

Hair density in the mouse mutant ragged (*Ra*)

By J. SLEE

A.R.C. Animal Breeding Research Organization, Edinburgh, 9

(Received 15 March 1963)

A recent paper by Mann (1963) deals with the mutant Ragged, first reported by Carter & Phillips (1954) and later described in detail by me (Slee, 1957*a*, 1957*b* and 1962). Mann's paper re-states and confirms many of these previous findings and shows that a new mutant, Opossum, is in many respects similar. However, on one point Mann claims that his data on the ragged mouse differ from mine (Slee, 1957*a*), where I reported that guard hairs and awls were denser in *Ra* + than in + + mice. Mann states that my results were spurious because they were based on 'the relationship between the frequency of pelage hair in a given area and the number of follicles found in longitudinal histological sections'. Since many of these follicles were incomplete non-functional zigzag follicles their inclusion would, as Mann points out, give a spuriously high ratio of guard hair and awl follicles in the *Ra* + mouse. But the estimations were not made in this way. As stated on pp. 107–108 of my paper they were derived from data on fibre type frequency and data on total *hair-shaft* density obtained from fibre samples and whole skin mounts respectively; *follicle* counts from skin sections were not used for this purpose. Follicle density estimates from skin sections were presented later in a different context.

Mann later comments as follows: 'No evidence was obtained in the present (Mann's) study to support the idea that *Ra* + mice have a higher density of any hair type than do + + mice. There is, however, sufficient evidence to show that the density of some hair types is lower in *Ra* + than in + + mice.' This statement is questionable on two grounds. First, no critical evidence is given by Mann regarding the density of any hair fibre types other than guard hairs. Awls, which normally comprise 25% of the coat and much more than this in *Ra* + mice, were not dealt with in his paper. Zigzag fibres are mentioned by Mann, quite correctly, as having reduced density in *Ra* + mice. But this has been shown previously in quantitative terms (Slee, 1957*a*). Mann has produced no new data. Secondly, even for the last main fibre type, guard hairs or tylotrichs, Mann's own data (Table 5) tend, if anything, to support previous evidence that *Ra* + guard hairs are denser than normal. In three groups of data from different body regions *Ra* + guard hairs were each time slightly denser than normal and in one case the difference was significant at the 5% level. These data do not, of course, constitute strong evidence for the proposition that the density of guard hairs in *Ra* + mice is greater than in + + mice, but they certainly do nothing to refute it.

The issue here is of some theoretical interest from the point of view of gene action. Can the gene Ragged, as one of the hair texture mutants (which generally act as reducing, removing or delaying agents upon the pelage and its development), augment the density of two specific fibre types (guard hairs and awls) whilst almost removing another (zigzags)? Although I do not regard my evidence for a positive answer as incontestable, I do not think that Mann's contentions weaken it.

REFERENCES

- CARTER, T. C. & PHILLIPS, R. J. S. (1954). Ragged, a semidominant coat texture mutant in the house mouse. *J. Hered.* **45**, 151–154.
- MANN, S. J. (1963). The phenogenetics of hair mutants in the house mouse: Opossum and Ragged. *Genet. Res.* **4**, 1–11.
- SLEE, J. (1957*a*). The morphology and development of Ragged—a mutant affecting the skin and hair of the house mouse. I. Adult morphology. *J. Genet.* **55**, 100–121.
- SLEE, J. (1957*b*). The morphology and development of Ragged—a mutant affecting the skin and hair of the house mouse. II. Genetics, embryology and gross juvenile morphology. *J. Genet.* **55**, 570–584.
- SLEE, J. (1962). Developmental morphology of the skin and the hair follicles in normal and in Ragged mice. *J. Embryol. exp. Morph.* **10**, 507–529.