A CONTRIBUTION
TO THE
NON-GLANDULAR THEORY OF ORIGIN
OF
MOLLUSCUM CONTAGIOSUM.

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OF late years there has been a difference of opinion, chiefly amongst foreign observers, as to the nature of the pathology of molluscum contagiosum. By some the process is looked upon as simply a hyperplasia of the sebaceous glands, together with certain degenerative changes taking place in the cells composing them. This is the old view. It has stood its ground in this country since the days of Bateman, whose name was first associated with the disease, and continues to receive almost universal assent. Some Continental observers have, however, maintained that molluscum contagiosum has nothing to do with the sebaceous glands, being in fact an overgrowth from the Malpighian layer. An attempt will be made to support this latter view; moreover, it will be shown that the degenerative changes peculiar to molluscum contagiosum

are closely connected with the superficial layers of the epidermis.

Perhaps it may be as well in this place to give a brief *résumé* of the writings of some of the observers whose names are associated with the non-glandular theory of the disease. References to their articles will be found appended to this paper.

Virchow, writing in 1865, says:—"If a section of one of these tumours be made (molluscum tumour) an appearance as of a lobulated gland is seen. Two distinct parts may be recognised: one soft, occupying the interior, which may be pressed out, the other firmer, following the walls of the cavity; it is the Malpighian layer greatly developed. The soft substance is composed of epithelial cells, polygonal, and mostly without nuclei, having depressions, in which one or more peculiar bodies (molluscum bodies) are lodged. Nowhere can be seen the fatty granules and oily globules which are seen in sebaceous glands. These (molluscum) bodies have the greatest resemblance to swollen starch granules, but no characteristic reaction can be obtained with iodine and sulphuric acid. They are due to a peculiar degeneration of the epithelial cells." This author considers molluscum contagiosum to begin in the hair-follicles, the folded gland-like appearance being due to a hyperplasia of its epidermal lining. He suggests the name of epithelioma molluscum.

Boeck, writing in 1875, says, concerning the molluscum bodies found in molluscum contagiosum, that "they are epidermal cells which have undergone a peculiar degeneration. This consists in an alteration in the protoplasm of the cell, which appears always to begin round the nucleus. In a vertical section through the lower part of a molluscum at first, several layers of normal rete cells are met with, and these gradually give place to other cells, in which the nucleus has a peculiar shining margin, generally quite distinct from the nucleus itself; this margin increases in width in other cells, until at last the new material fills the whole cell, which becomes larger than before, and of

a more regularly oval shape. These oval cells when aggregated together in vast numbers form the body of a molluscum wart, and have been falsely regarded as of the same nature as those of a sebaceous gland. They contain no trace of fat, nor do they give the reaction of amyloid degeneration with iodine and sulphuric acid."

Lastly, Lukomsky (1875) "was not able to find out the nature of the molluscum bodies by treating them with various reagents. He considers the disease to be one of the Malpighian layer, and not of the sebaceous gland, the Malpighian projections grow rapidly, the peripheral portion being lined with cylindrical epithelium; on these follow two or three layers of the mucous cells. In the centre of the projections appear large granular cells, which as they advance upwards pass into molluscum bodies. The molluscum bodies come from cells which lie in the mucous layer, but they arise from wandering cells, which are always to be found in this situation."

Although some confusion existed formerly between the two varieties of molluscum, namely, "molluscum simplex," or "fibrosum," and "molluscum contagiosum," yet the strongly marked, and now more widely known, characteristics of the latter affection have caused it to be easily recognised, even in countries where it is of comparatively rare occurrence. Error in diagnosis, therefore, can hardly be taken into consideration in accounting for the discrepancy of opinion.

As is well known, the little tumours of molluscum contagiosum vary in size from that of a minute papillary elevation, scarcely recognisable above the surface, to that of a pea or small marble; for the most part they are of the same colour as the surrounding skin, and in delicate anæmic subjects present a sodden, greasy appearance.

Before they attain the size of millet seeds a central depression or "umbilication" is seen; this is, in reality, a widened natural orifice of the skin, probably indicating the original point of departure of the morbid process.

Whilst the tumours are small and only slightly elevated

above the surface, the central depression or umbilication confers on them an appearance which has been likened to that of a small pearl shirt-button. As they become larger, they overhang their narrow bases, and may be said to be pedunculated, although they rarely if ever become pendulous. In this stage the umbilication often presents more the appearance of a comedo orifice. There is a marked tendency for neighbouring lesions to become confluent, and thus some tumours present a lobate appearance, with two or more comedo-like depressions, according to circumstances. On pressure, there exudes from the "umbilication" a thick, pultaceous, or thinner gruel-like, matter; sometimes a milky fluid is discharged in a jet. If the pressure be continued, and especially if the umbilication or comedo-like orifice be enlarged with the point of a lancet, there enucleates a firm, pinkish-white mass, which, to the naked eye even, appears finely lobulated and gland-like. The shrivelled capsule is left behind, oozing some drops of dark venous blood.

Through the kindness of Dr. Stephen Mackenzie, material from a child with molluscum contagiosum, attending the out-patient department at the London Hospital, was procured. Some of the smallest papillary elevations were selected; these were snipped off with curved scissors, together with some of the neighbouring skin; larger tumours were also taken. The material was hardened in methylated alcohol, and stained with logwood in the usual manner.

Fig. 1 represents a vertical section through a molluscum tumour the size of a large pin's head; the new growth is seen partly spread out beneath the epidermis, and continuous with it in places, as at *i*, partly in isolated patches (*d*). Those portions of the growth which have undergone molluscous change (molluscum bodies) are at once recognisable by the deep blue staining. The section has traversed the central depression or umbilication, hence the ease with which the continuity of the new growth with the epidermis is demonstrable. The lobular

appearance, which has gone far to suggest the gland origin of the disease, is especially well seen at *d*, where outlying expansions from the growth have been divided transversely, and appear as it were cut off. Commencing molluscous change (molluscum bodies) are seen here and there (*f*).

It is convenient in this place to allude to a few facts as to the structure of the epidermis. The latter, as is well known, is divided into four layers. The deepest layer is the Malpighian layer proper, one of its chief peculiarities being the elongated vertical cells (palisade cells) which are placed next the papillæ. As the cells of this layer become flattened towards the surface they pass into the "granular layer;" this, in the normal condition, has a thickness of two or three cells, which, on section, appear diamond-shaped or spindle-like, with granular contents and clear nuclei. Above the granular layer is the "stratum lucidum" (not demonstrable in these specimens), and above this the corneous layer. The granular layer can be traced into the mouths of the hair-follicles but no farther; it is not represented in the sebaceous gland or its duct.

Fig. 2 represents a vertical section through a small papillary molluscum, but more highly magnified than that shown at Fig. 1. The section does not involve the central depression or umbilication, consequently no communication of the molluscum growth with the surface is seen, nor is the continuity of the growth with the Malpighian layer directly traceable. At the periphery of the lobular mass are seen the elongated and vertically-placed cells, corresponding to the palisade cells of the normal rete. At *e* the molluscum bodies are seen, round or oval-shaped, vitreous looking, and lying in a granular meshwork, which in places (*f*) becomes merged into groups of diamond-shaped, granular cells, bringing to mind those of the granular layer of the epidermis. The granular reticulum ceases somewhat abruptly, and the more superficial molluscum bodies become more transparent and closely

packed. At *h* is seen a trabecular, apparently fibrous structure, splitting into processes, which become continuous with divisions between the molluscum bodies.

Fig. 3 represents the two ingrowths from the Malpighian layer seen at *g* in Fig. 1, but more highly magnified. The hypertrophied layer of granular cells is at once noticeable at *c*; it is seen to dip down and becomes continuous with the granular reticulum between the molluscum bodies. The hypertrophied corneous layer is more intimately connected with the superficial molluscum bodies.

Fig. 4 shows a vertical section through a minute molluscum growth, together with some of the adjacent skin. Three layers of the epidermis are easily recognised on the right, namely (*c*), the Malpighian layer (*b*) the granular layer, and (*a*) the corneous layer. The Malpighian layer becomes identified with the more peripheral portion of the molluscum growth, the palisade cells being seen in uninterrupted continuity. The granular layer becomes merged into that part which has undergone the peculiar molluscos change (molluscum bodies), and is especially associated with the granular reticulum, while the corneous layer, becoming gradually hypertrophied, expands into the more superficial molluscum bodies, which, as in all specimens, are seen to bear a different character to those lower down. A fibrous structure (*g*), similar to that at *h*, in Fig. 2, is seen; also a definite layer of the same nature (*h*), but continuous with the corneous layer, intervenes between the granular cells and the molluscum bodies.

Fig. 5 represents part of a lobule, highly magnified to show the nature and mode of formation of the molluscum bodies. The peripheral cells are elongated, and placed vertically to the surface; next follow crowded cells with large oval nuclei; then there appear oval or ovoid bodies considerably larger than the cells amongst which they lie; these are the "molluscum bodies." At first they are made up, more or less, of coarse granules and a refractile substance; but soon they appear hyaline or vitreous, as

at *c*. They are seen to lie in a granular matrix (*d*), which, under a low power, puts on the character of the granular reticulum before alluded to.

The appearances as detailed above apply to specimens mounted in glycerine. They differ somewhat in those prepared with Canada balsam; for instance, the nuclei of the cells situated towards the periphery of the lobules become possessed of a bright border, occupying part of the circumference, due to commencing vacuolation. Perfect vacuoles, with the dark and shrunken nucleus pushed aside, are also to be recognised. It is probable that the dark spots seen in the molluscum bodies, as at *c*, in Fig. 5, represent these shrunken nuclei; a similar appearance is figured by Bizzozero and Manfredi. On examining the superficial molluscum bodies with a high power they are seen to be transparent and almost structureless; there are no granules traceable between them, and in fact they are separated merely by the single or double contour of their opposed surfaces.

If the granular cells be examined with a high power in situations such as at *f*, in Fig. 2, where they may be supposed to be undergoing molluscous change, the latter seems to consist, primarily, in an enlargement of the nucleus, the contents of which subsequently become modified to form the molluscum body, while the granular matter occupying the remainder of the cell is pushed aside to form the matrix or reticulum.

It would seem, then, that molluscum contagiosum is a disease of the epidermis. As may be seen in Fig. 4, all three layers take part in the changes, but it is difficult to determine which is primarily at fault. Probably the hyperplasia of the rete is reactive, following the molluscum changes in the more superficial layers; of these, the granular layer is associated with the more deeply placed molluscum bodies, the granular reticulum betraying their genetic connection. (In Fig. 5, accompanying Lukomsky's article, the deeper molluscum bodies are seen lying in a granular matrix.) The more

superficial molluscum bodies, different in character, may be directly descended from those more deeply placed, but it may be conjectured that the corneous layer is concerned in their production. This theory is supported by the appearances seen in Figs. 2 and 4. The trabecular masses have the same fibrous character as the corneous layer of the epidermis, a peculiarity conferred by the sectional view of flattened cells; moreover, the layer (*h*) in Fig. 4 is in direct continuity with the corneous layer. It seems probable, then, that these are masses of unaltered cells, bearing the same relation to the surrounding molluscum bodies as the groups of granular cells (*f*, Fig. 2) bear to those more deeply placed. The hypertrophy of the corneous layer as the molluscum growth is reached is another fact in this direction (Fig. 3).

If it be conceded that the molluscum changes essentially belong to the granular and corneous layers, the sebaceous-gland theory at once falls to the ground, for, as before mentioned, the granular layer does not extend to the sebaceous gland. As a proof that the peripheral cells of the lobular masses are descended from the rete Malpighii there is the fact that with a high magnifying power the prickly cells of Max Schultz may be recognised. Now these have been described as occurring in the external root-sheath of the hair-follicles, as well as in the rete, but not in the sebaceous gland (Fig. 6). Bizzozero and Manfredi figure minute striations between the peripheral cells of the molluscum lobules.

Lastly, may be mentioned a negative fact against the gland-theory of the disease. The normal appearance of a sebaceous-gland cell is very characteristic. The large nucleus occupies the centre of the cell, while the remainder has a peculiar reticular appearance. In the specimens examined no such reticular cells were traceable in any relation with the molluscum bodies, such as would suggest their pathological connection.

What the peculiar degenerative change may be, giving rise to the formation of the molluscum bodies, it is not

the purport of this paper to discuss ; it seems, however, that it first affects the nucleus of the cell, causing it to enlarge and push aside the remaining protoplasm of the cell. This description applies especially to the way in which the deep molluscum bodies are formed from the granular cells. Boeck and others have shown the changes not to be of a fatty or amyloid nature.

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DESCRIPTION OF PLATES III AND IV.

Origin of *Molluscum Contagiosum* (ALFRED SANGSTER, M.B.).

PLATE III.

FIG. 1.—Vertical section through a small molluscum tumour.

- a.* Superficial layers of epidermis.
- b.* Malpighian layer.
- c.* Lobular new growth from rete cut longitudinally.
- d.* Lobular new growth cut transversely.
- e.* Molluscous change (molluscum bodies).
- f.* Commencing molluscous change.
- g.* Ingrowths from rete, magnified in Fig. 3.
- h.* Fibrous tissue of corium.
- i.* Junction of Malpighian layer with new growth.

FIG. 2.—Vertical section through a minute papillary molluscum.
(Hart., oc. 3, obj. 4, tube out.)

- a.* Superficial layers of epidermis.
- b.* Malpighian layer.
- c.* Lobular expansion of molluscum growth.
- d.* Peripheral cells elongated and vertically placed.
- e.* Deep molluscum bodies enclosed in granular reticulum.
- f.* Groups of unchanged granular cells.
- g.* Superficial molluscum bodies.
- h.* Trabecular masses (?), unchanged corneous cells.
- i.* Fibrous tissue.

FIG. 3.—The ingrowths from rete, Fig. 1, *g.* (Hart., oc. 3, obj. 4, tube out.)

- a.* Hypertrophied and irregular corneous layer.
- b.* Malpighian layer continuous with peripheral portion of ingrowth.
- c.* Granular layer dipping down to become continuous with *d.*
- d.* Granular matrix or reticulum.
- e.* Superficial molluscum bodies associated with corneous layer.
- f.* Commencing molluscum change.
- g.* Fibrous tissue of corium.

PLATE IV.

FIG. 4.—Vertical section through a minute molluscum-growth, probably a widened and altered hair-follicle. (Hart., oc. 2, obj. 4.)

- a.* Corneous layer of epidermis.
- b.* Granular layer.
- c.* Malpighian layer.
- d.* Peripheral cells of molluscum growth continuous with rete.
- e.* Molluscum bodies, with granular reticulum continuous with granular layer.
- f.* Superficial molluscum bodies.
- g.* Trabecular masses (?), unchanged corneous cells.
- h.* Fibrous layer, continuous with corneous layer, intervening between granular cells and molluscum bodies.

FIG. 5.—Part of a molluscum lobule. (Hart., oc. 3, obj. 8.)

- a.* Vertical peripheral cells.
- b.* Molluscum bodies in early stages of formation.
- c.* Fully formed molluscum bodies.
- d.* Granular matrix (reticulum).
- e.* Fibrous septa between lobules.

FIG. 6.—Part of molluscum lobule, highly magnified, showing molluscum bodies lying amongst prickly cells; somewhat diagrammatic. (Hart., oc. 3, obj. F. Zeiss.)