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LOUIS A. DUHRING, M. D.,

CLINICAL PROFESSOR OF DISEASES OF THE SKIN IN THE UNIVERSITY OF PENNSYLVANIA.

WITH MICROSCOPIC EXAMINATION

BY HENRY WILE, M. D.

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A CASE OF AINHUM.

By LOUIS A. DUHRING, M.D.,
Clinical Professor of Diseases of the Skin in the University of Pennsylvania.[1]

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The notes of the following case of ainhum, together with the specimen, have been sent to me by Dr. George B. Simpson, of Weston, West Virginia, by whose courtesy I am enabled to present this report.

The patient is a negro, forty years of age. When about ten years old he noticed a furrow in the digito-plantar fold of the little toe, upon both feet, which gradually began to increase with considerable constant pain. The toes gradually enlarged, and, in the language of the patient, "the skin seemed to deaden on the outside, but down in the creases was very tender and painful." Dr. Simpson first saw the case ten years ago, at which date one toe seemed nearly amputated, and could have been easily cut off with a knife without loss of much blood and without pain. Time finally amputated one toe about two years ago. This specimen Dr. Simpson was unable to obtain, as the patient was superstitious and insisted upon burying the member. The other toe dropped off a few months ago, and was at once placed in alcohol and prepared for microscopic examination.

In addition to the above history, Dr. Simpson learned the following interesting facts: That the father of the patient lost both toes in the same way; one he cut off with a chisel. The mother, moreover, is at present suffering with the same disease, but has not as yet lost either toe. She desires to have them amputated, as she cannot wear shoes with comfort.

These statements are of interest as pointing to heredity as a cause, to which factor in the production of the disease Dr. H. Weber has already referred.[2]

[1] Read before the American Dermatological Association at its seventh annual meeting, August 29, 1883.

[2] Trans. Path. Soc. Lond., vol. xviii. p. 277.

I am indebted to my assistant, Dr. Henry Wile, for the following exhaustive study of the microscopic appearances of the specimen.

"Macroscopically, the specimen consists of the ungual phalanx of the right little toe. It is irregularly spheroidal, is about one inch in diameter, and on the dorsal surface is a well-developed nail. On the proximal end is the place of attachment, consisting of a round, one-quarter inch in diameter, somewhat uneven surface with a concentric appearance very much like the end of a coil of thick paper. The entire specimen is of a pale-whitish hue, extremely hard (it having been preserved in alcohol), though presenting a swollen, œdematous appearance.

Sections prepared for microscopical study were made perpendicular to the plane of the attachment; the same were stained with borax carmine, cleared up in turpentine, and mounted in Canada balsam.

Under low power (25) the horny layer of the epidermis is seen to be increased in thickness, compact, though easily separated into layers; slight separations in the form of irregularly-shaped linear empty spaces frequently being seen. Passing downward towards the rete, the epidermis assumes a marked scalloped form, which is indicated by a few layers of more deeply stained cells. This scalloped form or arrangement of the cells is occasionally continued through all the layers of the epidermis, appearing on the surface in the form of papillæ-like elevations and depressions.

The papillary layer of the epidermis is very deep, each papilla being elongated, slender, or spindle-formed, with pigmented borders. Some end in sharp points, others are more rounded, while the pigment is rather unevenly distributed, in some places being quite extensive, in others scanty or even wanting.

The papillæ of the corium are also elongated, and are much enlarged, being plainly visible to the naked eye. The enlargement is specially marked around the face where they present a swollen appearance. Their capillaries are greatly dilated, winding, and packed with corpuscular elements. The perivascular space is occupied by a deposit of small round cells, which, as we pass downward into the different layers of the corium, increase in extent, in some places being considerable, and extending in the meshes between the bundles of the surrounding connective tissue. The connective tissue and smooth muscular tissue, arranged in bundles of various thickness, cross and intervene so loosely as to leave larger and smaller empty spaces. This is more noticeable in the lower layers of the corium in the vicinity of the sweat glands; and near the small bloodvessels, especially the small veins and capillaries, the appearance is such as would indicate the presence, during life, of considerable exudation whose only residue consists of scattered, smaller and larger, collections of lymphoid cells, which occupy these spaces.

The bloodvessels are numerous, the arteries for the most part being contracted and full of corpuscles. The adventitia of the large arteries is noticeably increased in thickness, as are also the media and endothelial lining. The capillaries and small veins of the upper layers of the corium, and particularly those vessels forming plexuses about the sweat-glands, are all engorged with blood-corpuscles. The veins, especially the larger ones, are empty, while the lymphatics are greatly distended; and, the contents having been fluid containing little cellular matter, their lumen is empty. In some places the pouch-like dilatations are marked, and contain some cellular debris. Here and there in the upper layers of the corium parts of ducts of sweat-glands are met with whose walls and lining cells present

an atrophic appearance. The coils of sweat-glands are numerous, and, lying between the bundles of smooth muscular tissue in the lower layers of the corium, they have a small lumen, and present the same shrunken, contracted, atrophic condition as the ducts. Between the coils of these glands there is an extensive growth of areolar connective tissue containing fat cells and a varying amount, sometimes considerable, of lymphoid cellular infiltration.

The subcutaneous connective tissue contains a scant amount of fat.

With higher power (250) the appearances above described were confirmed, and the character of the changes in the tissue elements was brought out in clearer definition. The cells composing the horny layer of the epidermis are swollen, occasionally cloudy and granular, but for the most part present a peculiar hyaline appearance. They contain a nucleus which grows smaller as we ascend to the surface. The pigment in the rete Malpighii is confined to one layer of cells—that layer of cylindrical cells which is situated next to the papillæ of the corium—the pigment being more extensive around the lower part and the sides than on the top of the papillary layer of the rete.

The capillaries of the papillæ and upper layer of the corium are greatly dilated and full of white and red corpuscles. The immediate neighbourhood of these vessels is the seat of lymphoid cell infiltration, which is more extensive in some places than others. Occasionally this cell infiltration has gone on to organization, forming connective tissue which appears as a ring around the vessels.

Between the decussating fibres of the connective tissue are also seen here and there variously sized collections of small round cells which apparently have no connection with any bloodvessel. Around and among these clusters many spindle cells are seen, which is an indication that the process of organization and formation of new tissue is going on. Further proof of this fact is found in the presence of a considerable amount of young, embryonic connective tissue in the immediate vicinity of these small round exudation cells.

In lower layers of the corium the bloodvessels, dilated and full of red blood corpuscles, are often surrounded with numerous fat vesicles, which are also found in great abundance in and about the coils of sweat-glands.

The sweat-glands lying in large spaces between bundles of smooth muscular tissue are surrounded by a plexus of capillaries and venules, which are also in a state of intense congestion. There are, besides this, large round alveoli filled with lymphoid cells, between which the parts of coils of sweat-gland may be observed.

Approaching the place of attachment the epidermis is observed to grow thinner gradually, and finally end in a point. It does not slant down smoothly in a straight line; it descends with step-like processes. The papillary body also ends abruptly, and the space beyond is occupied by closely connected bundles of connective tissue, intermingled with several strands of yellow elastic tissue. At the end or place where there was connection with the pedicle the tissue has the appearance of having been cut square by a knife.

The observations made may be briefly enumerated as follows:—

1. Increase in thickness of epidermis.
2. Enlargement and elongation of papillary body.
3. Bloodvessels of papillary body, also perivascular spaces, dilated and filled with red and white corpuscles.

4. The meshes of the connective tissue of the corium contain larger and smaller clusters of small round cells, which for the most part immediately surround the bloodvessels. In some places the cells composing these cellular collections have gone on to organization-forming tissue.

5. The lower layers of the corium are composed of loosely arranged bundles of connective tissue and smooth muscular tissue, between the bundles of which are variously sized empty spaces.

6. Bloodvessels are everywhere numerous—arteries, capillaries, venules dilated and filled with blood-corpuscles.— *Veins for most part empty.*

7. In the walls of the larger arteries there is a noticeable thickening of the media and adventitia, and proliferation of endothelium.

8. Lymphatics distended, but mostly empty.

9. Sweat-glands numerous, but atrophic.

10. About the coils of sweat-glands are numerous fat vesicles and round alveoli filled with lymphoid cells.

11. The tissue attached to the pedicle composed of connective and yellow elastic tissue closely packed together.

12. The epidermis observed to descend with step-like processes to the place of attachment.

13. Altogether the general impression which all the foregoing observations would tend to make in connection with a careful study and comparison of sections, is one that would be conveyed by the study of a tissue, the seat of a chronic *inflammatory œdema.*

As far as a judgment, based upon a microscopic examination of one specimen may go, I am led to believe, that the entire process is due to a disturbance of the circulation. Furthermore, that the cause of such disturbance was intermittent in its action. Such causes have been assigned by Dr. Da Silva Lima,[1] in the form of "limited, or localized scleroderma," and by Drs. Heitzmann and Atkinson,[2] in the form of a thin ligature applied "with a purpose and persistence." Believing in the intermittent action of the cause, which is clearly indicated by the condition of the tissues, particularly the bloodvessels, I regard the latter as the most probable explanation. Supposing a ligature to have been applied, the superficial veins suffering first from compression, it prevented the return of blood, while the deep arteries being free, continued to supply blood to the part and pass into a state of congestion in which there was some exudation into the surrounding tissues. The ligature being removed, the compression was relieved, and larger veins becoming free conveyed blood away from the part. That the larger veins were free, is shown by the specimen in which their lumen is for the most part empty. A reapplication of the ligature caused a repetition of the process, each time giving rise to more cell exudation, which finally brings about a condition known as *inflammatory œdema.* In this condition we find spaces between the bundles of tissue occupied by an exudation containing a considerable amount of cells, in contradistinction to the condition of simple œdema, in which the exudation contains little or no morphological products. The *inflammatory œdema* increasing, causes a compression of the veins, which interferes with the return current, and keeps the part in a state of congestion. This in turn keeps up the inflammatory œdema which must sooner or later end in necrobiosis. The ligature, then, is in my opinion probably the cause of the *disease.* Of the points enumerated, the twelfth is the only one which sheds any direct light or furnishes any

[1] Archives of Dermat., Oct. 1880, p. 467. [2] Trans. Amer. Derm. Assoc., 1881.

tangible evidence in favor of such a mode of procedure. On one section 8 step-like formations were counted, on another, 7.

I wish to state, in conclusion, that only skin and subcutaneous tissue were examined,—not the bone."

Concerning the cause of the disease difference of opinion prevails. The view expressed by Dr. Wile, namely, that a ligature must be regarded as the cause, is that which has already been put forth by Drs. Heitzmann and Atkinson, in their communication to this Association, and is based solely upon microscopical study. On the other hand, such a cause is not even hinted at by such accurate clinical observers as Da Silva Lima. Now, however, that it has been suggested, it behooves clinicians to verify or disprove the assertion.

But few cases of the disease have been reported in our country. Its geographical distribution includes chiefly the West Coast of Africa, and certain countries in South America, more particularly Bahia, Rio de Janeiro, and Buenos Ayres. But cases have also been encountered in North Carolina, by Drs. Hornaday and Pitman,[1] while the case in the present report occurred as far north as West Virginia. As the disease becomes better known, it will, doubtless, be found that it is met with throughout our Southern States, though, probably, as one of the rarer diseases.

[1] North Carolina Medical Journal, Sept. 1881.

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