

Morphological Classification of the Basal Melanocytes of the Human Skin

The pure epidermis preparation of human skin¹ was first dissolved by SHUKLA, KARKUN and MUKERJI² in 1 mg/ml solution of 3,4-dihydroxyphenylalanine in normal saline (DOPA-saline), and later by SHUKLA³ in normal saline, in such a way that all the constituent cells of the epidermal layers, except the stratum corneum and lucidum, were separated into complete individual identities in their natural shape and form without any loss in their number⁴ or internal structure⁵. Through this technique, the respective upper and lower surfaces of the bodies of the melanocytes, lying hidden in close apposition to the lower poles of the basal cells above and the upper pole of the dermal cells below, and the dendritic processes lying in the intrabasal spaces⁶, were rendered free and the entire cell exposed to view under the microscope.

In the following experiment, the pure epidermis preparation from the infrascapular region of the back, the peroneal surface of the leg, forehead, mastoid region, buttocks (near the ischial tuberosity), dorsal and ventral aspect of fore-arm and lateral and medial aspect of thigh of adult human subjects was dissolved in DOPA-saline² and normal saline³ and mounted on albuminized slides. The DOPA-saline mount was dehydrated in the usual manner and examined under the microscope. The normal saline mount, after a short demelanization of 4 h in 10% hydrogen peroxide⁷, was stained with Mayer's hemalum⁸ and similarly examined under the microscope.

The DOPA positive melanocytes were seen to possess thin, often folded (Figures 1-3, 5, f), leafy central bodies of many shapes giving out dendritic processes from their sides at various angles in different modes of branching, thus producing several distinct forms, viz. straight, angular, dichotomously branched, trident, spherical, rectangular-

lar, polygonal and irregular forms (shown respectively in Figures 1-8). In all the forms of the melanocyte, the body was seen to have a concave upper surface covered with fine hairy processes which probably interdigitated with the serrated lower end of the base of the basal cells and convex and smooth lower surface. The border of the body of the melanocyte was found to be concave (Figure 2, c) or straight (Figure 4, st) in contour, angulating at places to form the roots of 4-6 or more, stout, long or even short and dichotomously branched dendritic processes. These in the course of their run bore numerous short and fine dendrites, arranged in the form of spike (Figure 1, s), panicles (Figure 2, p), asymmetrical umbell (Figure 5, au) and globose clusters (Figure 8, glcl), which in turn were divided in a dichotomous fashion.

It was found that while the shape of the cells isolated from the various sites in the body remained the same, their sizes varied with the location. The cells isolated from the infrascapular region of the back were found to be largest in size (Table) in the series examined here.

The nucleus in all the forms of the melanocyte⁹ retained the central, vesicular, basophilic, double-notched and egg-

¹ P. B. MEDAWAR, *Nature* 148, 783 (1941).

² R. C. SHUKLA, J. N. KARKUN and B. MUKERJI, *Curr. Sci.* 22, 211 (1953).

³ R. C. SHUKLA, *Curr. Sci.*, in press.

⁴ R. C. SHUKLA, *Nature* 212, 956 (1966).

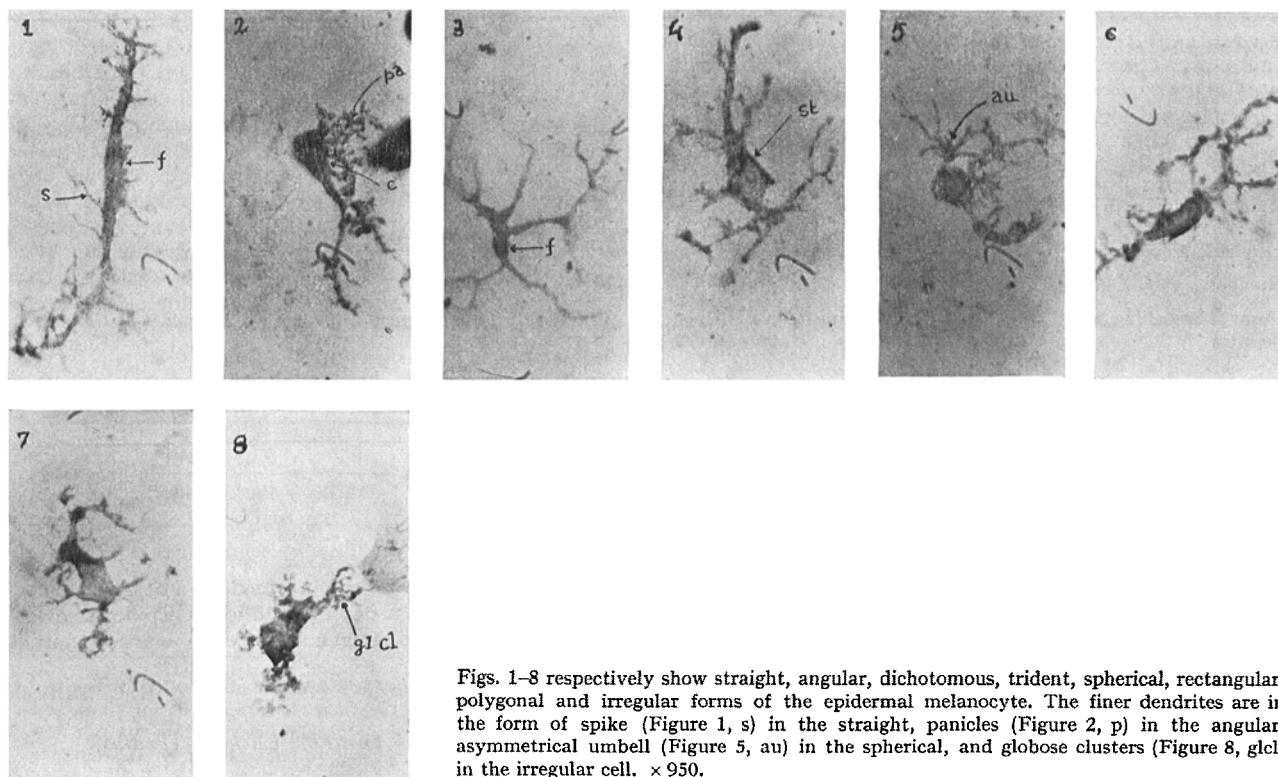
⁵ R. C. SHUKLA, *Nature* 211, 885 (1966).

⁶ R. C. SHUKLA and B. MUKERJI, *Indian J. med. Res.* 43, 433 (1955).

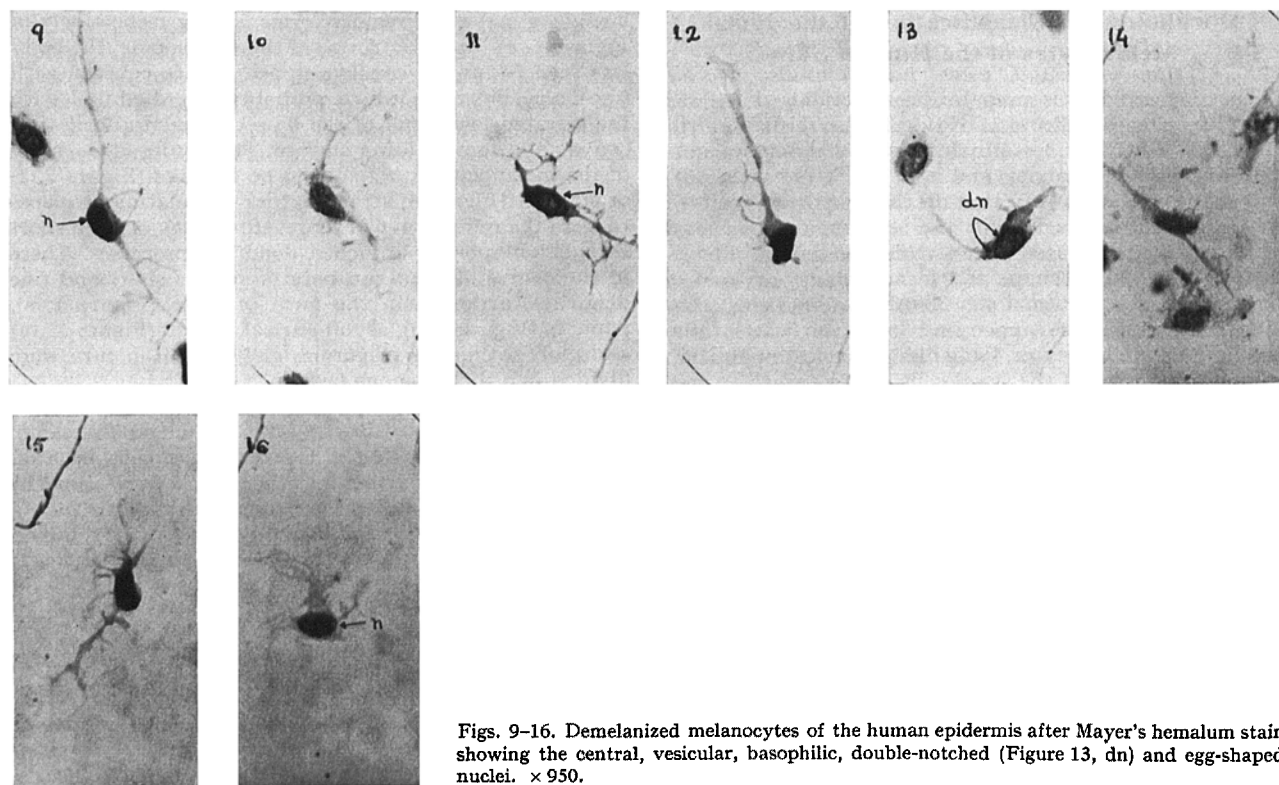
⁷ A. G. E. PEARSE, *Histochemistry* (J. and A. Churchill, London 1961), p. 920.

⁸ J. F. A. MACMANUS and R. W. MOWRY, *Staining Methods* (Paul B. Hoeber, New York 1960), p. 74.

⁹ R. C. SHUKLA, *Nature* 207, 1102 (1965).



Figs. 1-8 respectively show straight, angular, dichotomous, trident, spherical, rectangular, polygonal and irregular forms of the epidermal melanocyte. The finer dendrites are in the form of spike (Figure 1, s) in the straight, panicles (Figure 2, p) in the angular, asymmetrical umbell (Figure 5, au) in the spherical, and globose clusters (Figure 8, glcl) in the irregular cell. $\times 950$.



Figs. 9-16. Demelanized melanocytes of the human epidermis after Mayer's hemalum stain showing the central, vesicular, basophilic, double-notched (Figure 13, dn) and egg-shaped nuclei. $\times 950$.

Characteristic features of the 8 forms of the basal melanocytes isolated from the infrascapular region of the back of human beings

| Characters examined | Types of melanocytes | | | | | | | |
|--|----------------------|--------------------|------------------------|--------------------|----------------------|------------------------|----------------------|----------------------|
| | Straight (1, 9) | Angular (2, 10) | Dichotomous (3, 11) | Trident (4, 12) | Spherical (5, 13) | Rectangular (6, 14) | Polygonal (7, 15) | Irregular (8, 16) |
| Total length of cell (μ) | 70 | 60 | 60 | 60 | 55 | 55 | 50 | 45 |
| Body | | | | | | | | |
| Shape | Folded leaf | Copula | Folded leaf | Curved triangle | Spherical | Curved leaf | Curved leaf | Irregular and curved |
| Length (approx. in μ) | 15 | 15 | 15 | 15 | 12 | 18 | 18 | 18 |
| Breadth (approx. in μ) | 8 | 10 | 6 | 12 | 10 | 8 | 8 | 10 |
| Dendritic processes | | | | | | | | |
| Number | 2-4 | 4-6 | 4-6 | 4-6 | 4-6 | 4-6 | 4-6 | > 6 |
| Form of branching of denrites | Spike | Panicle | Dichotomous | Irregular | Symmetrical umbell | Irregular | Irregular | Globose clusters |
| Nucleus (length \times breadth, approx. in μ) | 10 \cdot 6 | 8 \cdot 6 | 10 \cdot 6 | 8 \cdot 6 | 8 \cdot 6 | 10 \cdot 6 | 10 \cdot 6 | 8 \cdot 6 |

The numbers in parentheses denote Figure numbers.

shaped character (Figures 9-16, n) and occupied nearly $\frac{3}{5}$ of its cytoplasm.

The characteristic features of the 8 types of melanocyte, isolated from the infrascapular region of the back, are presented in the Table.

Further studies on the epidermal melanocyte of the vitelligenous skin are being carried out and will be communicated shortly.

Zusammenfassung. Sehr verschiedene Formen DOPA-positiver Melanozyten der menschlichen Epidermis werden beschrieben. Messungen der Zellen wurden durchgeführt.

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