

Formation of New Wool Follicles in the Adult Sheep

It has generally been held that the formation of new hair follicles from the epidermis does not occur after the adult complement has been established. Evidence to the contrary was published by Ribbert¹ as early as 1904, and more recent work in this field has confirmed that new hair follicles can in fact develop from adult epidermis²⁻⁵. This phenomenon has not, to our knowledge, been reported in the sheep and the present observations, describing the formation of new wool follicles in adult animals, were made by chance during the examination of unsuccessful homografts.

Pieces of skin (about 3 mm. × 3 mm.) from 49-80 day Merino sheep fetuses were grafted on to the abdominal walls of their mothers, the graft beds having been prepared by the removal of pieces of full-thickness maternal skin. When these sites were biopsied, 15-62 days after grafting, and examined microscopically, the presence of immature follicles was noticed. Neither the age of foetal skin when grafted, nor the time that elapsed between application of the grafts and sampling of the site, seemed to have influenced the occurrence of new follicles. They were

considered to be maternal and not foetal in origin, due to the presence of features which could only be associated with adult skin, for example: (a) mature follicles, including bundles of secondaries; (b) shedding and regenerating follicles; and (c) fibre remains in the dermis.

Both regenerating and new wool follicles were observed. The former developed from below the sebaceous gland-level of a resting follicle and were associated with original dermal papillae. This process in sheep has been briefly described by Burns⁶. New follicles were of two kinds, derived and original; derived were formed from the neck region of existing follicles, and original from the epidermis, in a manner similar to that described in the sheep foetus⁷. Their papillae also, if present, were newly formed.

There was considerable variation in the stages of development reached by both original and derived new follicles. In their early forms they appeared as slender epidermal downgrowths, generally, though not invariably, associated with dermal papilla cells (Fig. 1A and B). Sebaceous glands and hair canals had been formed in the more advanced follicles, but no sweat glands were observed. The most advanced follicle contained a fibre about to emerge above the skin surface. However, since the majority of the new follicles were in early stages of development (prior to the formation of the hair cone), it cannot certainly be claimed that this neogenesis would have culminated in the general emergence of new fibres.

Breedis² found that the prevention of wound contracture was a pre-requisite for the formation of new hair follicles, and it seems reasonable to suppose that in the present experiments this was achieved by the presence of the foetal homografts. The possibility that an interaction between foetal and adult tissue was responsible for the phenomenon of neogenesis cannot be dismissed. However, in the absence of distinguishable foetal skin, our findings show that the skin of adult sheep has not entirely lost the potential for the initiation of new wool follicles.

A. H. BROOK
B. F. SHORT
A. G. LYNE

Division of Animal Health and Production,
Commonwealth Scientific and Industrial
Research Organization,
Sheep Biology Laboratory,
Prospect, New South Wales.

¹ Ribbert, H., *Arch. Entw. Mech. Org.*, **18**, 578 (1904).

² Breedis, C., *Cancer Res.*, **14**, 575 (1954).

³ Billingham, R. E., and Russell, P. S., *Nature*, **177**, 791 (1956).

⁴ Kligman, A. M., and Strauss, J. S., *J. Invest. Derm.*, **27**, 19 (1956).

⁵ Billingham, R. E., in "The Biology of Hair Growth", ed. Montagna, W., and Ellis, R. A., 451 (Acad. Press, New York, 1958).

⁶ Burns, M., *J. Agric. Sci.*, **39**, 64 (1949).

⁷ Hardy, M. H., and Lyne, A. G., *Aust. J. Biol. Sci.*, **9**, 423 (1956).

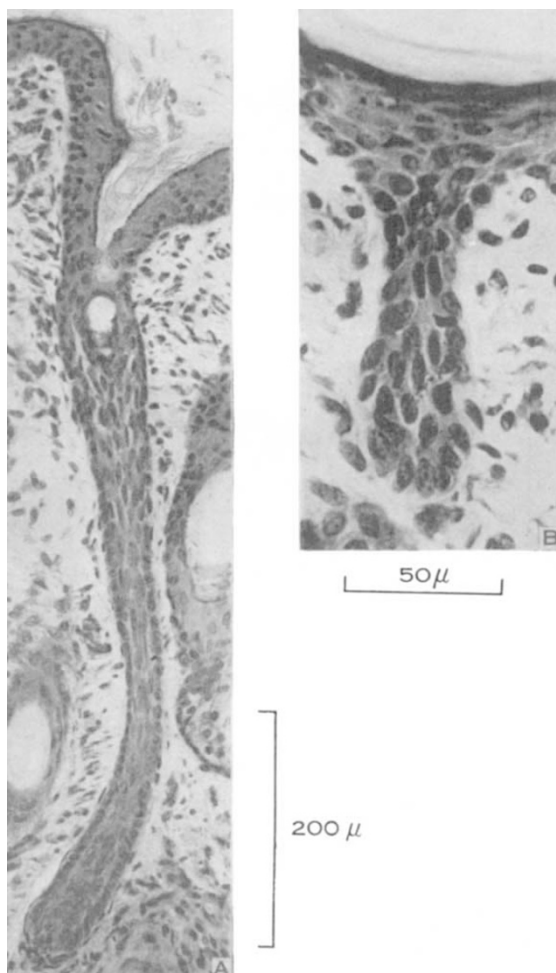


Fig. 1. Longitudinal sections of new original wool follicles on the abdomen of an adult sheep. A, New follicle with a dermal papilla; B, new follicle at an earlier stage without dermal papilla cells

Penetration of *Fasciola gigantica* Cobbold, 1856 into Snail Hosts

I HAVE recently demonstrated¹ that penetration of *Fasciola hepatica* into *Limnaea truncatula* is a brief but elaborate process which involves the successful attachment of the miracidium to the snail, seemingly by suctional adhesion, and the production of a secretion which cytolyses the integument of the snail in a circumscribed area underlying the anterior non-ciliated pit of the larva. Not until the snail's