompanied with any constitutional taint, that is to say, other parts of the body are not simultaneously affected with similar productions. It is even more common for one ovary to be singly affected, than for both to give origin to this form of cysts; nevertheless it does sometimes happen that we meet with cases of double ovarian dropsy, but in many, if not in most of these, there is likewise a complication with some one of the diseases commonly called Malignant, of which I am about to speak. It is by no means easy to say what are the exciting causes of this form of ovarian dropsy. Though in many instances the patients refer the commencement of the disease to parturition; yet it is far from being uncommon for unmarried or barren women to labour under this affection. The tumours and growths allied to ovarian dropsy, of which I shall presently speak, as formed in other parts of the body, can often be referred to some mechanical injury, but in the case of organs, which appear to be so well protected as the ovaries, it is more difficult to conceive the possibility of such an exciting cause.

Something may possibly be ascribed to the natural and periodical changes which these organs in common with other parts of the female genital system doubtless undergo.

Another circumstance which deserves some consideration and inquiry, is the far greater size, and greater abundance of the contents of the cysts formed in and about the uterus, than those of similar cysts formed in other parts of the body. Two or three causes, I presume, mainly contribute to this result. The first which I shall mention, is the obvious fact, that the system on which, in the case of ovarian dropsy, these cysts are implanted, is naturally disposed to obey a stimulus which requires an increased supply of nutritive matter, and which gives rise to a proportionably rapid growth. In the next place may be mentioned the abundant supply of blood which the parts habitually receive ; and thirdly, and, as I believe, principally, must be noticed the position of these parts situated in the abdomen, and consequently exempt from all pressure or restraint calculated to limit their development.

This last point appears to merit an additional attention from the suggestions which it excites in relation to the operation of paracentesis for the relief of this form of dropsy.

As long as the distress and inconvenience of the patient will allow us to defer the operation of paracentesis, it is doubtless desirable to do so, since even the pressure which the full sac itself is able to exert on its contents, must have a tendency both to diminish the rapidity of secretion, and

retard the growth of the inferior order of cysts. It is well known that the oftener the operation has been performed, the shorter is the interval which elapses before a repetition is required; and in the course of a very few weeks a quantity is produced as large, if not larger, than that which had been many months in accumulating prior to the first operation.

The next and last point of which I shall speak in connexion with ovarian cysts, is the degree of irritation which they occasion in the surrounding parts.

This irritation is generally, in the early stages at least, remarkably slight, indeed it is very probable that it can scarcely be said to exist until some of the causes have been brought into action; which I formerly described as producing either the inflammation or the death of a part or parts of the adventitious growth. I have frequently been astonished, at the comparatively slight and recent peritoneal adhesions, by which some of the largest ovarian cysts have been attached to the surrounding parts. This circumstance is not only a striking feature of difference between this affection and others closely allied to it in structure, but it is of the utmost practical importance with reference to the only mode of treatment hitherto devised, which is at all adequate to the cure of the disease, —I mean the absolute extirpation of the diseased organ.

Adventitious serous cysts, assuming the form of reflected membranes, are also met with in the male organ, corresponding to the ovary; that is to say, in the testicle; it constitutes that affection which has been designated by some hydatid testicle.

After what I have already said respecting the confounding of serous cysts with true hydatids *, it is needless that I should again point out the decided characters which distinguish these two forms of cysts.

The serous cysts which are developed in the testicle are very far from attaining the same size as those which are produced in the ovaries, yet at times they distend the testicle to a size superior to that which it acquires under any other disease, fungus hæmatodes, perhaps, alone excepted. Like the affection of the ovary, of which we have been speaking, this encysted disease of the testicle appears to be unaccompanied by any constitutional taint; and when the affected organ has been removed, the patient has not been troubled by any return of the complaint. This disease is much more rare than the corresponding disease in the female, and I am not aware that observations have been collected which tend in the least to shew, that there is any thing like an hereditary predisposition to this affection.

* True hydatids are sometimes found in the testicle.

In the encysted disease of the testicle, the fluid bears so much less a proportion to the solid parts, than is the case with the encysted disease of the ovary, that it affords an easy transition to those tumours which, though for the major part solid, nevertheless affect the structure, bearing the closest resemblance to, if not absolutely identical with, the compound serous cysts, the formation of which I have already attempted to explain. In fact the difference between them so far as the proportion between the fluid and solid parts is concerned, appears, as I have already hinted, to be very much influenced by the degree of pressure to which the exterior of the adventitious growth is subjected.

There are two other situations in which the class of adventitious serous membranes, with which we are now occupied, is occasionally met with, and respecting which, from the predominance of the fluid parts, it may be proper for me to say a few words, before I proceed to the consideration of those growths which, from the predominance of the solid parts, are more commonly styled tumours.

The female mamma, and its immediate neighbourhood, are occasionally the seats of the adventitious formation of serous cysts, assuming the form of reflected membranes, and bearing the closest resemblance to those which I have already mentioned as occurring in the testicle, and having

in consequence received a similar appellation, and been called with equal inaccuracy hydatid breasts. The cysts formed in a breast thus affected contain bunches of secondary cysts, and a fluid sometimes serous, sometimes very nearly resembling synovia, and at other times of a mucous character. It does not appear to be an affection accompanied by any constitutional taint, or to be at all malignant in its nature, the disease being wholly removed by the removal of the part. I shall not dwell longer on this form of disease, since these cysts are generally accompanied by others which give rise to a more solid structure.

Bunches of cysts are occasionally formed in the eye; they are more interesting from the importance of the organ which they affect, and from their situation, so remarkably favourable for the inspection of their progress, than from the size to which they attain.

They cannot, however, fail to excite very serious apprehension, since in their commencement it must be difficult, or even impossible, to distinguish them from the commencement of a malignant disease. Though they should not present this character, and therefore not endanger the life of the patient, they will at times completely deprive him of the use of the affected eye. The production of these cysts in the eye may be

sometimes traced to external violence, at other times the exciting cause is more obscure.

I have now to solicit particular attention to the different forms of Heterologue deposits, which may be referred to the same general laws of formation which I have endeavoured to explain when speaking of ovarian dropsy. Many of the accidental formations have been called heterologue, to denote their dissimilarity from those structures which naturally exist in the body. They are marked by a certain degree of uniformity of character, and more particularly by their mode of formation. Most of them have been styled malignant; and they may be reduced under the four following heads:—

The first, comprising those cases which consist in the production of well-formed cysts, generally assuming the character of reflected membranes, unaccompanied by constitutional taint, and commonly called hydatids. They may be considered as typical of the order at the head of which they are placed. I have already detailed their most striking characters.

The second division comprehends true scirrhus, yet it must be confessed that it is often difficult to say whether this term is applicable or not, since the natural boundaries are most indistinctly marked

between this and some other members of the family.

The third division comprises fungus hæmatodes, fungus medullaris, medullary sarcoma, fungoid disease, spungoid inflammation, cerebriform cancer, &c.

The fourth division comprises melanosis, in that particular form which exhibits a structure resembling the preceding, to which the term melanosis, as descriptive of a particular specific affection, has been by some restricted.

Laennec has remarked, that the older surgeons, and, in imitation of them, the modern anatomists, have confounded, under the names of cancer, scirrhus, and carcinoma, accidental productions which have no common characters, except either their having no analogy to the structures naturally existing in the body, or in their being produced in a state of firmness or crudity, and tending to destruction by a process of softening. I am very far from wishing to set aside the discrimination between the different forms of malignant diseases. We owe much to my late valued preceptor, Laennec, for the distinction which he very powerfully contributed to introduce. At the same time, I am persuaded, that there are certain points of resemblance by which the affections, known by the different names which I have

enumerated, are most intimately, and, as a family, inseparably connected. These common points of resemblance, chiefly dependent on structure, and which appear to have been very much overlooked, not only by Laennec, but by many others, form the characters which I shall endeavour, in the first place, to point out. Having explained these, I shall proceed to notice what I conceive to be the structural and other peculiarities of each division.

The tumours of the description of which I am now speaking have a more or less rounded form. On making the section of them they present various appearances, but are all more or less divided by septa, which affect sometimes a radiated form, and at others a cellular character. Both of these characters have been insisted on by many writers on this subject; but I believe the differences which have been observed in many instances depended on the direction in which the sections were made.

The mode of examination by means of sections, if it be the only one employed, is not better adapted for the investigation of these tumours than for that of the brain. The objection to it is increased by the plan of immersing the specimen in alcohol, which is sometimes had recourse to for the purpose of hardening the parts. By this measure the fluids are coagulated, and the trans-

parent parts rendered opaque: we consequently destroy two of the most important characters which assist the examination, by marking the boundaries of structure and arrangement. It is on this account that almost all the preparations which I have made myself, or seen made by others, are more or less unsatisfactory, and, even in the most successful cases, fall incomparably short of the inspection of the recent specimen. If we carefully dissect down to the surface of one of these tumours, we shall usually find that it has a capsule or covering, which has, I believe, generally been supposed to consist of the altered and condensed cellular membrane of the parts which have given way before the growth of the tumour. This idea is probably correct with respect to the unequally thick external part of the capsule; but if we dissect carefully, and examine those tumours in which the process of decay has either not commenced, or has made very little progress, we shall find that surface which is next to the mass of the tumour more or less smooth and even, and on raising it we find that it is reflected over one or more somewhat pyriform bodies, attached by a base, which is generally narrow and peduncular to some part of the circumference of the inclosing capsule. Unless the tumour is very small, it is much more common to find several rather than a single body of this kind, and as there is often little, if any, fluid intervening between them and the enclosing capsule, their form is somewhat modified

by their mutual pressure. Sometimes, though more or less closely applied to each other, these pedunculated bodies are perfectly detached at their sides, and may, consequently, be readily traced to the point which forms the common origin of their peduncles. At other times, these bodies are so adherent amongst themselves, and the membrane covering them is so tender and delicate, that without very great care the arrangement of their structure may be overlooked, in consequence of the pedunculated bodies being broken or torn through in a different direction from that to which their mode of formation would naturally dispose them.

It must be sufficiently obvious that the appearance presented by the section of a tumour, such as I have just described, must be very materially affected by the direction in which the section is made. If it pass through or near to the point at which the pyriform bodies are attached to the enclosing cyst, it must nearly correspond with the direction which some of these bodies take towards the circumference, and their edges will consequently be seen in the form of radiating lines. On the other hand, if the section be made more or less nearly transversely to the axes of these bodies, their sections will convey the idea of cells of various shapes. If we continue dissecting and raising the outer cyst, forming the reflected membrane which covers the radiating pedunculated bodies,

we shall generally find, that on one or more sides it dips down deeply into the mass of the tumour, and forms a part of the septum which separates the one packet of pedunculated bodies from the others which generally concur to form the mass of the tumour; for it comparatively rarely happens that the tumour is composed of a single cyst filled with pedunculated bodies. On examining the different encysted packets of pedunculated bodies which compose the tumour, we shall often find some indication of their having taken their origin from nearly the same spot, which is generally the most indurated part of the tumour. We may likewise observe, that the different secondary tumours or encysted bundles of pedunculated bodies are in very different stages of progress.

In those in which the internal growth is the most active, we shall find that a process has taken place perfectly similar to that which I described as occurring in ovarian tumours, when the development of the contained cysts produces the hernia or rupture of the containing one. The secondary cyst or cysts, which make their way through the containing one, rapidly advance when they are freed from the restraint which its pressure afforded, and thus constitute another tumour, which adds to the original mass.

If we examine the structure of this new tumour, we shall find that the subordinate growths of which

it is composed, radiate from the point at which this tumour made its escape from the original one. At the same time that the escaped cyst or cysts acquire their more rapid growth, they often acquire a new character with respect to their consistence, which is generally much more soft and tender. The most striking illustrations of this principle are met with in osteo-sarcomatous tumours, which very decidedly belong to the class of which I am speaking. Whilst that portion which constitutes the original part of the tumour, and has been formed beneath the pressure of the periosteum, is dense, and more or less loaded with bony matter, that portion which has grown through the openings presented by the distended fibrous tissue is of luxuriant and rapid growth, and is almost wholly composed of soft matter.

Those parts of the tumours in which the rapid and unrestrained growth is most remarkable, are generally situated near the circumference, where they are at once both exempt from the restraint of mutual pressure, and receive more abundant supply of nourishment from the surrounding natural structures. A marked difference exists between those just described, and others in which development has been restrained or vitally lost by pressure and consequent defective supply of nutrient matter.

I have already explained the mode in which these effects are brought about in those ovarian

tumours in which the secondary cysts are thickly crowded and attached by very narrow peduncles. Precisely the same process takes place in the tumours of which I am now speaking; and when we make a section through one of them, which happens to be composed of many secondary tumours, and which consequently presents many centres of radiation, we shall often find that the pedunculated bodies connected with one or more of these centres have lost their vitality by a natural strangulation or ligature, and also that the immediately adjoining parts which yet retain their vitality, irritated by that which has now acquired the character of a foreign body, are brought into a state of inflammation. The result of this compound action is the formation of a cavity filled with broken down and softened matter of a peculiar character, intermediate between suppuration and gangrene. This process very frequently takes place before the exterior of the tumour exhibits any symptom of irritation or inflammation, and, to my mind, very satisfactorily accounts for that disposition to central softening or decay, on which Laennec, Wardrop, and some others, have so forcibly insisted as characterising the progress of heterologue deposits. At the same time, I think I am correct in stating, that for the production of this form of gangrene or softening, the supply of nourishment should be pretty promptly cut off by the operation of the natural ligature. When the process proceeds more

slowly, the parts which are under its influence gradually acquire an increasingly dense structure, and ultimately becoming penetrated by earthy matter are allowed to remain unproductive of serious irritation, notwithstanding their deteriorated organization, and diminished supply of nourishment. Striking examples of this process are met with in the scirrhous tubercles developed in the uterus, and I have likewise seen it in the liver.

Tumours, such as I have described, in the course of their development produce, by the irritation which they excite, a greater or less degree of thickening of the surrounding cellular structure, and sooner or later become visible externally, dilating the integuments which are stretched over them. The points at which this distension is the most considerable are inflamed, the inflammation proceeds to ulceration, and the tumour either sprouts luxuriantly at the part from which the pressure is thus removed, or participates in the ulcerative process; which latter event, for reasons which I shall presently explain, is that which we have most frequent occasion to observe.

The ulcer, the production of which I have described, is worthy of special attention, and has been particularly insisted upon as peculiarly characteristic of malignant disease. It is universally described as presenting elevated and everted edges,

whilst its ragged and depressed central portion is bathed by an unhealthy secretion, to which the name of pus can scarcely be applied.

The mechanism by which this peculiar ulcer is produced, is well worthy of attention. I have shewn, that at the external part of the tumour its growth is the most luxuriant, both from the want of pressure, and from the increased supply of nourishment: this will explain why the circumference of the tumour is the most elevated. The central parts, on the other hand, have not only to encounter the pressure which they sustain from the surrounding parts of the tumour, and to suffer the diminished supply of nourishment which this pressure occasions, but, moreover, ulceration having removed the integuments, all supply of nourishment from the surrounding natural structures is necessarily cut off. The depth and irregularity of the central part of the ulcer is often further promoted, by a communication being formed between this part of the ulcer and a cavity commenced and produced in the interior of the tumour by the process which I heretofore described. We may be easily convinced of the general accuracy of the description which I have endeavoured to render intelligible, by making a section through a recent specimen of an ulcerated tumour of the kind I am now describing, in such a manner that the incision may pass through the diameter of the ulcer; by then carefully dissecting the cut edge of the ulcer,

we may almost always find satisfactory evidence, that the elevated margin is composed of radiating pedunculated bodies,—whilst in the centre this disposition is less distinct, much more condensed, and exhibits little, if any, trace of organization, excepting in a few spots, in which inflammation appears to have been set up by the irritation caused by the neighbouring dead parts.

There yet remain a few remarks for me to offer respecting these tumours generally, before I proceed to speak of their different species.

1st. With respect to the more fluid parts of the tumours. Although these generally bear a very small proportion to the solid part, we shall almost always find a fluid in a greater or a smaller quantity, which, on close inspection, is seen to be either contained in cells of various sizes, or lodged between the pedunculated bodies and the membrane reflected over them. This fluid is by no means uniform in its appearance and qualities. In that form of tumour which I have taken as the type, in which the encysted structure is the most evident, in which the surrounding parts are the least altered, and in which there appears to be no constitutional taint, the fluid is most abundant, and more frequently than in the other forms, presents a serous character; but, even in this form we find it passing through the various degrees of ropiness, in some of which it very closely resembles synovia,

until we arrive at the form of thick and perfect mucus. In some cases it is also met with of a yellow colour, as if tinged with bile, and at other times streaked or spotted with blood. It is sometimes more intimately mixed with blood or cruor. Most of these appearances may be met with before the contained cysts or pedunculated bodies have lost their vitality, yet the last mentioned appearance, or that in which the fluid is soiled by cruor, is most likely to occur when this change has taken place. At other times the fluid contained in those cells in which the inferior cysts or filaments have lost their vitality is yellow, opaque, and puriform, or grumous. In those tumours which present a very dense structure, bearing a considerable resemblance to cartilage, the fluid which may be observed to exude from those parts of the incised surface at which the vitality of the structure has not been lost before the removal of the tumour or the death of the subject, is, I believe, invariably of a viscid, mucous character. I would wish this observation to be kept in mind, as I shall hereafter have occasion to advert to it. In the present instance it deserves notice as forming one of the features of resemblance, between the tumours with which I am now occupied, and those more manifest serous cysts with the description of which I commenced. In these dense tumours, we may often observe small scattered yellow opaque points, presenting the same character as those already

described as occurring on a larger scale where vitality has been lost by strangulation.

2nd. The differences observable in the solid part of these tumours merit particular attention, since it is on them that the distinctions drawn by pathologists have been principally founded; we find it presenting every gradation, from an almost stony hardness to the consistence of the brain of a child, or of weak glue. It is not, however, in the degree of consistency that the only difference exists. There are likewise differences of structure, which appear to depend partly on the mode in which the contents of the cyst have been thrown out, and partly on the susceptibility of organization possessed by the matter effused. In those cases, in which the structure on which I have insisted is the most evident, the most subordinate pedunculated bodies are well defined, and each inclosed in a peculiar membrane. Although these membranes may be adherent amongst themselves, collectively they entirely fill the sac which is reflected over them; they are seen to take their origin from one particular part, and their small thickened and feebly organized membranes principally constitute the solid part of the tumour. At other times, instead of a bunch of numerous small cysts or pedunculated bodies, the enclosing cyst or reflected membrane, as I have already said, contains only very few bodies, or even a single

body of this kind, which, if examined at an early period of its formation, will be seen to bear a close resemblance to some forms of polypi, and to be nearly or quite transparent, but of an amber or sanguineous colour. It appears to consist of tender coagulable lymph, which at times admits of the elongation of vessels into its substance. These vessels ramify in a radiating form from the point to which the peduncle is attached; they seem however to be incompetent to maintain the vitality of the structure in which they are distributed. This structure, as its degree of vitality is lowered, becomes opaque; it is white and resembles the medullary structure of the brain, if the small vessels of which I have been speaking do not give way; but when they do give way, the blood which they effuse pervades the opaque matter, and more or less deeply discolours it. I have never met with the last described appearances except in tumours of rapid growth, dependent on fungus hæmatodes or medullaris. I am induced to lay some stress upon them, since they appear to me to explain why we are sometimes able to inject large masses of fungoid matter, and why, whilst they yet retain some degree of translucence, we may without injection detect a few vessels passing through the substance. I think, moreover, that they tend to reconcile the conflicting opinions which have been advanced respecting the organizibility of fungoid matter.

Sometimes the more or less solid matter appears to consist of a secretion from the internal surface of the membrane generally, rather than of a growth protruded into its cavity from a particular part of its circumference. In this form we occasionally meet with a laminated structure, such as is observed in an aneurismal clot; I am not aware that it ever exhibits the slightest indication of organization, though it not unfrequently becomes infiltrated with extravasated blood. This form, like the preceding, is principally, if not solely, met with in fungoid disease. Some tumours, which are of an almost gristly hardness, and acquire a considerable size before they pass into the stage of softening or ulceration, appear to be formed on the type of those ovarian tumours, which are composed of cysts with broad bases; in these the radiating structure is but little observable. I have seen, in examining cysts, in which the structure which I have now repeatedly endeavoured to explain was unequivocally present, some appearances which are worthy of observation, and which I cannot better introduce than in this place, though it is not easy to say whether they belong more to the fluid or to the solid part of the structure. The cysts of which I am speaking contained a substance, which may perhaps be best described by comparing it to the crystalline lens when it has been in some degree softened by decomposition, though rather less uniform than it, both

in consistence and appearance. That part which was the nearest to the containing cyst, was the least firm and consistent, but the most transparent. It was too transparent and colourless to conceal the firmer interior part, which was rendered distinguishable by a slight degree of opacity, and appeared to consist of a cluster of small pyriform grains, but nothing like a membrane could be distinguished inclosing them individually and separating them from the transparent matter in which they were placed. This observation appears to possess a twofold interest. In the first place it will enable us to conceive how easily the traces of original structure may be lost when we find them impressed on a material so tender, and which is in contact with another material in composition almost identical with it. Secondly, we may draw from it a strong presumption, that the cysts of which we have been speaking in the various forms in which they present themselves are altogether new formations, and not the result of the extension or development of pre-existing structures, and which, therefore, tends to confirm the opinion which I have already advocated, that they are neither the dilated terminations of the extreme branches of any of the three vascular systems, nor modifications of the cells of the cellular membrane. I shall not trespass on the time of the Society by entering into the speculation which I have entertained as to the mode of their formation.

Such are the principal points of variety which I have thought it necessary to point out in reference both to the fluid and solid matter constituting that part of the tumour which consists essentially of a new and adventitious structure, and not of the degeneration of structures natural to the body.

I have next to notice the changes which these structures undergo in the immediate vicinity of that which is adventitious. In the immediate vicinity of those tumours which consist of well formed adventitious serous cysts of the second class, such as those which have been described as hydatid disease of the testicle or mamma, and in conjunction with which there appears to exist no constitutional taint, we find some thickening and condensation of the surrounding cellular membrane; but even this is seldom very considerable, and the muscular and other structures appear to undergo no other alteration than that which may be referred to pressure or distension. The case is different with respect to other tumours of this class, in which the essential form of an adventitious serous membrane of the second kind is complicated with the effusion or secretion of a material, which, though possessed of certain points of resemblance, appears to differ from any thing that is produced by the natural structures of the body in their healthy state. It seems pretty evident, that in the disturbed, if not in the healthy,

process of nutrition, the new product in one part is influenced by the nature of the surrounding parts. As this is an important point, which I wish not to be taken barely on my word, or solely on the authority of cases relating immediately to the subject before us, I will endeavour to illustrate it by one or two independent examples. The first instance that occurs to me is in the case of masses of bony matter deposited in the condensed cellular structure, resulting from a chronic ulcer situated over bone. In one example which I have particularly in view, the ulcer occupied the neighbourhood of the trochanter major, and the masses were formed in the immediate vicinity of the bone, but were, nevertheless, perfectly detached from it. The numerous instances which we see of ossification at the origins or insertions of muscles are probably referrible to the same principle, although it must be admitted that these examples are not unexceptionable, since in them we have a continuity of structure. I need scarcely call to mind the fact, that inflammation of a serous membrane tending to the production of an inorganizable deposit on its smooth surface, is frequently accompanied by a similar production on its attached surface. How often after the fracture of a bone is the process by which the new bony matter necessary for its union is produced, morbidly carried on in the matter which inflammation has deposited in the surrounding structures.

I shall not at present adduce any further illustration of this principle, before I proceed to mention those cases which more immediately belong to the subject before us. They are, in fact, the most striking that can be brought forward, probably from the circumstance, that the heterologue structures are much more readily produced accidentally than the analogue. Although I have adverted to this principle as one of much interest and importance, and well worthy of investigation, I wish it at the same time to be expressly understood, that I very fully admit the operation of many other causes which appear to perform at least as important a part in modifying the function of nutrition, and consequently in determining the nature of its product. It is, however, as I apprehend, mainly on this principle, that we are to explain the fact that the natural structures in the neighbourhood of those tumours of the class of which I am speaking, to which the epithet of malignant has been applied, are so apt to degenerate into a substance in some respects resembling that of the original tumour. Thus, in the neighbourhood of those tumours which are of slow growth, and of cartilaginous hardness, we often find the surrounding structures, but more especially the cellular membrane, partaking of the same character of hardness, though necessarily wanting that structural arrangement which characterizes the essential part of the tumour. In the same way we find that those tumours, in which the

arrangement that I have described has been given to a soft and almost brain-like substance, are surrounded by natural structures which degeneration has converted into nearly a similar substance, or which have a similar matter deposited interstitially. Again, in those tumours which are remarkable for their black colour, and compose that division of tumours to which the name of melanosis has from this circumstance been applied, the surrounding structures become more or less deeply tinged with a black or carbonaceous material. This disease also presents us with a good illustration of the principle, but in a mode precisely the converse of the preceding examples. There is, perhaps, no organ so liable to be affected with melanosis as the eye, and I cannot help strongly suspecting that it is the natural and healthy production of black pigment performed by the choroid coat of this organ, which is the chief cause of this predisposition. It appears, that these changes in the natural structures surrounding the tumours in question, do not take place until some cause, connected with the presence of the tumour, has produced in them either absolute inflammation, or a degree of irritation almost amounting to it. It is on the nature of the ingorgement or effusion to which this irritation gives rise, that the nature of the alteration in the natural structures depends.

On reverting to the different causes of variety, which I have now enumerated as affecting the ge-

neral arrangement of the structure of the tumour, the character and proportion of its fluid, and also of its solid parts, and likewise the structures surrounding the essential part of the tumour, and often occasioning their being confounded with it, it will at once be seen that there is abundant reason, both for the want of uniformity in the very great number of tumours which may notwithstanding be referred to one and the same type, and for the very great variety in the opinions entertained by pathologists respecting the appearances, structures, and natures of these tumours. There are, however, still, other causes which contribute to add to the variety and obscurity to which I have alluded; amongst the most fruitful of these are the differences in the original structure in which the new growth has taken its origin: thus, when the new growth is so situated as to be intimately involved in the muscular fibres, the combined effect of their pressure and motion has a strong tendency to obscure the peculiar and essential structure of the new growth. But, although its form is thus altered, and its structure in some instances approaches the character of elastic ligaments, I have never yet failed to detect in some part or other of the new growth, indications sufficiently conclusive to convince me, that even in them the type which I have explained is still observed. With this remark, I shall conclude my general observations on the structure of this class of tumours; but before I proceed to the special

description of its several divisions, I shall take notice of other characters which are common to some of them.

Since nearly all of them have been termed malignant, and as the question of malignity is almost constantly agitated with reference to individual tumours, it becomes a matter of considerable importance to define exactly what is meant by this term, and not less so if it be possible to ascertain with certainty the sign by which a tumour may be known to possess this quality. On this point, however, I do not flatter myself that I shall be able to speak very satisfactorily. There seems indeed to be a generally received and conventional meaning attached to the term malignant, but it is so vague, that I have not been able to obtain from books, or from those individuals who are the most conversant with this subject, such a definition of the term as would bear the test of critical examination. Still less have I been able to compose a satisfactory definition for myself. The best substitute that I can offer in the absence of the desired definition, is an enumeration of those characters, the whole or greater number of which concur in cases to which the appellation of malignant has by common consent been applied. The first of these is the alteration which I have already described as taking place in the structures in the immediate neighbourhood of the spot primarily affected. The second, the peculiar figure and appearance of

the ulcer to which the malignant tumour ultimately gives rise. This ulcer, as well as the mechanism of its production, I have already particularly described. Thirdly, as a consequence either of the external ulceration, or internal death and softening of the tumour, the absorbent glands situated in the course of the lymphatics leading from the part, become enlarged, by a deposit having very much the character possessed by the original tumour. Fourthly, besides the affection of the glands situated in the course of the circulation, and at times without this having sensibly taken place, other parts of the body become the seats of similar deposits. Sometimes deposits of this kind have taken place in very many structures and parts of the body simultaneously. At other times they are confined to very few organs or even to a single organ; in which case the organ or organs in which such deposit takes place, appear to be very much influenced by the seat of the primary affection. Some of the instances of this kind afford curious proofs of the inexplicable sympathy existing between remote organs; thus, in a case of fungoid disease affecting an absorbent gland in the neighbourhood of the parotid, glands of a similar description, situated near the upper edge of the pancreas, were found enlarged and participating in the disease. Scirrhous tubercles in the uterus are in the same way found in conjunction with scirrhous mamma. The liver of all organs is perhaps the most liable to become the seat of these secondary depositions

of malignant tumours or tubercles. We find them in this situation when the primary formation has taken place in the eye, the breast, the stomach, the rectum, the mesentery, the kidney, the testicle, and perhaps in many other situations. Fifthly. Whilst these affections have taken place in different parts of the body, and in some instances, even whilst the structural derangement continues limited to the immediate neighbourhood of the spot first affected, the system generally becomes more or less seriously deranged, the complexion loses its natural and healthy clearness, and presents a diffused sallow or leaden hue, or in some instances a dingy redness; the countenance is expressive of sadness or anxiety, and is so peculiar, as in most cases to be easily recognized by the practised eye, though it is difficult to convey a description of it in words. The patient, worn by a lingering hectic, which is generally accompanied by distressing watchfulness, becomes in most cases, though not invariably, extremely emaciated. To the production of this effect, loss of appetite, distressing nausea, and occasional vomiting, together with colliquative sweats, the ill-conditioned discharge and occasional hemorrhage from the sore, and local and general pain, mainly contribute. It is, however, sufficiently notorious that many of the characters which I have just enumerated, are often absent, notwithstanding the existence of a tumour, or even of an ulcer, respecting the malig-

nant nature of which, few competent judges would hesitate to pronounce. Again, some of these characters belong to affections which are not regarded as malignant, as well as to those which are so. First. With respect to the alteration in the surrounding structures. This may accompany other tumours besides those which are considered as malignant, and the peculiar nature of the change which they undergo in conjunction with those which are so regarded, is not to be positively ascertained by the mere application of the fingers to the tumour whilst covered by the integuments, nor always even when the parts are actually removed from the body. Secondly. The characteristic appearance of the ulcer is not at all times present, for the production of the new and external part of the tumour on which the elevation of the edge depends, is not constantly going forward; and during its suspension, the surrounding more or less healthy integument will sometimes put on an appearance which affords a temporary and fallacious promise of cicatrization. Again, ulcers possessing no degree of malignity in consequence of the size and arrangement of their granulations, sometimes present an imperfect resemblance to the malignant ulcer. Thirdly. The consecutive effect observable in the absorbent glands is far from being peculiar to malignant diseases, but attends them in common with scrofulous, venereal, and common inflammations. The nature of the changes which

these glands undergo, may indeed be peculiar in malignant diseases, but of their changes we can know but little at the time when the knowledge of them would be of the most importance. With respect to the fourth character which I have mentioned, or that of similar productions taking place in different organs after the one primarily affected, it is one which, though it may be often suspected, can frequently not be ascertained until after death. Moreover the same tendency not unfrequently accompanies the production of the scrofulous tubercles which we find invading various organs in the same subject. And, again, it does sometimes happen, that the most undoubted cases of malignant disease, both with respect to the local affection and the characteristic derangement of the general system which accompanies it, and ultimately brings the patient to his grave, may present no trace of the disease, except in the part first affected and in its immediate neighbourhood, but not even in the absorbent glands belonging to it. A striking instance of this kind occurred in a patient of my friend J. Morgan. This man came into the hospital affected with fungoid disease of the testicle. The testicle was removed. The disease reappeared in the cut extremity of the cord; a second operation was performed, which, like the first, was followed by the renewed growth of the morbid structure. No further operation could be performed. A large bleeding fungoid ulcer occupied the greater part of the groin, and the patient died with all the con-

stitutional symptoms which belong to the last stage of this formidable complaint. On examining the body after death, I found that the new growth which presented the ulcerated surface which I have mentioned, afforded a very complete specimen of the medullary or brain-like matter. I was much surprised in pursuing the examination, not to discover any trace of the disease in the absorbent glands, or in any other part of the body. Those general and constitutional symptoms which I enumerated in the fifth place, are like the others, which I have mentioned, by no means infallible. Sometimes the patient, though affected with a tumour, respecting the malignant nature of which there can be no doubt, for a long time bears up against its fatal influence: and sometimes, patients whose health is seriously impaired by chronic visceral derangements, present, in the complexion and expression of their countenances, appearances which induce strong suspicions of malignant disease.

Besides the indications of malignity of which I have been speaking, others, which may, perhaps, be regarded as of still less value, have also been pointed out. Amongst these may be mentioned the obstinacy with which the ulcer resists all the efforts which are made to promote its healing; but this is a character by no means peculiar to malignant ulcers. Another character is the enlargement of the veins in the neighbourhood of the affected part; this symptom, however, is not at all times present as an accompaniment to malignant

formation, and may be present where malignity does not exist. More stress has been laid on the peculiar darting or lancinating pain which is felt in and about the diseased part; but this symptom, though strongly characteristic of some forms of malignant tumours, does not accompany all of them, and pains presenting very nearly the same character at times accompany affections of a different nature. Hence arises the difficulty, not merely of composing a concise verbal definition of the term malignant, as applied to the tumours in question, but also in many cases of drawing the line in actual practice. For my own part, I should, in examining a tumour in the living subject, be in general disposed to suspect what has been called malignity, whenever I could detect indications of the structure which I described accompanied with alteration of the surrounding structures, and in its origin referrible to some external violence, or to a pre-existing indolent tumour. These suspicions would be proportionably stronger if the tumour in question occurred in a part known to be rarely, if ever, affected with that non-malignant and well defined form of tumour which, in common with those of a malignant character, distinctly possess the structure alluded to; my suspicions would be progressively converted into absolute certainty in proportion as the other symptoms, previously detailed, unite themselves to those which I have assumed as presenting themselves in the suspected tumour. But suppose

the tumour to have been removed from the body, and that a question as to its malignity has been started. In the first place, I should consider some traces, however slight, of the structure which I have described existing in some part of the morbid growth, as a *sine qua non* to the character of malignity; hence the importance of having the whole, or a very considerable part of the tumour submitted to our examination, and, if possible, that part which constituted the original formation should be contained in the portion selected for examination. This point being ascertained, we may, I believe, pronounce on the malignity of the new formation with a confidence proportioned to the degree to which the new growth deviates from the natural structures of the body, but more especially from the serous membranes. The spontaneous death of some internal part of the tumour, in consequence of the strangulation of some of the pedunculated bodies which compose it, is not alone a proof of malignity, but I have little doubt, that the influence which this change exerts, strongly contributes to induce a malignant character in the tumour. The degree of integrity or degeneration of the surrounding natural structures will also materially contribute to decide the question. When we have the opportunity of examining, not only the tumour, but the entire body, the presence of similar tumours in other parts of the system may warrant us in giving an unqualified affirmative, but their absence by no means proves the nega-

tive. I must now be allowed to say a few words respecting the constitutional taint, or specific diathesis, which is by many supposed to accompany the production of malignant formations.

It is manifest, that the common exciting causes to which the origin and formation of malignant tumours are wont to be ascribed, are continually operating on hundreds of individuals, on whom no serious effects are produced. Hence, it has been supposed, that a certain pre-existing condition of the system is an essential element to the production of the disease, although these same individuals may have enjoyed perfect health up to the time at which the exciting cause was applied. On the other hand, facts, at least equally strong, tend to favour the idea, that it is from the local affection that the constitutional taint is derived, since, in proportion to the indolence or activity of the primary affection, may in general be observed the invasion of other parts of the system. The affection of the glands, in the course of the absorbents, leading from the diseased part, might also be adduced as an argument in favour of the contamination of the system, through the agency of absorption; but on the other hand, we have unequivocal proof of this effect having taken place when the part primarily affected has been completely removed before the absorbent glands had been affected.

Having now completed the general remarks

which I think it necessary to offer respecting the mode of formation, anatomical structure, composition, and habits, common to the greater number of the heterologue adventitious deposits that are met with in the human body, I will proceed to speak of the different species of these structures, but especially of those to which the term malignant has been applied.

Formerly, as I have already stated in a remark borrowed from Laennec, all the forms and varieties of these productions were vaguely comprehended under the term cancer or carcinoma. Although, as I have endeavoured to shew that these formations by their structure, mode of development, and for the most part, by their influence on the system, are, with propriety, to be referred to one common type and grouped into one family, yet, as we shall presently see, there are certain peculiarities which will justify me in forming at least three specific divisions. Their limits, it is true, are so ill defined, and they pass so gradually into each other, that it is often difficult to decide to which of the species a particular specimen should be referred. In the best marked cases there is no difficulty of this kind. The distinctions of which I am speaking were, I believe, first pointed out and insisted on by Laennec and Bayle in France. It happened, very nearly at the same time, and without any intercourse between the two countries, that Burns, Hey, and Aber-

nethy, were engaged in the investigation of the same subject in this country. Their labours have been followed up amongst our countrymen by Wardrop, Langstaff, Cullen, and Carswell; and in France by Cayol, Breschet, Creuvellhier, and Ferrus.

I commence by speaking of that form of tumour to which the name of scirrhus or true scirrhus has been more particularly applied. As the term implies, tumours of this denomination are characterised by their hardness, which in many instances is at least equal to that of cartilage, but they want the uniform texture of this natural tissue, and in this respect bear a nearer resemblance to fibro-cartilages; hence, when divided by incision, they give rise to some noise, and are said "to cry under the scalpel." It is not only in density of structure but also in colour, that the scirrhous tumour exhibits a want of uniformity. These variations may be satisfactorily referred to the mode of formation which I have been pointing out.

The hardness of these tumours appears to be intimately connected with the slowness of their growth, and the comparative indistinctness of the structure, to which I have alluded, is another effect proceeding from the same cause.

True scirrhous tumours appear sometimes to depend on a single primary tumour; at other times,

several may be satisfactorily made out. That part of the tumour which appears to have been the common origin of the primary cysts, where there are more than one, or from which the contained pedunculated bodies radiate when there is only a single primary tumour, is in general the most indurated portion, and is, at the same time, the most indistinct in its structure. When examined externally, after the surrounding natural structures have been carefully dissected off, this part of the tumour is found to be the most irregular, has a somewhat corrugated appearance, and suggests the idea of its having been the sort of root by which the adventitious growth was implanted on the natural structures. The radiated appearance so strongly insisted on by most authors who have described scirrhous tumours, and the rationale of which I trust I have shewn, is particularly conspicuous when the section passes through this point. The fluid part of a true scirrhous tumour bears in general a very small proportion to the rest of the structure, it has a viscid or mucous character, more especially where softening has not taken place; but where this process is going on, it assumes the character of an offensive ichorous discharge, and acrid and highly deleterious qualities have by some been ascribed to it.

The process of softening sometimes commences internally at one point, at other times in several

small isolated points; in others, again, the ulceration through the integuments is the first part of the process of decay.

True scirrhous tumours, notwithstanding the length of time during which they continue to grow, very rarely acquire a considerable size. Indeed, it not unfrequently happens, that the wasting of the neighbouring structures, and more especially of the female mamma, which is by far the most frequent seat of true scirrhus, more than compensates for any increase of volume dependent on the new formation. Charles Bell has particularly pointed out this source of fallacy, which has induced some persons to assert, that scirrhus was not always productive of tumour.

True scirrhus appears to be a form of malignant disease essentially peculiar to the more advanced periods of life. It would seem, indeed, that the more resisting nature of the different tissues, and the more tardy and feeble operation of the function of nutrition, which characterise the decline of life, are the principal causes that render scirrhus a malignant disease of old age. The chronic characters, which belong to scirrhus, are not confined to the essential part of the tumour itself, the surrounding structures participate in it. By repeated attacks of inflammation of this description, the neighbouring cellular structure becomes thickened and indurated. It is on this altered structure,

implicating the nervous fibrillæ of the part, that, as I apprehend, principally depends the peculiar and characteristic lancinating pain which accompanies the accessions of inflammation, to which an organ affected with scirrhus is continually liable. This indurated cellular membrane has often been observed extending from the external part of the tumour, amongst the adipose structure, in which the mammary gland is situated. Like inflamed and thickened cellular membrane, resulting from other causes, this structure becomes gradually contracted, and most materially contributes to the puckering and distortion of the affected part. In the mammary gland, in which this puckering has been chiefly noticed, the traction exercised by the lactiferous tubes is the cause generally assigned. I do not deny that they may have some share in producing this effect, both by their own obliteration and contraction, and also as the medium by which the gland, altered and displaced by the tumour, acts upon the nipple; but I feel pretty confident, that the cause which I first assigned is the principal one. These same prolongations of indurated cellular membrane, proceeding from the tumour into the surrounding adipose substance, appear to have been considered as prolongations of the radiating lines, observable within the essential part of the tumour, and to have been regarded as a part of the scirrhous structure itself; in fact, as fibres of the disease on which its re-appearance, after an operation, mainly depends. For my own

part, I very much doubt whether this altered cellular membrane itself really possesses any thing of the malignant nature, although I can easily conceive, that the tumour by which the disease makes its renewed appearance, may have taken its origin in the course of one of these indurated prolongations left in the surrounding structures. I believe this circumstance is to be explained in the following manner:—In dissecting away the fat from the principal part of a scirrhous tumour, I have had occasion to notice these prolongations of cellular membrane, and in doing so I have observed very small and delicate pedunculated cysts, some of which scarcely exceeded the size of a pin's head, dispersed upon the aforementioned cellular membrane. It is to the development of one or more of such cysts, rather than to the altered cellular membrane itself, that the new tumour is to be attributed.

True scirrhous tumours, in many instances, remain for a length of time in an indolent state, without passing into a state of softening or producing an external ulceration. Before this ulceration takes place the tumour becomes adherent to the skin, and though there is generally but little redness observable in these tumours, a spot, most frequently of small extent, becomes of a bright and cherry red or of a purple livid colour, before the continuity of the integuments is destroyed. It is needless that I should again describe the characters of a malignant ulcer, which are in general

very completely seen in the ulcerative stage of true scirrhus. It may, however, be said, that the ulceration of true scirrhus is attended with a more decided loss of substance than that of the next form of tumour of which I shall speak,—viz. cerebriform cancer, and which is often attended with large, rapid, and irregular growth from the ulcerated surface, whence the names of fungoid disease, fungus medullaris, &c., have in all probability been derived. The ulceration of true scirrhus is indeed bounded by its elevated wall of circumvallation; but the central parts, gradually hollowed away by the softening of the very imperfectly organized structure, present a foul and deep chasm.

It is to this state of the ulcerative stage of true scirrhus that the appellation of cancer, or carcinoma, in the most restricted sense, has been applied. Some pathologists have considered that both cancer and fungus result from the degeneration of scirrhus; that if acute inflammation attack the scirrhous structure, ulceration follows, presenting all the characters of cancer, but that if the structure undergoes a gradual degeneration and breaks down, a cerebriform mass is the result. I must avow my dissent from this doctrine, although promulgated by the learned authors of the Dictionnaire de Médecine, in an article which I believe to have come from the pen of Breschet. I see no reason to doubt that these two species of diseased structure depend on differences which

exist *ab initio*, and I cannot help being more particularly surprised that cancer should have been considered as a more acute form than the fungoid disease.

In a cancerous or carcinomatous ulcer it not unfrequently happens thatone or more vessels give way and lead to a hæmorrhage, which in some instances is very profuse. Such hæmorrhages are, however, very different from those which form so characteristic a feature of fungus hæmatodes. In the case of cancer, of which I am now speaking, the greater part of the ulcerated surface, though irregular, is possessed of considerable, nay, almost cartilaginous firmness; the hæmorrhage in question takes place from particular points, and if we attempt to inject such an ulcer with fine injection, either after its removal from the body, or after the death of the subject, we obtain but very imperfect success, because the larger portion of the injection escapes from the open arteries. Such hæmorrhages are so far from being attended with an exuberant sprouting fungous growth, that at times they seem to be the principal means of procuring a temporary improvement in the appearance of the ulcer.

I believe that it has sometimes, though indeed very rarely, happened that tumours, possessing the characters of true scirrhus, and regarded as such, have become detached by the sloughing of

the surrounding structures; and being in this way completely thrown off from the system, the cavity which they occupied has been filled up by granulations, the surface cicatrised, and a permanent cure obtained. The occasionally successful practice of some empyrics consists, I believe, in attempting to induce this process artificially. Although the mamma, the uterus, and the lips, are the parts the most frequently attacked, few, if any, organs can be said to be wholly exempt from it. It is not, however, so prone to invade numerous organs in the same individual as the fungoid disease, of which I shall have next to speak.

Before quitting, for the present, the subject of scirrhus and cancer, there is one form of tumour, to which the term scirrhus is applied, which differs so considerably from some of those which I have been describing that I must not pass it over unnoticed. I allude to the scirrhous tubercles developed in the body of the uterus. They possess a well defined rounded figure, a close and compact tissue, in which the structure, referrible to the same type as the cysts, to which I have so often alluded, is tolerably distinct, on a much larger scale than that generally observable in true scirrhous tumours in other parts of the body. They rarely, if ever, present any cells or cavities. They acquire a much larger size than true scirrhous tumours in other parts of the system. They never, or at most very seldom, pass into the stage of

softening or ulceration, and when formed in the uterus, without any other organ having exhibited a tendency to the production of scirrhus, the formation almost always continues wholly confined to this organ. Consequently, they do not appear to be accompanied by any constitutional taint. On the other hand, their occasional formation, in conjunction with the primary scirrhous and cancerous affection of the mamma and other parts, necessarily connects them with the malignant disease of which I have been speaking. Although these tumours, or tubercles, are little liable to the process of softening, their formation disposes them, in common with other growths of the same family, to a diminution or loss of their vitality. It would seem, however, that this takes place very gradually, and is accompanied by deposition of bony or earthy matter, so that by the time the nutrient vessels are nearly, or quite, obliterated, the scirrhous is converted into a bony structure, little susceptible of change, and which may, consequently, be retained to an almost indefinite period in the system, without material injury to the organ in whose substance it is embedded. The peculiarities which I have just described as belonging to the scirrhous tubercles of the uterus are, doubtless, in great measure referrible to the part in which they are developed. In the first place, the uterus, as I have before remarked, is naturally disposed to accommodate itself to a stimulus, which excites to an increased supply of nourishment. It

is no less remarkably calculated passively to yield to the distension of bodies progressively increasing within it. Moreover, its structure is but little susceptible of morbid actions. Hence the new or adventitious growths have an abundant supply of the nutrient fluid. Their enlargement meets with no violent or partial obstruction, but, at the same time, is subjected to a steady, moderate, and uniform pressure, which tends materially to diminish the relative proportion of the fluid parts, and to which, in the instance before us, we may attribute the absence of cells, and the firm and compact structure of the tumours. Since the fibres of the uterus rarely contract, except during parturition, we need not be surprised to find that the scirrhous tumours developed amongst them are very far from being similarly modified to those which I mentioned as being formed amongst the ordinary muscular fibres, as, for instance, in the deltoid or the masseter. To the little susceptibility which the uterus exhibits with respect to morbid actions, we may, most probably, attribute both its own immunity from the scirrhous affection and the absence of constitutional taint.

The affection of which I have next to speak, notwithstanding that it must have been long familiar to the eyes of practical pathologists, has only recently been regarded and described as a particular disease. It has, however, already received several names, which, by some, are used almost

indifferently or as synonyms, whilst by others some of them are considered as denoting different varieties, if not species, of malignant disease. Thus we find the terms encephaloid tumours, cerebriform cancer, medullary sarcoma, spungoid inflammation, fungus hæmatodes, and fungoid disease.

I am rather inclined to prefer the last of these terms, namely, fungoid disease, not merely in imitation of my distinguished teacher, Sir Astley Cooper, but because, whilst it indicates that exuberant growth which almost invariably characterizes this class of tumours, it leaves undefined the particular character of the structures composing them, and consequently does not exclude any of the varieties comprehended in the division of which I am now to speak.

One of the most striking features which distinguish the fungoid disease from true scirrhus, is to be found in the extent and the rapidity of the development of fungoid tumours. Whilst, as has been seen, true scirrhus often remains for a considerable length of time in a chronic and indolent state, and after a growth of some years produces a tumour of only a moderate size, the fungoid tumour in the space of a few weeks is sometimes seen to attain to a prodigious size, and to pass through all the stages which belong to it in common with the other members of the same family of adventitious structures. Whilst true scirrhus is almost exclusively the disease of advanced life, the fun-

goid disease makes its appearance in individuals of every age; but its most formidable and extensive ravages are seen in the young. Whilst in true scirrhus the fluid matter forms a very inconsiderable and scarcely notable part of the structure, in the fungoid tumour it is frequently pretty abundant, presents a great variety in its characters, and is often collected in cavities of considerable size. In the scirrhous tumour, the peculiar mode of formation which I have pointed out must often be inferred by analogy, guided by faint and partial traces; but, in the fungoid disease, we meet with those unequivocal manifestations which almost speak for themselves. In true scirrhus the traces of vascularity are very faint; but in the fungoid disease the adventitious membranes possess a high and preternatural degree of vascularity. The vessels which we see ramifying in them, are not only numerous, but large. By some they have been considered principally arterial; by others venous: I will not attempt to decide to which class of vessels they are most nearly allied. They appear to consist of the capillary vessels of Bichat on a large scale; and as we sometimes meet with these membranes of a bright and arterial red, and at other times of a venous or livid hue, it seems probable, that accidental or fortuitous circumstances have the principal share in determining to which class of vessels these capillaries should most incline. These newly formed vessels, though large and numerous, are extremely weak and tender, and derive little or no support from the structure through which they

ramify, or by which they are surrounded; hence, they are liable to give way at numerous points, whence proceed those frequent and extensive hæmorrhages which so often characterize these tumours, and have led to the term of fungus hæmatodes, which has not inaptly been applied to many of them.

Sometimes the hæmorrhage from these vessels produces an effusion into the cavity of the membrane reflected over an inferior order of pedunculated cysts or bodies, and distends it into a cavity filled with blood, the characters of which will vary according to the time which has elapsed between its effusion and the making of the examination. At other times, the effused blood infiltrates the more solid parts of the tumour, and produces an appearance which by Laennec has been well compared to an apoplectic clot.

The more solid parts of the tumour differ in a marked manner from that which composes the scirrhous tumour. In this disease, the secondary cysts, which are often of large size, generally become filled with a material which at first bears a considerable resemblance to tender or feebly coagulated fibrine or plastic lymph. Into this substance new vessels speedily shoot; but being neither susceptible of perfect organization, nor calculated to remain inert and dormant, it speedily, but gradually, loses its vitality, and, like other transparent parts in

which such a change is effected, gradually becomes opake, and bears, in consistence and appearance, a close resemblance to the substance of the brain of a child: hence the terms, cerebriform cancer, encephaloid tumour, and medullary sarcoma. The idea of this resemblance has been carried so far by Professor Monnoir, of Geneva, that he has even considered that an adventitious production and deposit of cerebral matter actually takes place in this disease, and constitutes the bulk of the tumour. Such an idea I consider perfectly inadmissible. I am not aware, that even a single nervous fibrile has ever been discovered in the essential part of the fungoid growth. Although in fungoid disease the solid part of the tumour often bears a striking resemblance to cerebral substance, we frequently find it, on the one hand, deviating into a much more firm material, and, on the other hand, into one of a softer and grumous consistence. Sometimes it has a minutely foliated structure of a pearly white colour. When the diseased structure has completely lost its vitality, it breaks down into a variously discoloured pultaceous grumous mass, in which the remains of the membranes of the secondary cysts and their vessels may often be detected. Although in a recently formed tumour, or in the newer parts of an older one, the traces of that mode of formation on which I have insisted are sufficiently evident; they are very much lost or obscured as the process of decay advances. It is also at times difficult to distinguish

it when the tumour has only advanced to the stage of opacity, provided the substance of the tumour be very uniform, and the membranous parts not only very thin and tender, but adherent amongst themselves and to the contained substance.

The characters of fungoid disease are very much modified by the tissues in which the tumours are developed. Though I shall not attempt to particularize all these variations, I must not wholly pass over the peculiarities which this disease exhibits when it affects the bones. When the fungoid disease takes its origin in a part of the osseous system, bony matter continued from the natural structure forms a striking part of the new growth, through which it often radiates from that part of the bone in or near which the disease commenced. The bone thus formed is of a loose and feeble texture, compared to that of healthy bone. It would appear, that the deposit of bony matter only takes place in that part of the tumour which is subjected to the pressure of the periosteum, which is often greatly distended by the growth of the tumour. Its fibres become separated by this distension, the morbid growth advances through the opening and proceeds with increased rapidity, and soon loses all trace of bony deposit. It is not common for fungoid tumours to shew any disposition to ossification, except when originating from bone in the manner which I have just described; nevertheless, in some rare instances it is met with, but it pre-

sents very different characters from those which are at times observed to accompany true scirrhus. It is not, as in these last cases, the central and most compressed part of the tumour which forms the bed in which the earthy matter is deposited, but the cysts themselves, which become converted into bony shells, circumscribing their broken down contents. I have only noticed this phenomenon in some comparatively chronic cases of this disease. I apprehend it is very rare in this affection for the morbid growth to remain stationary for a sufficient length of time for the process of ossification to be carried on.

Having, I fear, already extended this paper to an unusual length, I suppress for the present some further remarks, which I had intended to bring forward. I shall probably submit them to the Society on a future occasion, and till then I refrain from speaking of the third form of malignant disease, viz. Melanosis.

THE END.

G. Woodfall, Printer, Angel Court, Skinner Street, London.

Fig. 1.

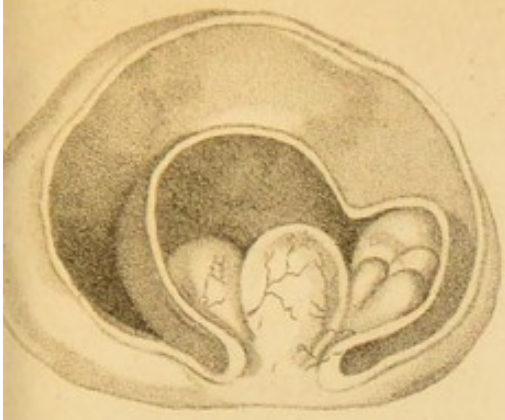
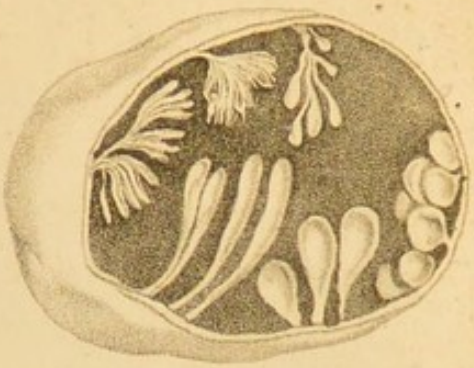


Fig. 2.



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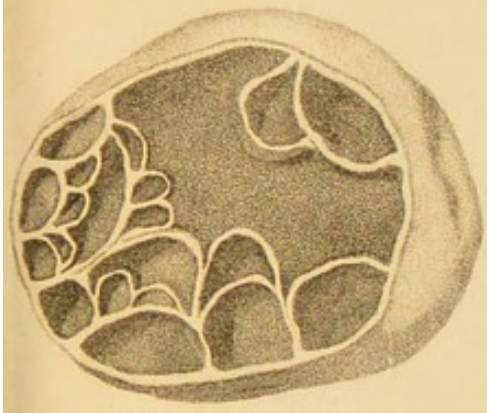

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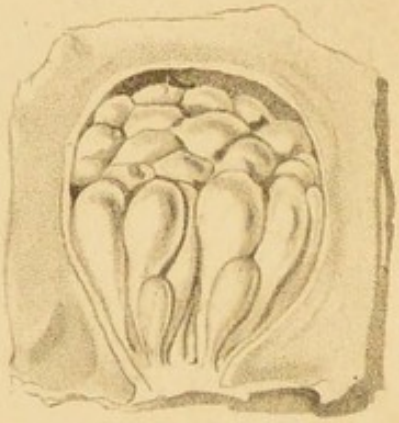

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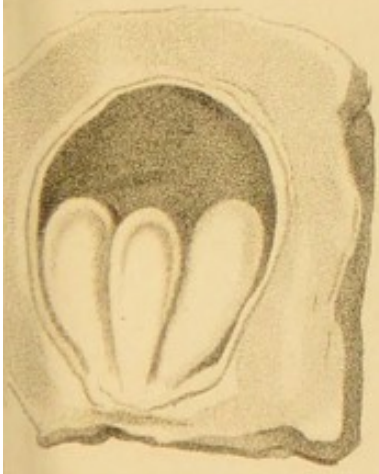

Fig. 6.

Fig. 7.

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Fig. 1

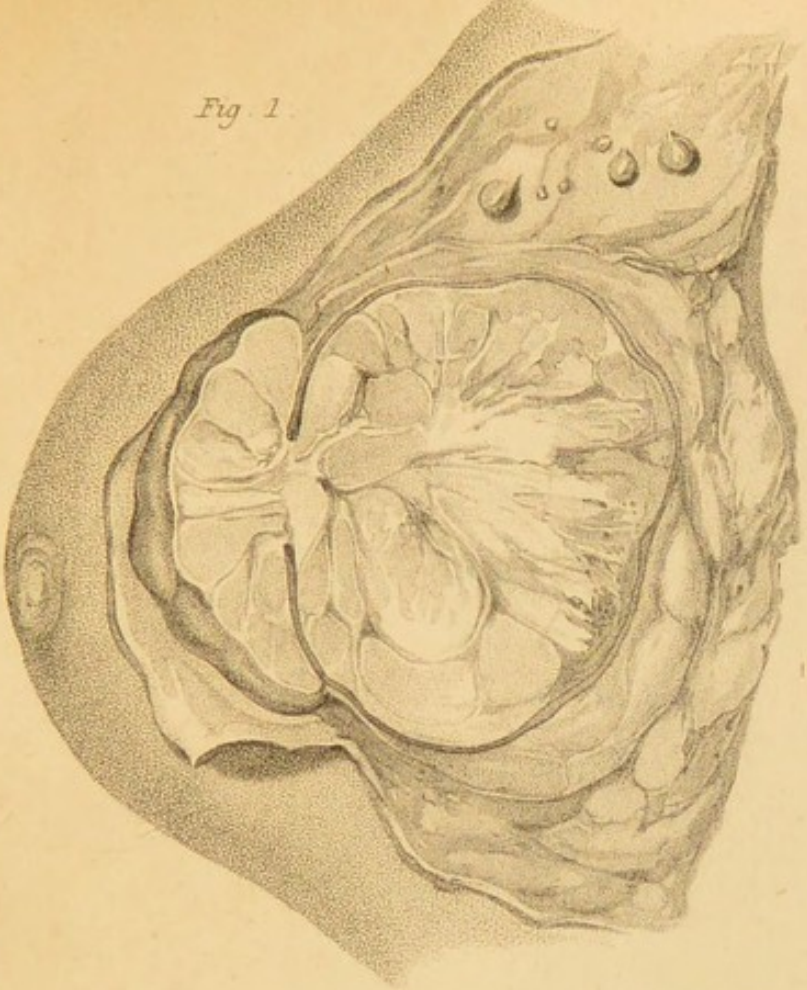
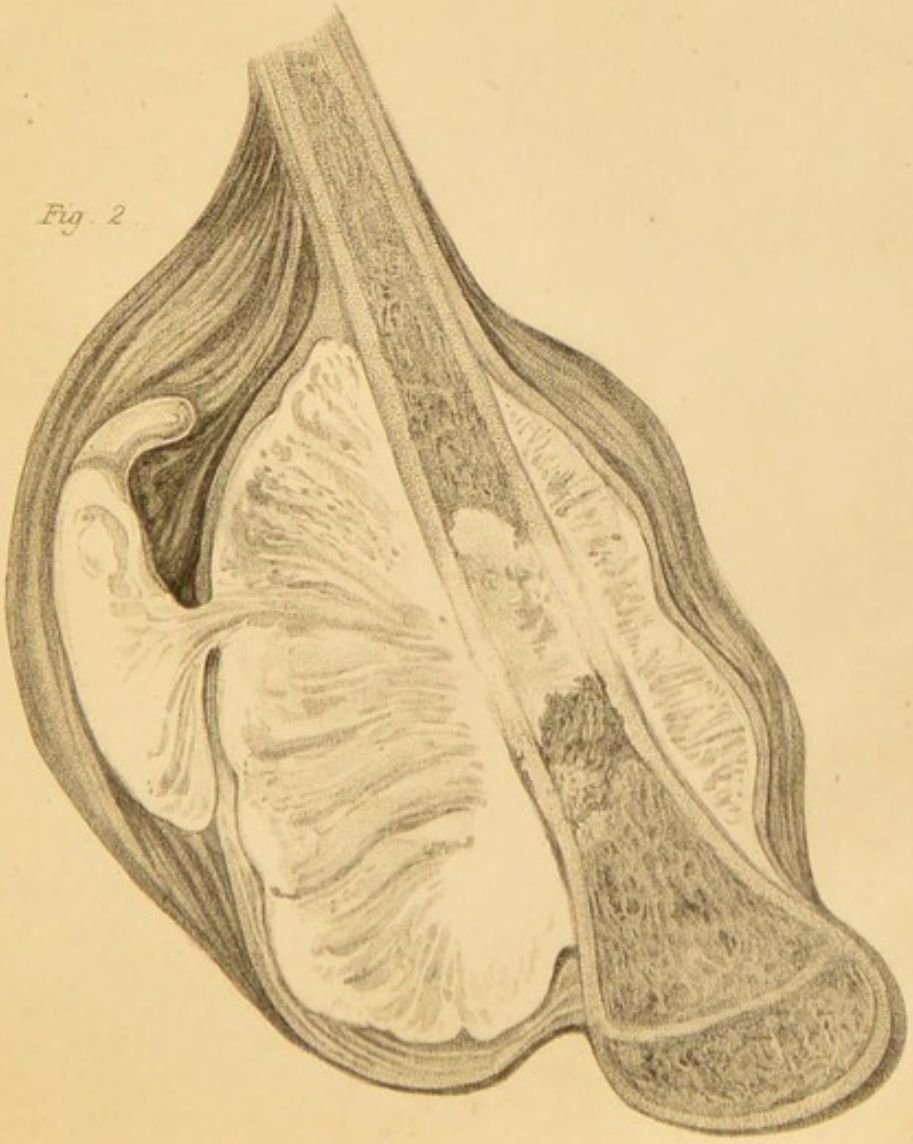


Fig. 2



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