

POLLITZER (S)

PRICKLY HEAT

LICHEN TROPICUS, MILIARIA PAPU-
LOSA, M. RUBRA, ETC.

BY
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PRICKLY HEAT,

LICHEN TROPICUS, MILIARIA PAPULOSA, M. RUBRA, ETC.

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S. POLLITZER, A.M., M.D.

AN affection like prickly heat which causes only temporary inconvenience to its victims and, however annoying during its continuance, affects neither the general health nor leaves any permanent lesion in the skin, and which, moreover, disappears spontaneously, may well be looked upon as a minor ill, hardly worthy the attention of the physician. It is for this reason, perhaps, that the disease has been almost entirely neglected by dermatologists and that, as a matter of fact, its anatomy has never been studied.

Many authors follow Hebra in looking upon the affection as an eczema due directly to the irritation of sweat which is allowed to remain on the skin; others like Kaposi, as an eczema associated with sweating, not due to irritation but to exudation from overcharged papillary vessels; others again confound the disease with miliaria crystallina, a wholly different affection; while still others, assume the pathological process in prickly heat to be like that of miliaria crystallina,—without, however, basing their assumption on any examination under the microscope.

It seemed to me, therefore, desirable to put an end to this uncertainty and divergence of opinion. With this view I excised during last summer pieces of skin from eight cases of prickly heat. Two of the patients were infants, the others ranged from adolescence to old age. The specimens were taken from the back, the chest, or the abdomen, were fixed in a saturated aqueous solution of corrosive sublimate, hardened in alcohol, and embedded in celloidin or paraffin. In two of the cases serial sections were made. The results of the microscopic examination were on the whole so uniform that it is not necessary to enter into a description of each case.

In the cutis there were apparently no changes, except perhaps that the lumina of the coil glands appeared at times unusually wide. In the papillary layer the capillaries seemed well filled and often there was a slightly increased perivascular leucocyte infiltration. This was especially marked in the cases in which the disease had existed for a considerable time. The rete cells showed no changes, and though the inter-cellular



lymph-spaces appeared distended, there was a striking absence of emigrated white blood-corpuscles among the cells. Here and there in the rete there were large cyst-like spaces which proved to be sections of dilated sweat-ducts. These spaces

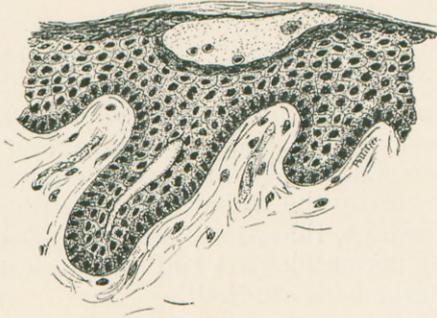


FIG. 1.

were oval or circular, and frequently several of them appeared arranged in an oblique line, one over the other throughout the whole thickness of the rete (Figs. 4 and 5); sometimes a single cyst occurred in the upper layers of the rete, while below it the section of a but slightly dilated sweat-duct appeared (Figs. 1 and 2).

The contents of these spaces was at times almost wholly fluid, containing a fine granular matter and very few epithelial and round cells (Fig. 1); at times the cellular elements were present in considerable numbers (Figs. 2 and 3); at times the entire

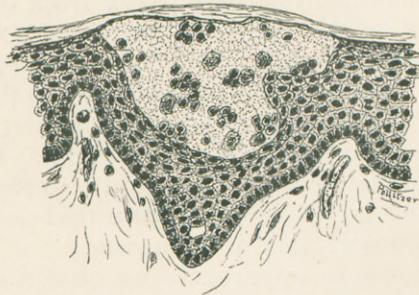


FIG. 2.

space was filled with closely packed epithelial and round cells and fragments of nuclei which stained intensely (Fig. 4). When the vesicle appeared in the upper region of the epidermis it was generally flattened into a long ellipse, and as a rule, though not

always, its floor was made of the cells of the str. granulosum. This location, just above the str. granulosum, seemed to be by far the most frequent when there was but a single vesicle, and in this situation its contents were generally clear. The arrange-

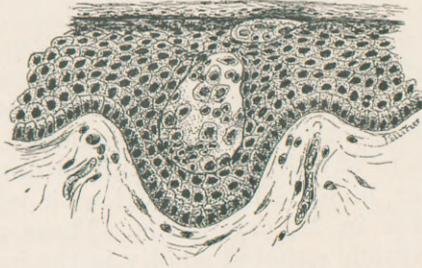


FIG. 3.

ment of these cyst-like spaces, when several of them occurred together, as in Fig. 4, or when a gland-duct appeared immediately below the vesicle, left no doubt as to what these spaces were. But where the entire thickness of the rete showed but a single vesicle it was necessary to make serial sections in order to demonstrate its connection with the sweat duct.

The stratum corneum was almost everywhere thickened, not, however, through increase in the number of cells, but on account of an enlargement of the individual cells. The cells, even in the

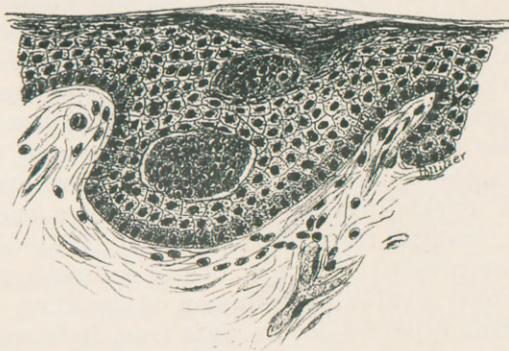


FIG. 4.

uppermost layers, frequently presented themselves not as thin lamellæ, but under the vesicular appearance of the horny layer of mucous membrane. The nuclei of the cells were preserved in many places (adding another point of resemblance to mucous

membrane) especially at or near the orifices of the sweat-ducts. The uppermost layers of the str. corneum were frequently lifted up by fluid constituting a vesicle usually with clear contents. These vesicles appeared also to be connected with the sweat-ducts; certainly a sweat-duct could often be seen in line with the vesicle.

En résumé, we have a horny layer swollen by imbibition, a rete malpighii slightly œdematus, and containing cystically dilated sweat-ducts, and a cutis unchanged except in the papillary layer, where the blood-vessels appeared gorged.

It is needless to say that this picture is not that of eczema, nor, on the other hand is it identical with what Haight and Robinson describe in *M. crystallina*. These authors found a perfectly clear vesicle situated wholly in the horny layer. The most striking change found in prickly heat is the cystic dilatation of the sweat-ducts. It is this change which constitutes the chief clinical feature—the minute discrete vesicles. As to the minute papules which are usually described as interspersed with the vesicles, I have not been able to satisfy myself of their clinical existence, and I have seen nothing like a histological papule anywhere in the specimens. A minute cyst deeply seated and filled with cellular elements may simulate clinically a papule; and certain regenerative products to be described later may produce a similar effect. It may be of interest to discuss the probable mode of origin of these cysts.

The cysts, it is evident, belong to the class of retention-cysts and there must be an occlusion of the duct somewhere externally to the cyst. This occlusion occurs evidently in the upper layers of the str. corneum, for the cysts develop at points below this layer and it is hardly likely, the cause being always the same, that the occlusion occurs now in one place now in another. Haight sought to explain the development of the vesicle in *M. crystallina* as resulting from a sudden flood of sweat which, rushing through the spirally twisted canal in the epidermis, compressed one turn of the spiral against another and so produced a valvular occlusion of the duct. Such a sudden out-pouring of sweat occurs, it is true, in fevers—the “critical sweat”—in which *M. crystallina* develops, but we cannot recognize any such factor in prickly heat in which there is more or less constant sweating. Moreover the explanation seems to me faulty, the flood of sweat would occlude the duct at its first spiral turn if at all, and in *M. crystallina* the vesicle is always located wholly in the horny layer. I should rather suggest a

mechanical occlusion by accumulation of epidermis during the fever at a time when there is cessation of the sweat function, and generally but little regard paid to cleansing the skin. *M. crystallina* occurs by far less commonly nowadays (since patients in fevers are bathed, sponged, etc.), than formerly when the skin was entirely neglected. Such an extensive eruption of vesicles as to lead physicians to regard the rash as the essential feature of the fever—*febris miliaris*—is practically unknown to-day.

It is evident that a profuse perspiration alone, with patent ducts, can no more explain the occurrence of retention cysts in prickly heat than in *M. crystallina*; some interference with the outflow is essential. The location of this obstruction must be sought in both cases in the horny layer. The nature of the obstruction in the case of prickly heat appears to me reasonably clear from the microscopic examination. I have described the cells of the horny layer as swollen and their nuclei preserved, the resemblance to mucous membrane being especially marked near the orifices of the sweat ducts. This condition is evidently due to imbibition with water, with sweat. An epidermis which is bathed in perspiration retained as it commonly is by wet underwear, cannot properly cornify; and in imbibing water the cells swell, and swell of course in all directions, laterally as well as vertically. The line of cells, therefore, expanding, may easily be pushed over the orifices of the ducts occluding them at a time when the secretion of sweat is momentarily in abeyance. The next flow of sweat through the ducts would be unable to escape and must naturally cause a dilatation of the duct at a point just below the obstruction. The secretion of sweat continuing the cystic dilatation must grow larger, and larger, and there will result such a condition as is shown in Figs. 3 and 4,—a funnel-shaped spiral canal.

It may be objected that many people who sweat profusely do not get prickly heat, and in those who suffer from the rash not all regions of the skin, not even all those regions which sweat freely, become affected. Perspiration is generally very profuse in the face where, except perhaps under the hat band, prickly heat never occurs. There is one respect in which the horny layer varies in different regions of the body and in different individuals which may serve to explain the predilection of prickly heat for certain regions and individuals, and that is in respect to its oiliness. Cells which are well impregnated with fat cannot imbibe water and therefore will not swell up and occlude the sweat duct when soaked in perspiration. That this

soaking in perspiration will not always cause the cells of the str. corneum to swell will explain why it will not always produce prickly heat. The negro in the tropics sweats profusely, yet does not acquire the rash; his skin is particularly well oiled. The Englishman in India, who takes his "couple of tubs a day," suffers frightfully from prickly heat, perhaps because his frequent use of soap and water reduces the fat in his horny layer to a minimum. No region of the skin is so well supplied with fat as the face; despite the profuse sweating prickly heat does not occur there. I am in doubt as to whether the rash that occurs under the hat band on the forehead is an eczema or prickly heat. Assuming it to be prickly heat, we can find in the very severe conditions of soaking to which the skin perspiring under a close-fitting impervious hat band an explanation of

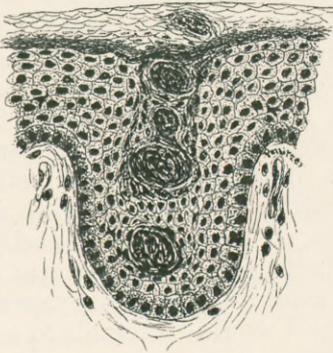


FIG. 5.

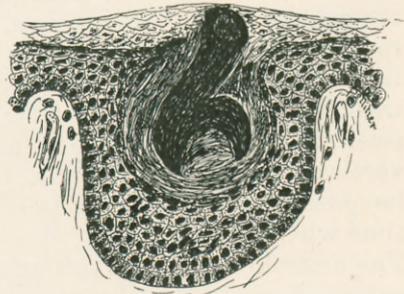


FIG. 6.

the rash occurring here in a region ordinarily well impregnated with oil.

If my view of the aetiology of prickly heat be correct,—that it develops on a skin soaked in perspiration and insufficiently supplied with fat,—we have at hand a means of preventing the occurrence of the rash in those who are subject to it. I have advised a number of patients who suffer every summer from prickly heat to annoint the usually affected regions with a fat, after their morning bath. The fat recommended was for obvious reasons lanolin, to which a little almond oil was added. This application is only a prophylactic measure, and is not to be continued if the rash develops. This treatment will probably throw still more work on the sweat glands; for as Unna has recently shown, the diffusion of vapor of water—the insensible

perspiration—is diminished through a horny layer impregnated with fat. But with patent sweat ducts this circumstance should not produce prickly heat. Of course, after the rash has appeared, the best treatment is a drying application, especially powder, and the avoidance of everything likely to produce sweating.

What becomes of the cysts in the epidermis ; and are the obstructed gland ducts restored to their function? With the growth of the epidermis the cysts must, of course, be slowly carried to the surface. But in the meanwhile, their fluid contents have been absorbed, the cellular elements have become packed more and more closely, the cells have gradually desiccated and broken down and we find such a condition as is shown in Fig. 5 ; a duct of but little more than normal calibre filled up with detritus and scarcely recognizable cellular elements. That this plug of detritus is ultimately passed on to the surface I am inclined to think appears from Fig. 6 in which we see a section of an irregular somewhat spiral-shaped mass in which only an indefinite stratified structure can be made out, the whole staining rather diffusely and vaguely with hæmatoxylin. It is, I think, a further stage in the development of Fig. 5 and the final stage in the restoration of the gland duct.

The illustrations to the paper have been made from pen drawings copied from photographs. Direct reproductions of histological subjects from the photographic negative do not, as a rule, give clear pictures. A pen drawing from the photograph is not so troublesome and not less accurate than a drawing made with the aid of the camera lucida.

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