Reports

Lactation Hair in the Asiatic Squirrel and Relationship of Lactation Hair to Mammary Hair

Abstract. A hair growth around the nipples during lactation is described in two species of the Asiatic squirrel genus *Callosciurus*. The term *lactation hair* is coined for this phenomenon, which is shown to be different from *mammary hair* in the sense for which that term was coined.

Pfeiffer (*1*) described the hormonal control of the changes in the color of the patch of hair around the mammary gland during lactation in the mountain beaver (*Aplodontia rufa*). The normal belly fur around the nipple, in this animal, falls out and is replaced during lactation by coarser black hair.

The only similar phenomenon in mammals that had been noted up to then was the appearance of two patches of cinnamon-colored hair on the thorax in *Erethizon* (*2*). These patches are, however, associated with estrus and not lactation.

Recently, while surveying the mammary glands of rodents in the mammal collection of the United States National Museum, I came across two more examples of special mammary-gland hair development during lactation in Asiatic squirrels.

Apparently, in *Callosciurus leucomus* as the nipple and mammary gland enlarge prior to lactation, the normal belly fur around the teats is replaced by a cottony white hair. This white hair in turn is lost, leaving a bare area around the fully developed lactating nipple.

The sequence may be seen in the following skins in the National Museum collection: 216791—spots of white fur around nipples; 216784—area around nipples becoming bare, some white hairs still present; 216785—nipples almost bare, a few white hairs around the hindmost nipple on the left side; 216773 and 216788—area around nipples completely bare.

In *Callosciurus hippurus* lactation is accompanied by the acquisition of a sparse growth of coarse hairs around the nipples. The ordinary belly fur does not fall out; these "lactation hairs" (as I propose to call them) are added to it. The effect is of a dark spot around the nipple, so that one's first impression is that the fur is milk-stained.

Examination under a dissecting microscope shows these lactation hairs to be long and coarse. They are alternately banded with black and rufous red, the pattern reminding one of the guard hairs of the back (which are banded with black and buff). The hairs are flattened and tend to curl into loose spirals exactly like human pubic hair, which this lactation hair strongly resembles. I have never seen hair like this in any other rodent.

These hairs may be seen on museum skins, 38252, 29059, and 84443. The last has the largest nipples of the three and the best developed lactation hairs. In it, the dark spots around the nipples merge to form two continuous bands along the belly.

Pfeiffer believed that these patches of altered hair around lactating nipples were mammary hairs in the sense that the term is used by Bresslau (*3*)—that is, hairs from whose follicles the mammary glands originated. Examination of the pertinent literature convinces me that Pfeiffer's homology is incorrect.

In monotremes, mammary glands originate from the follicles of precociously developed mammary hairs that form in two broad bands along the belly of the embryo. Nipples do not develop (*4*), but eventually the mammary glands (still opening into the follicles of the mammary hairs) come to be concentrated into two relatively restricted gland areas.

In marsupials, the mammary glands arise from invaginations or inward proliferations of the epidermis that are later converted into nipples. From the bottoms of these primordia, hair follicles originate, and from the hair follicles, mammary and sebaceous glands. The hair follicles eventually degenerate, leaving mammary glands and sebaceous glands opening into the bottom of the nipple primordia (*5*). These transient hairs are presumably homologous to the mammary hairs of monotremes.

In placental mammals the process is similar, except that the nipple primordia develop from a continuous ridge, and mammary glands are less conspicuously associated with mammary hairs, although they have been reported, for example in horses (*6*), pigs (*7*), and man (*8*).

If these mammary hairs were to persist into adulthood, they should be found on the tips of the nipples protruding from the openings of the mammary glands. In many squirrels they do persist (as ventral vibrissae) and are found in precisely that position, although upon subsidiary nipple primordia that have separated and migrated from the nipples proper (*9*).

The lactation hairs of *Aplodontia* and *Callosciurus* occur in broad patches around the nipple, a position that does not suggest that they are associated with the developing mammary gland.

In addition, lactation hairs are far too numerous to be mammary hairs. The number of mammary hairs associated with each nipple is always small; the numbers given for *Trichosurus* are 13, for *Parameles,* 9 (*5*), and for *Homo,* 8 (*8*).

Of course, it is possible that the original mammary hair follicles migrated peripherally and broke up into numerous follicles to form lactation hairs. There is no evidence for this, however, and it seems to me more likely that lactation hairs develop in place from normal hair primordia, at the time of lactation.

Lactation hairs, therefore, could not be a "physiological relict," as Pfeiffer suggested, but are probably a specialization whose function is obscure. They should not be confused with mammary hairs; this term should be reserved for hair follicles associated with the earliest development of mammary glands.

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Type manuscripts double-spaced and submit one ribbon copy and one carbon copy.

Limit the report proper to the equivalent of 1200 words. This space includes that occupied by illustrative material as well as by the references and notes.

Limit illustrative material to *one* 2-column figure (that is, a figure whose width equals two columns of text) or to *one* 2-column table or to *two* 1-column illustrations, which may consist of two figures or two tables or one of each.

For further details see "Suggestions to Contributors" [*Science* 125, 16 (1957)].