

THE SIGNIFICANCE OF THE EPIDERMAL SWEAT DUCT UNIT IN THE GENESIS OF PUSTULAR PSORIASIS (ZUMBUSCH) AND THE MICROABSCCESS OF MUNRO-SABOURAUD¹

Emil Neumann and Stig Hård

From the Department of Dermatology, St Göran Hospital, Stockholm, Sweden

Abstract. Serial sections were made from material derived from 3 patients with pustular psoriasis and from 5 patients with psoriasis vulgaris. The former were examined by light microscopy and fluorescence microscopy and the latter by light microscopy alone. In all sections the spongiform pustules and the microabscesses of Munro-Sabouraud were found to be situated at the acrosyringium. The cells supporting the lining membrane of the sweat duct were found to be involved in the spongiform process. The view is expressed that this causes the sweat duct to collapse, the wedge-shaped or crescent-shaped pustules being thus formed.

A quantitative relationship between pustular psoriasis (p.ps.) and the microabscess of Munro-Sabouraud has been assumed for quite some time (7, 8, 9) and careful studies of these lesions have confirmed this assumption (1, 2, 3, 4). The general opinion is, that the migration of leucocytes through the epidermis is involved in the epidermal destruction in p.ps. Pinkus (12) assumed that the papillary capillary temporarily squirt serum and leucocytes into the epidermis and then returns to normal, and that this rhythmic activity of the affected papillae elicits the dermal action in psoriasis. He emphasized, however, that "the possibility remains that some abnormality in the epidermis elicits the dermal action". This latter remark appears to be of importance in the light of the observations made by Rupec (13) in an ultramicroscopy study of p.ps. He expressed the view that cytolysis of the epidermal cells liberates chemotactic agents, thus provoking invasion of the affected epidermal region by leucocytes and completing the picture of the spongiform pustule. This interpretation of the sequence of events involved in the origin of p.ps. conflicts diametrically with the

generally accepted view that p.ps. represents an advanced exudative stage of psoriasis vulgaris. It is interesting to note that cytolysis of epidermal cells has been reported to occur in psoriasis vulgaris. The view has been expressed that cytolysis gives rise to the formation of a microabscess differing only quantitatively from the spongiform pustule (10). Shelley et al. (14) compared the structure of the spongiform pustule to that of the pustule seen in pustular miliaria, but as they did not demonstrate any connection of the spongiform pustule with the sweat duct, little attention has been paid to their observation.

These findings and the observations made in a fluorescence microscopic study of spongiosis (11) prompted the present investigation, the aim being to throw further light on the epidermal conditions involved in the origin of the microabscess and the spongiform pustule.

MATERIAL AND METHODS

Three typical cases of p.ps. type Zumbusch and 5 cases of psoriasis vulgaris were investigated. Under local anaesthesia with a 1% xylocain solution a single isolated pustule from each p.ps. patient was excised and divided into two equal parts. One part was fixed in a 10% solution of formalin, embedded in paraffin, cut into serial sections and stained with haematoxylin-eosin. The other part, fixed in the same solution, was immersed in Michaelis's buffer solution (pH 6.5) for 5 minutes, stained 5 minutes with a 0.01% solution of acridine orange at pH 6.5 and finally rinsed in the buffer solution. Thereafter it was passed quickly through a 98% solution of alcohol and was immersed in xylol for 2 hours. Lastly it was mounted in Eukitt, a non-fluorescent medium, and cut into serial sections. With this staining method the cytoplasm of normal epidermal cells takes on a brilliant orange-yellow fluorescence owing to the presence of RNA. Horny structures show an indirect fluorescence due to the

¹ This work was presented at the meeting of the National Medical Assembly on December 2, 1972, in Stockholm.

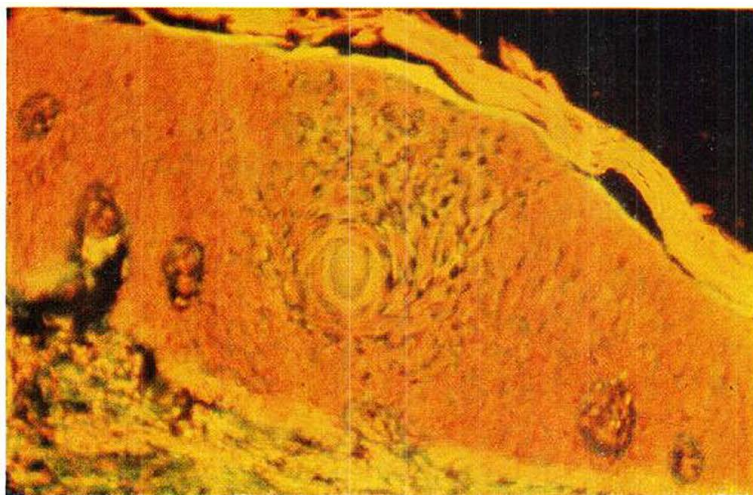


Fig. 1. Wedge-shaped spongiform pustule with occluded part of the intra-epidermal sweat duct at the vertex of the wedge.

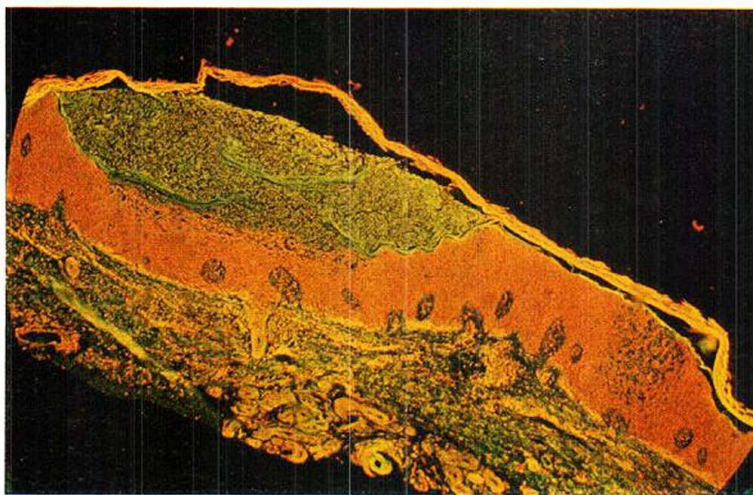


Fig. 2. Two pustules are shown. The large one occupies the major part of the epidermis, the small one is wedge-shaped and is seen, lower right corner.

presence of metachromatic substances. In the upper stratum corneum the loose horny material fluoresces an orange-yellow; the dense horny material in the lower stratum corneum takes on a green fluorescence. Acantholytic and dyskeratotic cells have been reported to take on a green fluorescence (5, 6, 11, 15, 16). Serial sections were made to investigate whether there was a morphologic relationship between the spongiform pustule and the epidermal sweat duct.

The slides were examined by both light and fluorescence microscopy. The fluorescence microscope was of the type Ortoplan, the light source being an HBO mercury-lamp. A fluorescent illuminator devised by Ploen was employed using the filters 2 mm UG11 4 mm, BG 38 and S 470.

In order to investigate whether there was a similar morphologic relationship between the epidermal sweat duct and the microabscesses in psoriasis vulgaris, five serial sections of the material derived from the psoriatic patients were stained with haematoxylin-eosin and examined with a conventional light microscope.

RESULTS

Frequent histological features were wedge-shaped pustules (Figs. 1-4). The base of the pustule was made up of the horny layer and the vertex projected into the epidermis. A keratin-like membrane (hyaline cuticle) was often seen between the pustule and the adjacent epidermis (Figs. 2, 3). Like the horny layer, this membrane took on a yellow or green fluorescence (Fig. 2). The epidermis in the vicinity of the membrane showed a spongiform disintegration (Figs. 2, 3, 4). Fig. 1 shows a transverse section of a part of the epidermal sweat duct situated at the vertex of the wedge-shaped pustule. Its lumen is completely obstructed by keratinous material. All spongiform pustules were seen to be situated around a duct, as is illustrated by Figs. 1, 5, 6, and 8. In a

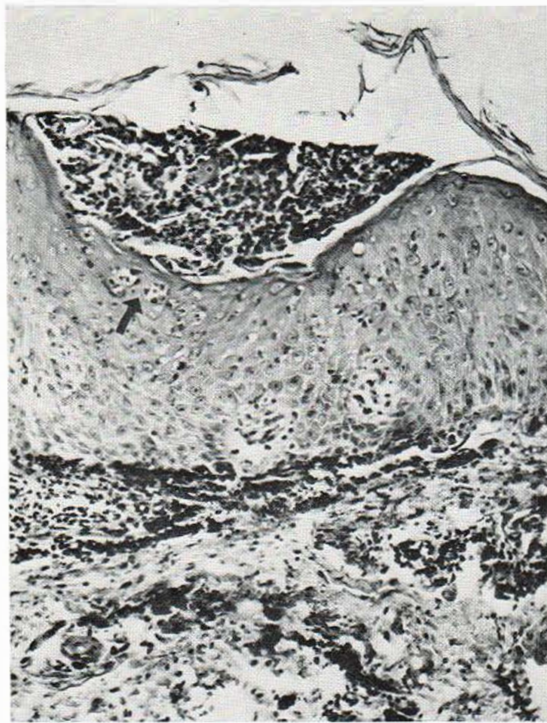


Fig. 3. A hemispheric pustule, bordered by a hyaline cuticle. Spongiform cavities and leukocytes are seen below the cuticle (arrow). A dyskeratotic cell with pyknotic nucleus and perinuclear halo is seen within the pustule.

large pustule three crescent-shaped fibrillar keratin formations were seen which appeared to be remnants of small pustule walls which had been fused together in the formation of the large pustule (Fig.

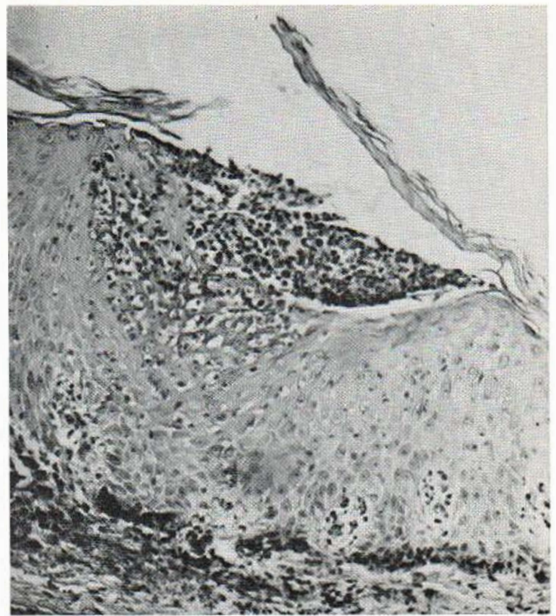


Fig. 4. Two phases in the formation of the pustule. The part below the cuticle, representing the spongiform phase, is somewhat lighter; the upper, darker, subcorneal part contains predominantly dense masses of leukocytes.

2). Figs. 2 and 7 show various levels of the sweat duct extending to the centre of the pustule.

Filamentous material of varying thickness, amorphous material and remnants of cells lacking nuclei took on a green fluorescence intermingled with yellow (Fig. 2). The microabscesses were seen to be situated at the orifice of the sweat duct in all excisions. Figs. 9, 10, 11 show microabscesses in three

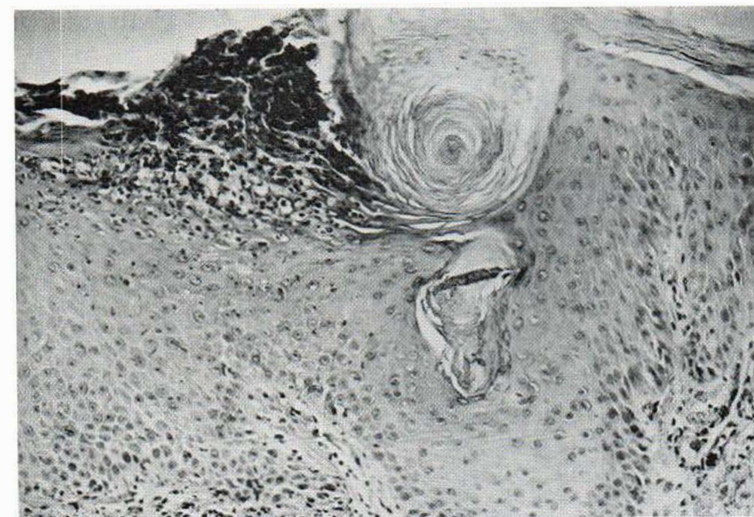


Fig. 5. A spongiform pustule situated at the orifice of a sweat duct.

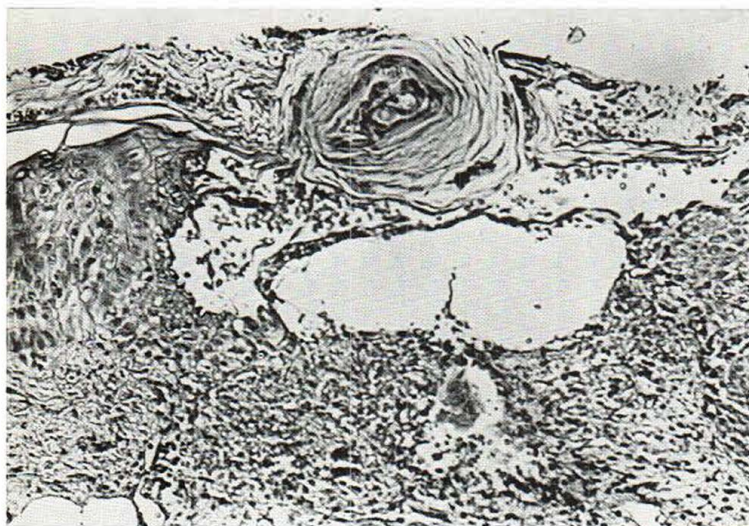


Fig. 6. A spongiform pustule is seen around a disintegrated intra-epidermal part of the sweat duct.

of them. In one instance 92 sections were required to detect a microabscess and this was situated at the orifice of the sweat duct. Mild spongiosis and exocytosis of the epidermis adjacent to the microabscesses were frequent findings (Fig. 10).

DISCUSSION

The findings in the present investigation confirmed the existence of a pathogenetic relationship between the spongiform pustule and the epidermal sweat duct unit. The explanation of the wedge-shaped or crescent-shaped pustule is that the cells supporting the lining membrane of the sweat duct undergo a degenerative process, thereby becoming

detached from each other. As a result, the epidermal sweat duct collapses, a pattern resembling that seen in pustular miliaria being thus formed. The difference between pustular miliaria and the spongiform pustule is that the eliciting factor in the former has been shown to be the obstruction of the horny portion of the sweat duct whereas no such changes have been observed in p.ps. Figs. 3 and 4, show the biphasic structure of the pustule, the part below the cuticle being the spongiotic one, the part above the cuticle containing a collection of leucocytes, keratinous material and cell debris.

Acantholytic cells stained with acridine orange have been reported to show a green fluorescence (5, 6, 11). Isolated cells, cell debris and filamentous



Fig. 7. The epidermal part of the sweat duct (arrow) in the centre of the large pustule which is shown in Fig. 2. The spongiotic part of the pustule is situated adjacent to it (two arrows).

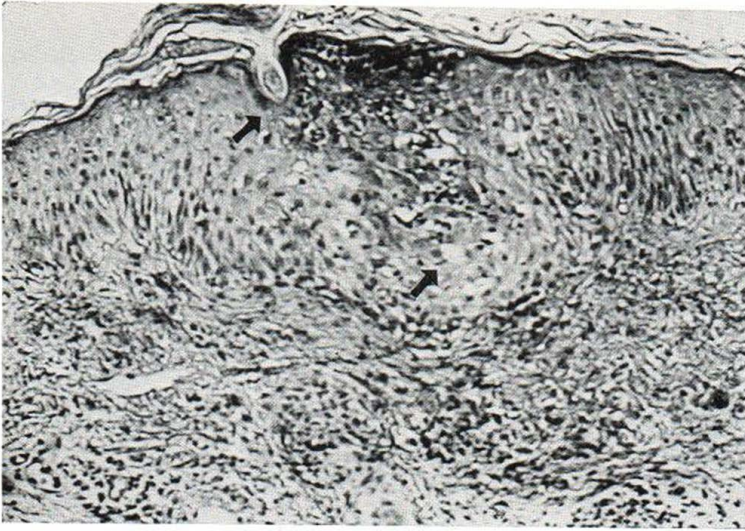


Fig. 8. A tiny spongiform pustule situated at the orifice and the partly disintegrated intra-epidermal part of the sweat duct (arrow).



Fig. 9. A microabscess situated at the orifice of the sweat duct (arrow).



Fig. 10. A microabscess situated at the orifice of the sweat duct (arrow) and mild spongiosis and exocytosis adjacent to the latter (two arrows).

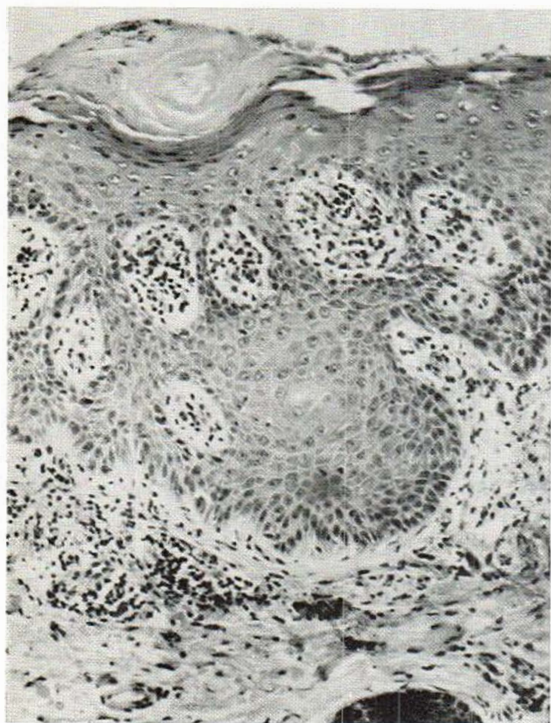


Fig. 11. A microabscess situated at the orifice of the sweat duct (arrow).

material taking on a green or yellow fluorescence were found in all sections of material from p.ps. As a green or yellow fluorescence is typical of horny material this finding indicates that a dyskeratosis-like process also occurred in the spongiform pustule. This assumption accords with the findings of Rupec (13). The abrupt transition of the spongiform pustule into the surrounding epidermis showing no exudative changes (Figs. 1, 2) argues against the view that an exudative process elicits the formation of the pustules in p.ps.

In agreement with Rupec (13) we believe that a metabolic disturbance in the epidermis is the primary eliciting factor in p.ps., the exudative changes, including the migration of leucocytes being a secondary phenomenon. This also holds good for the formation of microabscesses which reflect a quantitatively minor process.

ACKNOWLEDGEMENTS

We thank Associate Professor J. Wasserman and Dr Lars A. Linder, Stockholms Microbiological Institute, for advice and technical assistance during the fluorescence photography.

This study was supported by a grant from the Swedish Psoriasis Union and the Edvard Welander Foundation, Stockholm.

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Received April 10, 1973

E. Neumann, M.D.
Department of Dermatology
St. Göran Hospital
S-112 81 Stockholm
Sweden