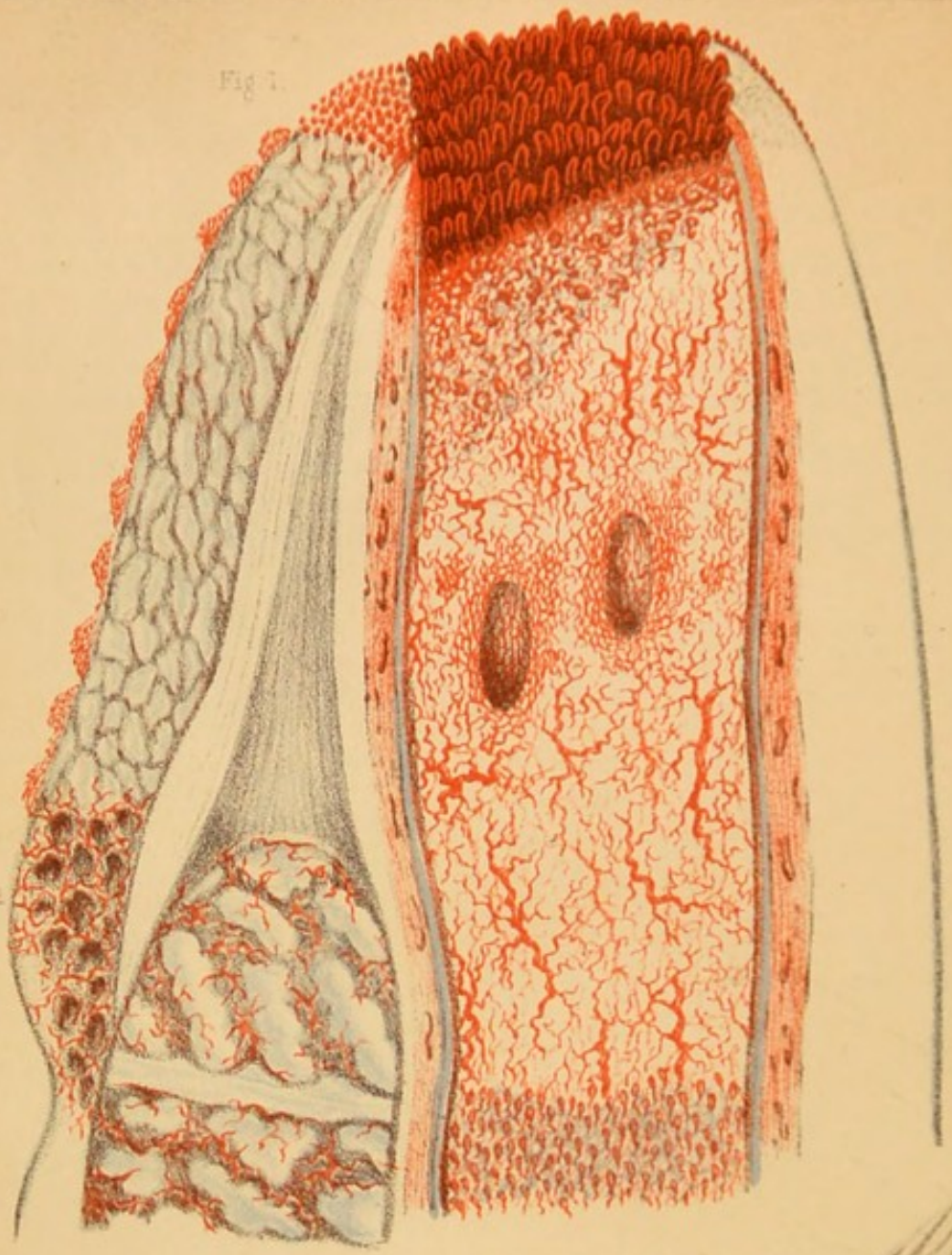
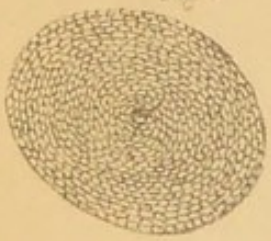
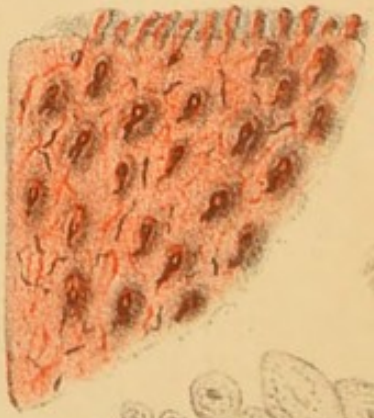
Investigations into the histological and pathological anatomy of the urethra and glans penis / by Jabez Hogg.







DESCRIPTION OF PLATE I.

Fig. 1 Shows an anterio-posterior vertical section of the urethral canal, with the papillæ at the orifice, their convoluted capillary terminations, and continuation into the lacunæ. Below the corona the papillæ re-appear, as seen under a two-inch, better under a one-inch objective, at Fig. 8. The outline of the organ is indicated merely with relative position of other structures.

Fig 2. Shows the external surface of the glans penis, near the corona, covered with papillæ; they become smaller as they approach the preputial fold; their relative size being preserved, for the sake of comparison, with those of larger size at the meatus urinarius. Tufts of papillæ are also indicated down the external margin of the outline in Fig. 1.

Fig. 3. A portion of the external surface of the glans, near the meatus, more highly magnified one-inch objective.

Fig. 4. Epithelial layer covering the terminations of the papillæ. This layer has been removed in Fig. 1.

Fig. 5. The open mouth, or free surface of one of the glandulæ Tysonianæ magnified 150 diameters.

Fig. 6. A bundle of the involuntary muscular fibre from a layer around the glans. Magnified 250 diameters.

Fig. 7. Gonorrhœal discharge seen under a magnifying power of 250 diameters : *a* before ; *b* after ; the application of diluted acetic acid.

INVESTIGATIONS

INTO THE

HISTOLOGICAL AND PATHOLOGICAL ANATOMY

OF

THE URETHRA AND GLANS PENIS,

BY

JABEZ HOGG,

Assistant Surgeon to the Royal Westminster Ophthalmic Hospital, &c.

BEING AN ABSTRACT FROM THE TRANSACTIONS OF THE PATHOLOGICAL SOCIETY, LONDON, 1855.

THE peculiar and rapid manner with which gonorrhœal matter is absorbed, has been a subject for consideration as long as the local derangement produced by its application has been observed.

John Hunter's investigations offered no satisfactory explanation of the large amount of the gonorrhœal secretion, nor for its absorption. Hunter observes "that it would appear there is hardly a sufficient surface of the urethra inflamed, confined as it is to within two or three inches of the orifice, to give out the quantity of matter

that is often produced;" and while noticing the "cherry redness" of the glans and lips of the urethra, he believes the glans to be a "*non-secreting* surface," although the seat of chancre.

Pathological, or rather histological, anatomy clears up a portion, at least, of the difficulty, and shows, in the *two or three inches from the orifice* spoken of, how glandulæ assist in this active secretion, and that the whole of the surface of the glans, so liable to be affected by chancre, is a secreting, instead of a non-secreting, surface.

Panizza was the first anatomist who clearly demonstrated, by his quicksilver injections, that the urethral canal, and the glans penis, were provided with an extremely fine network of absorbents. In the Museum of the Royal College of Surgeons, there are preparations showing this absorbent network and papillary structure of the glans penis. Kölliker has, in part, shown that the proper *corium* of the glans penis is extremely thin (one-tenth of a line) and that it is principally composed of connective and elastic tissues, capillaries, nerves, and absorbents; these, with the organic or involuntary muscular fibre, give to the tissues an erectile character.

The genito-urinary mucous membrane gradually assumes a mucous character from the prepuce, and becomes continuous with the membrane lining the urethra, as it passes into the bladder and seminal passages. There is also a continuation of membrane going to the accessory organs, whose orifices are at the urethra.

The mucous membrane covering the papillæ at the meatus, has its layer of cylindrical epithelium which gradually changes into transition epithelium; this, again, into cylindrical; and finally becomes transition epithelium, as it passes to the bladder. The deeper tint of the glans, than that of the surrounding integument, arises from the papillæ covering its surface. These are commonly

somewhat distended with blood and closely set in rows, with intervening furrows (Plate I, Figs. 2, 3); they are continued on to the loose fold of the preputial integument for a short distance, and then become lost in the simpler structure of epidermis found elsewhere.

As we approach the orifice of the urethra, we see a transition from the smaller papillæ on the glans to those of four times the length surrounding the lips of the urethra (Plate I, Fig. 1). These papillæ are entirely covered by their epithelial layer, which very nearly fills up the intervals and renders the surface apparently smooth to the unassisted eye.

When an injected portion of the orifice of the canal is examined under the microscope with a two-inch object-glass, the papillæ are seen to be looped blood-vessels; these pass to the ends of their membranous coverings, and again return to their bases to join the vessel next them; terminating in convoluted or knotted vessels, which, upon the first examination, appear to be depressions (Plate I, Fig. 4), but upon removing the epithelial layer, which after maceration can be easily raised from the surface, these convolutions are seen to be slightly raised papillæ, which had been previously obscured by their epithelial covering. At this part, absorbent glandulæ are freely distributed, and may be traced to their communications with those in the external walls of the glans penis, and throughout the urethral canal. There is likewise a substratum of capillary blood-vessels running into the adjacent tissues. Going down the urethral canal, from the papillary portion, the capillaries take the place of papillæ; having the appearance of a delicate network of vessels, closely aggregated, and terminating in tendril-like branches. These vessels likewise dip down into the open mouths of the ducts or lacunæ. To more correctly mark the boundary of this part of the canal, it would be better to describe it as the *non-papillary portion:* occupying so much, or rather more, of that

commonly recognized as the *fossa-navicularis*, below which the papillary coat *re*-commences (as in Fig. 8), and becomes constant,

Fig. 8.
A sectional view of the canal below the glans, showing papillæ.

until the bulbous portion is arrived at, when the papillæ gradually disappear, the mucous membrane is rugose (as in Figs. 9 and 10),

Fig. 9.
Rugose appearance of canal near the bladder

Fig. 10.
And near the veru-montanum.

the epithelium cylindrical, and finally it blends with the transition epithelial mucous coat of the bladder.

The papillæ, in whatever situation found, are surrounded at their bases by, or are embedded in, involuntary muscular fibre of $\frac{1}{2500}$th to $\frac{1}{2000}$th of an inch in diameter (a small bundle is represented at Plate I, Fig. 6); their arrangement is in the linear series of several deep, united by means of a delicate investment of connective tissue, throughout which nerves are distributed. It is by the contractile power of these muscular fibres that the papillæ are kept erect, and by which considerable assistance is afforded in other functions of the organ; constituting, for example, the orifice of the urethra into a sphincter, especially when the papillæ are distended by blood under excitement; and even when this is only partially the case, we find it firmly grasping the bougie, or catheter, and opposing an entrance into the canal*.

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* "The muscular structure, now demonstrated, brings home to our comprehension the manner in which a contraction of any part of the urethral canal can commence, even if it should be of a single bundle of fibres not thicker than a sheet of paper."—G. J. Guthrie, F.R.S. "On the Anatomy and Diseases of the Bladder and Urethra."

It is to Thomas Wharton Jones, F.R.S. that we are indebted for the first description, and the discovery in some structures, of the involuntary or non-striated muscular fibre: as early as 1843, and whilst Professor of Physiology at Charing Cross Hospital, he demonstrated its microscopic characteristics to his class. The simplest way of dissecting out this layer in the penis is the following: slit up the urethra, and put the flaps upon the stretch by pinning them down to a piece of cork. Having carefully dissected off the first or mucous coat, we expose a second or firm substratum of elastic cellular tissue; beneath this is a grayish layer, which, with the unassisted eye, may be seen to be of a different structure to the former; this is the muscular coat. Take a very small piece, and *tease* it out with fine needles in a drop of water, on a slip of glass; ten

The external surface of the glans is covered by tesselated epithelium, which has a stratified, and, at the same time, a wavy disposition, capping the papillæ and lining the depressions between them. Fibrils from the dorsal nerves of the penis are traceable into these papillary elevations, associated with the blood-vascular loops which these latter also contain.

In the deep folds of the skin which surrounds the glans penis, a continual glandular epithelial desquamation and reproduction go on; the former of which processes gives rise to that peculiar secretion known as *smegma preputii*, which is, hence, not a sebaceous matter secreted by the preputial glands alone.

Secretion and desquamation indeed occur, to a greater or less extent, over the whole surface of the glans. It is admitted, nevertheless, that the glandulæ Tysonianæ have some share in these processes; chiefly that of supplying a lubricating fluid to moisten the

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or fifteen minutes may be required to break this piece up, for examination under a power of not less than 250 diameters; the elongated nuclei are developed immediately upon the application of a drop of dilute acetic acid. The muscular fibre is more readily found in the prostate gland and the glans penis; in other portions of the urethra they often degenerate, as do other tissues with age, from defective nutrition, assuming at times the form of minute granules, which in part consist of oily or fatty matter; this is seen from their behaviour when ether is added, and also by analysis a large quantity of fatty matter results. At other times we have the wasting peculiar to a cessation of some of the functional uses of the part, or a conversion of it into fibro-cellular tissue. By an examination of the urethræ of the young, even in fœtal life, the muscular fibre is very easily found and may be traced throughout the whole extent of the canal; the nuclei at this period are of a much larger size than in after life. In some of the lower animals, as the dog, the involuntary muscular-fibre is better developed, and the nuclei larger in size.

free surface, and facilitating the removal of the worn-out epithelial scales, which, if permitted to dry, would irritate and excoriate the parts.

The discovery of *sebaceous glandulæ* around the *corona* has always been regarded as a remarkable exception to the general rule, of such organs being only to be found in connection with hair-sacs, and then opening directly upon the free surfaces of the skin. Plate I, Fig. 1, *a*, a sectional view of one of the glandulæ Tysonianæ is given; and portions taken from the same spot, and treated with caustic soda or acetic acid, show them to be racemose glans, composed of several small lobules, held together by a firm investing membrane, lined with glandular epithelium, the branched ducts of which unite and open in minute orifices, as at Fig. 5, on the external surface.

The *corpora cavernosa* are continued into the glans penis, and, by a tendinous septum, to within one-tenth of an inch of the meatus; thus completely separating the corpora spongiosa from the urethral canal.

The interspaces between the trabeculæ have a lining of epithelium, and these interspaces or cells are to be viewed as veins which have laid aside all their coats but this one, having in their stead the coverings formed by the trabeculæ. These vessels often separate and unite again, so that they are commonly said to present the character and appearance of a sponge cut across, rather than the network usually formed by the anastomoses of vessels. The trabeculæ are rendered contractile by involuntary muscular, and true cellular fibre. When the organism has ceased, these two fibres are called into use, and the blood is forced out by uniform and regular contractions, which gradually diminish the size of the cells. There is another tissue also contributing to this end; it is the elastic tissue found in the investment of the corpora cavernosa; this serves

the purpose of an intercellular tissue to the muscular fibre, and thus we have mechanical and vital contractility and elasticity combined.

This peculiarity of structure and action is perhaps better seen in the dartos, or those parts of the dermis, the contractility of which is found to be, in great part, owing to involuntary muscular fibre. It is this tissue which produces that remarkable state of the skin, in many other parts of the body, known as *cutis anserina*.

It is here, perhaps, that I may be permitted to notice the analogy which may be drawn between portions of the urethra and the cutaneous structures. If we take the papillæ at the meatus and over the glans penis, and compare them with those found at the extremities of the fingers, the oral aperture, lips, gums, and nose, the palpebral conjunctivæ, the os externum uteri, and meatus urinarius of the female; the analogy, both in structure and function, is apparent. This analogy is strongly borne out by the action of therapeutical agents upon them, and the pathological changes induced by inflammation or irritation.

In conclusion, I may add, that my investigations are to be regarded, only as to a continuation of those made with my much esteemed friend, Mr. Hancock, three years since, and have especial reference to that portion of the urethral canal and glans penis shown to be a network of absorbent glandulæ. This is, undoubtedly, more important, from its being the seat of gonorrhœal discharges, which may be proved by simply squeezing the canal between the fingers, and it is only as we approach the glans the discharge begins to flow from the orifice of the canal*.

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* The *lucunæ*, writes Sir Astley Cooper, "become so inflamed as to be principally concerned in the excretion of gonorrhæal discharges." This is not so, and the *lucuna magnum* is frequently wanting; neither is "the whole

The microscopical appearances of this gonorrhœal discharge, under a magnifying power of 200 diameters, are :

1. Epithelial, chiefly of the spheroidal kind (Fig. 7, *a*) ; upon the appplication of a drop of acetic acid (Fig. 7, *b*), the nuclei are greatly increased in size, nearly occupying the whole cell, and each has a well-marked central nucleolus.

2. The pus corpuscle is rendered more transparent, and the three or four well-defined nuclei are seen to gradually coalesce.

3. The mucous globules are very distinctly seen, being few in number and of large size.

In a part so peculiarly organized, it is obvious, should a puro-mucous secretion be ever established, it may go on, as it is known to do, without breach of surface, and the fluid discharged will possess in itself little or no acrid or erosive property ; but being pent up between the folds of the urethra, it there irritates the inflamed membrane, which irritation is quite sufficient to excite further inflammation, and thus one portion after another may become affected. This is always the course in neglected or mismanaged cases ; and what is often seen in an analogous disease attacking the sclerotic conjunctiva of the eye. Here, indeed, our

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of the canal implicated," except in a few cases. Hunter very properly says : "If the matter arose from the whole surface of the urethra, and from the glans near the bladder, there would certainly be many other symptoms than do actually occur ; for instance, if all the parts of the urethra beyond the bulb, or even in the bulb, were affected so as to secrete matter, that matter would be gradually squeezed into the bulb as the semen is, and from thence it would be thrown out by jerks : for we know nothing can be in the bulbous part of the urethra without stimulating it to action, especially when in a state of irritation and inflammation. We also know that if an injection of water only is thrown into the canal, if it reaches the bulb, the muscles are excited to action and quickly expel it."

analogy may be taken a step further, as we note a more vehement form of inflammation, in a part furnished with a papillary portion, and covered by a very delicate mucous membrane, it quickly assumes the form of aphthæ or pustules; whilst, in the glans penis, the well-known ulcer or chancre is the result. The continuation of the glandulæ, from the glans penis to those in the groin, satisfactorily explains the sympathetic swelling, bubo, so often seen in conjunction with chancre*. It is also to be remarked, that, after a chancrous sore has healed, the reparative process is continued, until the whole of the papillæ are renewed. The same takes place in the conjunctivæ, when the healing process is complete.

We likewise find, that as the epithelial character of the membrane lining the canal changes, so we have other and further stages of disorganization. In the membranous portion, or near the orifices of Cowper's glands, the epithelium is of the cylindrical form, and at about the same part we observe the cell structure is more readily changed into a *fibro-plastic* material†; the lymph effused from two

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* "This is only in accordance with the well-known function of the absorbent system, which is to take up and to convey into the circulation such substances as are capable of appropriation, whether those substances be directly furnished by the external world, or be derived from the disintegration of the organism itself: by their aid, a sort of digestion is carried on in all parts of the body."—Dr. Prout.

† "It is probably the albumen and fibrin that are chiefly concerned in the changes which occur when hardening or induration of any of the tissues succeeds inflammatory action. A large quantity of chloride of sodium is present whenever the metamorphoses of tissues depending upon cell development is going on; and that an increase of the chloride should be observed to take place in those pathological conditions in which cell formation takes so active a part, is exactly what we should expect; believing that the

abraded mucous surfaces, placed in opposition to each other, is then converted into bands of fibro-cellular tissue; this glues the neighbouring parts together, and, partially or wholly blocking up the canal, is the direct cause of the formation of stricture.

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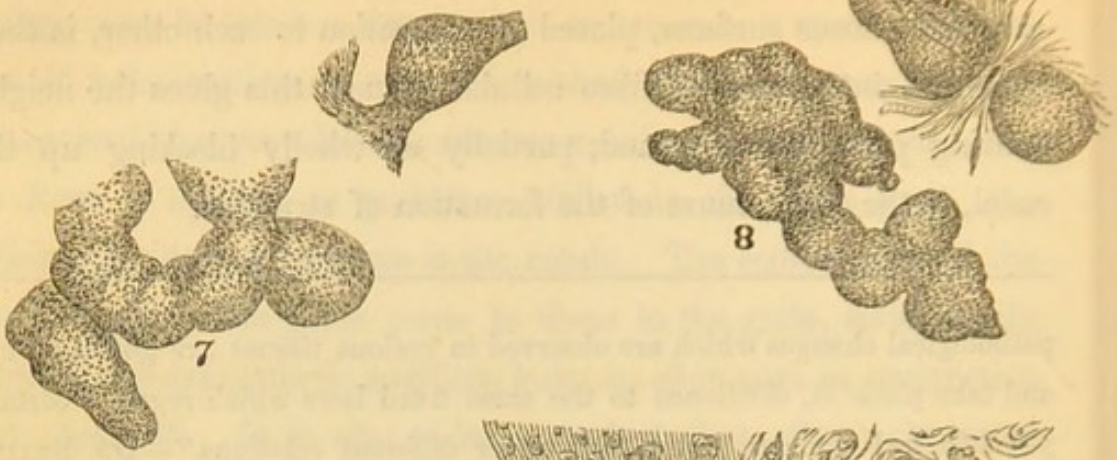
pathological changes which are observed in various tissues are governed by, and take place in, obedience to the same fixed laws which regulate certain physiological changes, but acting under different relations."—Dr. Beale, *Medico-Chir. Trans.*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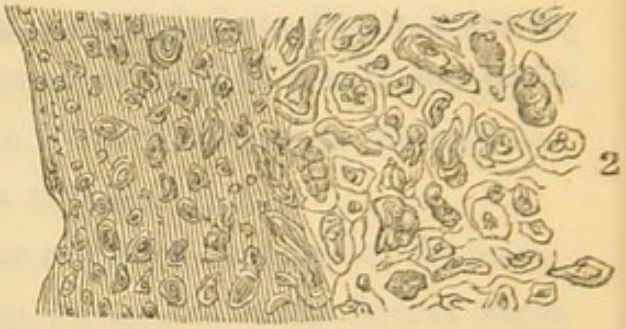
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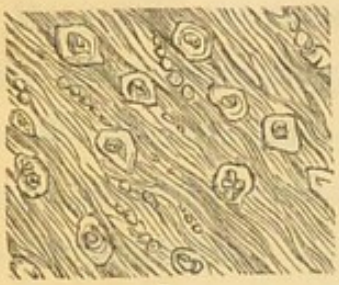
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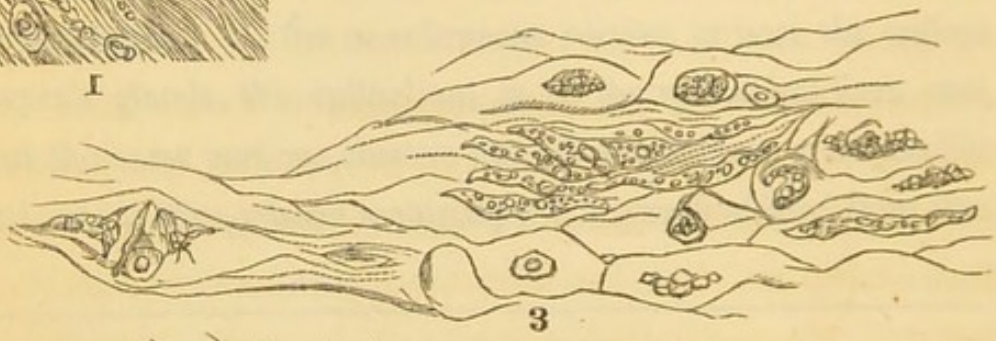
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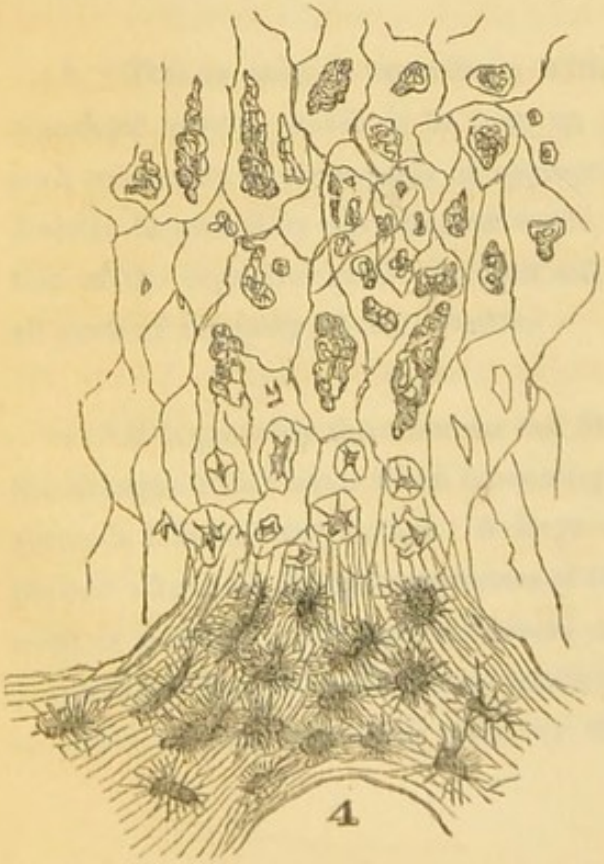
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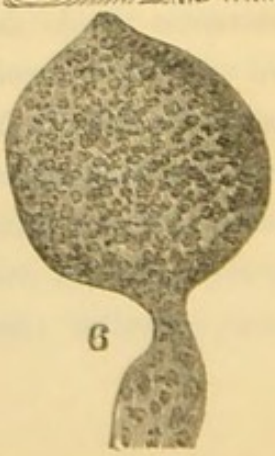
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6. A.

ENCHONDROMA OF THE TESTICLE,

Being an Abstract from the Transactions of the Pathological Society, London; vol. 4, 1852-3.

ENCHONDROMA, an abnormal structure, having the characteristics of cartilage, received its name from Müller, who was the first to notice the peculiar change. Within a few years this disease has been shown to occur not unfrequently in the substance of the testicle; the non-malignancy of which, from the many cases recorded having been successfully extirpated by the knife, must be admitted. This departure from the normal state in the testicle has been so often confounded with cancerous and malignant growths, that the true character of the change demands the special attention of the surgeon. Since my contribution to the Transactions of the Pathological Society, vol. 4, the subject has received some additional elucidation from the several very interesting cases that have been published. Another case has also lately fallen under my own observation, which terminated as successfully as the one I then narrated, the patient remaining, up to this time, in the full enjoyment of health.

W. W. a gentleman-farmer, aged thirty, in February, 1851, in leaping a fence, whilst out riding, was thrown forwards on to the pommel of the saddle, and received a smart blow upon the left testicle, causing much pain, and subsequently slight swelling. The pain lasted for a week or more, but was not sufficiently severe to induce him to call in his medical attendant; although it prevented him from again attempting to ride until the May following. At this time, when the testicle was struck or touched incautiously, he experienced piercing lancinating pain; and, upon careful examination, found that it had become hard at its inferior portion, and was also slightly enlarged.

This continued until the 10th of October, when, without apparent cause, the pain increased, and extended to the bottom of the spine; this went on for a few days, then gradually subsided up to the 28th, when he had again considerable accession of pain whilst in bed; this lasted for upwards of two hours. On the 29th, he was compelled to go a few miles from his own residence; he set off early, comparatively comfortable, but at noon was seized with severe pain in the lumbar region, which extended to the abdomen; the testicles became a little swollen, red, and painful, and the urine could not be voided; he applied to a druggist in the town, who considered it to be merely an attack of colic, and prescribed accordingly. He obtained sufficient relief to enable him to reach home; and during the night he voided a large quantity of urine.

The next day (30th of October) he was too unwell to leave his bed, the testicle continuing very painful, had swollen to twice its natural size, the pain extending up the spine. He then thought it necessary to consult his surgeon, Mr. Belcher, of Burton, who prescribed leeches and lotions to the testicles, with internal medicines. At the end of the week, the size of the testicle remained

the same, although the pain and inflammatory action had considerably abated; the lotion with iodine ointment was continued; and, at the end of another week, he was able to leave his bed, the swelling of the testicle having considerably diminished. The ointment alone was continued, and the testicle was in the same condition at the end of a month; but after this it very gradually increased in size up to July, 1852.

The great inconvenience now experienced, with symptoms of declining health, induced him to come to London. At this time the testicle was considerably distended, its surface smooth, and the vessels of the scrotum enlarged and tortuous; when squeezed, it gave but little pain, was elastic to the touch, and very heavy. Upon the introduction of an exploring trochar, a few drops of blood only followed the withdrawal of the instrument. The cord appeared healthy; no enlargement of the pelvic glands could be detected; and when the testicle was well supported, the dragging pain in the loins was relieved. Mr. Hancock saw him and advised its early removal, to which the patient assented, and the usual operation was performed by Mr. Hancock, under the influence of chloroform, on the 11th of July. He recovered without a bad symptom, and was able to leave London at the end of the same month.

After its removal, the mass was placed in the scales and found to weigh four pounds six ounces; on section, the disease affecting it was seen to be of the enchondromatous and cystic kind, the former being made up of nodules of fibro-cartilage; whilst many of the cysts were filled with coagulated blood, in others, flocculi, apparently fibrinous in character, were seen; whilst, of the remaining, the contents were, for the most part, of a light straw-coloured viscid fluid.

The knife cut through the cartilaginous parts firmly and

smoothly; the cut surfaces presenting a number of translucent, greyish, compact, lobulated masses, surrounded by fibrous and cellular tissue.

Fine sections taken from various parts of this cartilaginous mass, and examined under a power of 250 diameters, present a series of circular, ovoid, and elongated cells, varying in size from the $\frac{1}{400}$th to the $\frac{1}{1200}$th of an inch, enclosing within a delicate membranous cell-wall from two to eight or ten nuclei, with a few fat-globules; these nuclei varying in size from $\frac{1}{3300}$th to $\frac{1}{4300}$th of an inch, the cells being more closely aggregated and irregular than in healthy cartilage. (See plate 2, fig. 1.) Ether rapidly removed the fat-globules, causing the nuclei to run closer together, and the hyaline structure of the cell-wall became more apparent, as in fig. 2: gradually the spheroidal character of the cell became elongated, in its transition, from the nucleus of a cartilage-cell to the lacunæ of bone; as represented in figs. 3 and 4. Towards the outer portions of the tumour, cells and nodules were smaller, and arranged closer together, with interlacements of fibrous tissue, which is better seen in fig. 2. The edges of some of the cells being broken up, the contents escaped, and became distributed around, proving the existence of walls independent of the matrix-cell. A few crystals of cholesterin were also distributed throughout the cell contents.

In the central portions of some of the enchondromatous masses, were seen irregular groups of shrivelled nuclei, with only slight traces of cell walls, undergoing a process of gradual separation from each other, with here and there a patch approaching to a crystallizable form.

The tubuli seminiferi were almost wholly obliterated, and much of the tissue pushed to the upper and outer margin of the tumour: on making a careful examination of what remained, tubuli were seen in all stages of alteration, some being slightly, others greatly dilated,

as seen at fig. 7. Masses of cartilage partaking of the shape of the dilated tubes, as at fig. 8, could be readily discovered and separated from other masses of tubuli; so that it would appear that all the nodules of cartilage found in the tumour were originally developed in the tubuli seminiferi; and that, with the usual rapidity of cell-growth, we have cells dividing and multiplying, which may soon convert the whole of the substance of the testis into an abnormal fibro-cartilaginous tumour.

Mr. Paget having examined enchondromatous tumours taken from various situations in the body, with the exception of those found in the testicle, says: "As in all general appearance, the material of these tumours, in its usual and most normal conditions, is identical with fœtal cartilage, so is it, I believe, in its development, as Müller has shown, in its chemical characters. The diversity of miscroscopic form is enough to baffle any attempt to describe them briefly, or to associate them with any corresponding external characters in the tumours. The most diverse forms may even be seen side by side in the field of the microscope. But this diversity is important. It has its parallel, so far as I know, in no other innocent tumour; and the cartilaginous tumours form, perhaps, the single exception to a very generally true rule enunciated by Bruch; namely, that it is a characteristic of the cancerous tumours, and a distinction between them and others, that they present, even in one part, a multiformity of elementary shapes."

Professor Quekett, has observed, "that where we have these tumours developed near a bony structure, the mass may become turned into bone; but that he has never known this change to take place in any other situation." Mr. Canton, on the contrary, lately removed an enchondromatous tumour from the mamma of a bitch, which exhibited this transition to the true bone, precisely as represented at the lower portion of fig. 4; the position of the growth is

most remarkable, and its character proves that a change does truly take place in the lower animals, which the higher or more refined organism of man may be capable of resisting, or arresting at a certain stage of growth*.

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* "The last-named nuclei, with irregular outlines, deserve a more particular description; both because they are, so far as I know, found in no normal cartilage in any of the vertebrata; and because their imitating, in some measure, the forms of bone-corpuscles might wrongly suggest that they have a constant relation to the ossifying process.

"They were first described by Müller, and since by Professor Quekett, and many others. The phases of transformation by which they are produced appear to be, that a nucleus of ordinary form, or with one or more oil-particles, enlarges and extends itself in one or several slender, hollow, and crooked processes, which diverge, and sometimes branch as they diverge towards the circumference of the cell. Such nuclei may be found within the cells, or within cavities representing cells, whose walls are fused with the intercellular substance; but much more commonly it appears as if, while the nuclei changed their forms, the cells and the rest of their contents were completely fused with the intercellular or basis-substance, so that the nuclei alone appear imbedded in the hyaline or pale fibrous substance. The nuclei thus enlarged may appear like cells, and their nucleoli may be like nuclei. But although, at first, as we may suppose, the nuclei, as they send out their processes, may enlarge and retain the round or oval form of their central parts or bodies, yet they afterwards lengthen and attenuate themselves, so as to imitate very closely the shapes of large bone-corpuscles or lacunæ; or they elongate and branch, or shrivel up, lying in groups. Now, corpuscles like these exist permanently in no normal cartilage yet examined, in man or any of the vertebrata. The only natural cartilage yet known as possessing these corpuscles is, I believe, that of the cuttle-fish (Quekett, in Hist. Catal. of Coll. of Surg. Pl. vi, Fig. 7). If, then, heterology of structure were indicative of malignancy, the tumours that contain these corpuscles should be malignant; but there are no facts to make it probable that they are so, and every presumption is in favour of their being innocent."—*Paget's Surgical Pathology*, p. 179.

Rokitansky, "Pathological Anatomy," p. 253, says: "the formation of cysts in the testicle is very unusual, a fact of special interest from the frequency of their occurrence in the ovaries. Enchondroma is equally rare; with an anomalous osseous substance sometimes developed in the indurated testicle, assuming the shape of round, tuberculated, or tendiniform concretions." In this country, tumours of this character have been removed from various situations, and of considerable size. Sir Astley Cooper removed several—one preserved in St. Thomas's Museum, the testicle and tumour, weighs now nearly five pounds.

Mr. Warner, of Guy's, "found his knife resisted by a tumour of this kind." The patient recovered.

Mr. Tyrrell removed a testicle; the enchondromatous mass was of the size of a large orange; the patient recovered.

Mr. Curling, at p. 539 of his book, "On Diseases of the Testicle," describes a large "fibrous tumour removed from a patient aged seventy-three; it was of twenty years' duration, and from twelve to fifteen times the ordinary size; it was filled with small tumours, of stony hardness, with fibrous tissue, the *secreting structure having wholly disappeared; causing a total obliteration of the seminiferous ducts.*" The man recovered, and lived several years afterwards.

Sir Benjamin Brodie removed a testicle "that had undergone this conversion." The patient recovered.

M. Marjolin excised a testicle that was more than twice the natural size, and very heavy; it was found to be of a fibro-cartilaginous nature.

Mr. Liston's case, specimen No. 2390 Hunterian Museum, the patient recovered, there was no return of the disease.

Mr. John Adams, of the London Hospital, removed an enchondromatous testicle from a patient of his, who recovered.

A Preparation in the Pathological Series of the Hunterian Museum, presented by Mr. Ferguson, described by Professor Quekett as a cartilaginous tumour of the testicle; in greater part composed of true, more or less oval cartilage cells, embedded in a structureless matrix, with a central small mass of bone. The cells of the cartilagious portion are of small size, and in the neighbourhood of the bone are very closely aggregated together; still nearer the bone, both the walls and the nuclei are opaque from the deposit of ossific matter. This process appears not to be confined to the cells exclusively, but to take place in the intercellular substance also, as in several places an osseous ring may be observed inclosing a cartilage cell. Although the bony matter is of considerable thickness in parts, it exhibits no trace of bone-cells. A section of this specimen is given, Plate vii, "Histological Catalogue," fig. 12; others of much interest, at p. 164, "Professor Quekett's Lectures on Histology."

Sir Astley Cooper observes that "these deposits show the great propensity there is in serous and fibro-serous membranes to form cartilage and earthy matter; and how much the results of chronic inflammation may vary: under one action, a serous effusion; under a second, great thickening; under a third, cartilaginous substance; and under a fourth, earthy matter is the result."

Nevertheless, many erroneous descriptions of such morbid structures as those I have been describing have been handed down to us by the older anatomists. Consequently we find most of the specimens in the College, and other museums, of this peculiar form of disease, have been so imperfectly described as to cause them to be wrongly classed, or arranged. Take Nos. 2384 and 5 as illustrations of this; and No. 2386, described as "*a scirrhous tumour*," is one of fibro-cartilage or enchondroma. No. 2329 A, described as "*two large portions of bone-like substance, imbedded in a tumour exactly like that of scirrhus of the breast;*" this is not true bone,

but an ossific deposit in the central part of enchondromatous masses.

Sir Astley Cooper, in his book on "Diseases of the Testis," gives the drawing of a tumour described as "very hard; in some parts cartilaginous, in others ossific;" 100 parts of this, carefully divested of membrane and dried, were given to Mr. Barry for chemical analysis, and he stated them to be made up of:

Phosphate of Lime.....	45 parts.
Carbonate of Lime, with a trace of Magnesia..	17 ,,
Animal Matter.....	48 ,,
	100

This is, indeed, a close approximation to the chemical composition of true bone. Plate 10, fig. 2, in the same book, is described as a drawing from a "Scirrhous Tumour of the Testis," the specimen is in the Museum of St. Thomas's Hospital, and Mr. Wm. Adams says, this is a well-marked and beautiful specimen of enchondroma. Fig. 5 is a drawing made from a section of the tumour.

A preparation in Guy's Hospital Museum is stated "to show numerous cysts, studded with spiculæ and earthy matter, thrown out in patches of different sizes." This is a tumour with cysts and nodules of enchondroma.

No. 2387 (College Museum) is described by Hunter as "*fibrous*," containing numerous masses of *fibro-cartilage*. "In this," he says, "may be seen the *tubular substance of the testicle, apparently healthy, spread out in a layer from one to two lines in thickness, over the upper part of the tumour*."

Mr. Curling, in the article TESTIS, "Cyclopædia of Anatomy," says that "the origin of these cysts cannot be satisfactorily made out. It has been supposed that they are formed of dilated and obstructed seminiferous tubes; but as in certain cases the tubular

structure exists in the form of a *layer spread out over the morbid mass*, it is clear that the disease could not have originated in this way; and this morbid change is evidently quite distinct from the little cysts so commonly developed in the head of the epididymis."

Mr. Wm. Adams also maintains that all the specimens in the Museum of St. Thomas's "show this; as well as that cystic and enchondromatous disease nearly always exist together; and in some the tubular structure appears to coexist in a healthy condition." Professor Quekett, on the contrary, demonstrated, in his lectures, Session 1853, from a specimen removed and brought to him by Mr. Curling, that these cysts and masses were developed *in the tubuli*, as shown by me in fig. 8.

Mr. Curling has lately corrected his earlier formed opinion. After relating the history of a case operated upon with perfect success, in December 1852, he observes: "it is clear, from recent observation, that enchondroma is originally formed within the tubes and their cystic dilatation." Mr. Curling also fully believes in the non-malignancy of these cystic tumours, which, as he states, "is a point of considerable practical importance; for it enables the surgeon, after a minute inspection of a cystic tumour of the testicle, which has been removed by operation, to assure his patient of his permanent recovery, and immunity from all risk of a relapse.

From the various other cases that have fallen under his observation, he has been enabled to arrive at the following conclusions:

1. "That Cystic disease of the testicle occurs in two forms, an innocent and a malignant.
2. "Both forms are the result of morbid changes in the ducts of the rete testis, this part of the gland being the sole seat of the disease.
3. "The innocent form of the Cystic disease is characterized by

the presence of tessalated epithelium in the cysts; represented at fig. 6, from Mr. Curling's drawing.

4. "The malignant form is characterized by the presence of nucleated cancer cells in the cysts.

5. "Enchondroma occurs in both forms of the Cystic disease, and almost constantly in old cases of the innocent, the cartilage being developed within dilated tubes."

A most interesting case of cystic with enchondromatous disease, was lately operated upon by Mr. Henry Thompson; it is published in the Pathological Transactions for the present year, 1855. This case presents many features of peculiar interest, not the least noticeable of which is, "that of combined illustrations of three different structural manifestations of diseased action: cholesteatoma, enchondroma, and encephaloma with cysts. The combination of cholesteatoma with enchondroma and the cystic disease, has been noticed by Mr. Curling, in the case I have above referred to. The cholesteatomatous cysts were few in number, and not separated from the chief mass of disease, as in Mr. Thompson's case*.

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* Upon making a minute examination of the tumour—"The loose, red, areolar looking tissue investing the upper and smaller part of the diseased mass consisted mainly of seminal tubules, associated with areolar tissue and blood vessels. The tubules were dilated at short intervals, and filled with accumulated and charged cells. The cysts in this part of the mass were partially embedded, and varied in size from one quarter to one inch and a quarter in diameter. The wall of each cyst consisted of dense connective tissue, highly vascular on its surface, and coated on its inner with several layers of epithelial cells, which were flattened and laminar. The contents of the cysts varied: some contained a colourless fluid, with a few round and flattened nucleated cells in it. Others contained a yellowish, glairy fluid, which exhibited nest cells like those of epithelial cancer; large

"This examination also renders it probable that what are termed cholesteatomatous are but simple epithelial growths, and that the additional elements present are but the inevitable results of retrogressive metamorphoses or altered development.

"Mr. Thompson's case further illustrates the relations of cysts to growth; of simple epithelial growth to epithelial cancer; of epithelial cancer to encephaloid cancer; and of the interchange of characteristic elements which sometimes occur in both."

Doubtless, by neglect or constitutional tendency, these cases are likely to proceed on to a malignant form, and in time become destructive to life; whereas, by the early use of the knife, the disease may be arrested and exterminated in its milder and safer stage.

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granular cells, about $\frac{1}{800}$th of an inch in diameter, not dissolving in ether, spherical nucleated cells, flattened scales, structureless vesicles, molecular granular matter, and tables of cholesterin in laminæ."—*From Mr. Curling and Dr. Clark's "Report on the Microscopical Characters of this Specimen."—Path. Soc. Trans.* vol. vi.

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