

CORRESPONDENCE

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REGIONAL DIFFERENTIATION IN ALOPECIA OF THE EYEBROWS IN LEPROMATOUS LEPROSY

As related in an editorial note in this issue, an inquiry has been made concerning the reason for the odd fact that in lepromatous leprosy the outer portions of the eyebrows should be affected first and/or most severely. The essential parts of the replies of the various authorities who were consulted follow.

From Dr. N. E. Wayson, San Francisco, Calif.—My notes on leprosy are buried under twenty years of disuse, and I have not been able to find a reference to the development of the eyebrows. Its pattern follows, apparently, an evolutionary or phylogenic development, rather than an ontogenic one. It is possible that a discussion of the subject, as well as an explanation of other features of leprosy, may be found in the studies of Marcel Bloch on the pathogenesis of sympathicomimetic agents.

From Dr. Harold Cummins, Professor of Anatomy, Tulane University School of Medicine, New Orleans, La.—I can offer suggestions only as an amateur of the subject of your inquiry. In the fetus there is a shorter medial portion of the eyebrow and a longer lateral portion, differentiated by the difference in hair direction; in at least some adults their "parting" is still indicated. Whether this has any relation to the order of thinning or disappearance of eyebrow hairs in leprosy I cannot say. The differences in hair direction are associated with regional differences in growth stresses during differentiation of the hair follicles in the third month of fetal development, and it is of course possible that the differences of growth stress are associated with the anatomical or physiological factors that might later account for dissimilarities in vitality of the follicles. I imagine that the basic explanation, whatever it may be, is identified with the same factors that are concerned in the common regional localizations of ordinary balding.

[*Later:*] I have been unable to dig up any further suggestion on the subject; I really have no idea as to why in lepromatous patients the outer portions of the eyebrows thin and disappear sooner than the inner portions. As you point out, embryology seems to be barren in so far as an answer to this question is concerned, and I cannot offer any suggestion based on phylogeny.

From Dr. Mildred Trotter, Professor of Gross Anatomy, Washington University School of Medicine, St. Louis, Mo.—I can add nothing of consequence to what Dr. Cummins has written. The eyebrows are the first hairs to appear in the human fetus. The onset of both graying and "wild hairs" (seen in many individuals during the later years of life) occur earlier in the lateral than in the medial portion of the eyebrows—the same sequence as in leprosy. I know of nothing to either support or refute Dr. Wayson's suggestion of phylogenic development.

From Dr. C. H. Danforth, Professor of Anatomy, Emeritus, Stanford University Stanford, California.—Dr. Cummins' statement includes what I might have said if you had written to me first. It would seem to me, too, that the topographic subdivision of the eyebrow region might have some relation to the loss of hairs from those areas, but

I know of no real evidence that such is the case. It also seems probable that the differences in question are basically of the same order as other localized pilary responses to hormonal or other humoral agents. It is my personal impression, not well documented, that the lateral parts of the eyebrows do sometimes lose their hairs differentially in other conditions than leprosy. Since the eyebrow is said to develop in three zones, the medial part and a superior and an inferior lateral portion, it might be of interest to know if the loss of hair progresses uniformly from the temporal toward the nasal end, or if either the superior or the inferior segment of the lateral portion loses its hair first.

From Dr. Norman L. Hoerr, Professor of Anatomy, Western Reserve University School of Medicine, Cleveland, Ohio.—None of the members of our department has any explanation to offer for the earlier thinning and loss of the outer parts of the eyebrows, based on embryologic differences in their development; and one of the staff has studied the development of the face in the human for many years. I wonder if the explanation might not be found in pathology rather than embryology.

From Dr. L. H. Warren, of the Department of Clinical Investigation, Parke, Davis & Co., Detroit, Mich.—I have been unable to find any data that would explain the lateral preference in the alopecia of the eyebrows in leprosy. We seem to have little knowledge of the phylogenic origin of hair or of its relation to appendages in other species. I wonder if Wayson meant to suggest that there has been increasingly less need for the outer portion of the eyebrow during the development of the race, that it is becoming vestigial, and that it is less resistant to bacterial invasion or neurotrophic disturbances. I have had no personal experience with leprosy, but I should think that the phenomenon might be due in part to a greater vulnerability of a region where the blood and nerve supply may be to a greater extent terminal in nature. Each dermal connective-tissue papilla is vascularized by a single capillary tuft, but that of course does not explain the regional difference in vulnerability or the selectivity of involvement by leprosy.

From Dr. Rolla R. Wolcott, Clinical Director U.S.P.H.S. Hospital, Carville, La.—I would agree that the outer portions of the eyebrows are lost earlier than the medial parts in lepromatous leprosy. I find nothing about embryological differences in these two regions in the textbooks consulted here. Klingmuller's "Bible" is not helpful. He only says that eyebrows, especially in the outer thirds, may fall out early.

[*Later:*] I have learned that there is a difference in origin between the lateral one-third and the medial two-thirds. The former, it is said, comes from the maxillary process and the latter from the median nasal fold. (Reference to Kindred, University of Virginia.)

From Dr. J. E. Kindred, Professor of Anatomy, University of Virginia School of Medicine, Charlottesville, Va.—The source of the statement ascribed to me is as follows: In a case of cycloopia completa on which I reported [*Arch. Ophthalm.* 33 (1945) 217-225] there were, above the single, centrally-located eye, partial rudiments of eyebrows set at an angle of 45 degrees. I pointed out that the upper eyelid and eyebrow starts in the 16 mm. embryo as a lateral fold of mesoderm covered with ectoderm which forms the outer canthus [Mann, I. C. *The Development of the Human Eye*. London: Cambridge University Press, 1928]; and that at the 18 mm. stage a new fold appears medial to this and joins the lateral fold to complete the median part of the upper lid and eyebrow. From this normal process I inferred that the cyclops studied lacked that part of the mesoderm which forms the median parts of the eyebrows and upper lids, whereas the lateral parts did develop. I then suggested: "There is the possibility that the lateral parts of the eyebrows and the upper lids are proliferated from the mesoderm of the laterocephalic margin of the maxillary process, which are undergoing rapid extension at the time the eyelids are forming."

As a result of your letter I have looked up the more detailed anatomic relations of the region as given in the atlas of Anson [Anson, B. J. Atlas of Human Anatomy. Philadelphia: W. B. Saunders Company, 1950]. From the descriptions given there it would appear to me that the blood-vessel, nerve and muscle relations in this area would be more involved in the production of stigmata than would developmental changes. The skin and also the hairs in this entire area are innervated by a separate branch of the trigeminal nerve, the *supratrochlear nerve*, which courses forward on the medial wall of the orbit to emerge and care for the skin at the root of the nose, of the upper eyelid, and of the forehead. This region is the terminus of a separate branch of the *superficial temporal artery*. The lateral part of the orbicularis muscle which lies over this region is supplied by a separate branch of the ramus temporalis of the facial nerve. From these morphological facts it is evident that this area is of mixed origin, since the skin and hairs appear to have been derived from the ectoderm of the first branchial arch, while the muscles, blood vessels and nerves have been derived from the second and third arches. Hence the shifting of the germ layers in this region during development must have been so great that they could hardly influence changes in later life.