

Table 1

Group	No. of rats	Total No. of young	No. of young with deformities of brain and calvaria	Percentage of young with deformities of brain and calvaria
1	12	77	6	7.8
2	18	45	31	68.8
3	9	62	0	0

The most striking feature to emerge from these experiments is the marked effect of 4-methyl-2-thiouracil on the incidence of deformities of the skull and brain. In previous experiments in which cortisone was given in conjunction with vitamin A, the incidence of deformities of the skull and brain was 36.6 per cent. Cortisone was, however, administered on the ninth to twelfth days of pregnancy, that is, towards the end of the critical period for this deformity.

The results of these experiments suggest that 4-methyl-2-thiouracil has a potentiating effect on the teratogenic activity of vitamin A similar to that previously described for cortisone^{1,2}.

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Effect of Trauma on Growth of Hair

It has recently been reported that ionizing radiations produce local stimulation of growth of hair in the rabbit¹. Subsequent to this observation, the stimulating effect of some nitrogen mustard derivatives was recorded², and it was suggested that "It should be of interest to determine whether the observed effects can be obtained with other radiomimetic agents or carcinogenic substances³".

It seems to me that no specific effect of radiation or radiomimetic agents is required to explain the observed phenomena. During studies on hair growth I have often observed that simple mechanical trauma such as scratching or cutting the rabbit skin causes a sudden hair growth to occur around the site of injury. The effect is most dramatically seen in the quiescent phase of the hair-growth cycle. A clipped area of skin may stay quiescent and free from hair for as long as 3-4 months at a time. Trauma to the centre of such an area results in growth of hair around the site of trauma, with the result that a tuft of hair is soon seen lying in the centre of the hairless zone. The accompanying photograph (Fig. 1) shows the effect of a small incision, 0.5 cm. long, into the entire thickness of the skin in the quiescent phase of the cycle. Failure to appreciate the mechanics of the hair-growth cycle has led to many errors in the past, and a brief summary of some of the important facts is as follows.

Hair replacement in the mouse^{4,5}, rat^{6,7} and rabbit⁸ is discontinuous and occurs in cyclical waves of active growth. In the mouse and rat cyclical waves of activity start on the ventral surface and spread upwards over the trunk. In the rabbit the hair replacement on the back and flanks occurs in a progressive cycle starting at the dorsum and spreading downwards

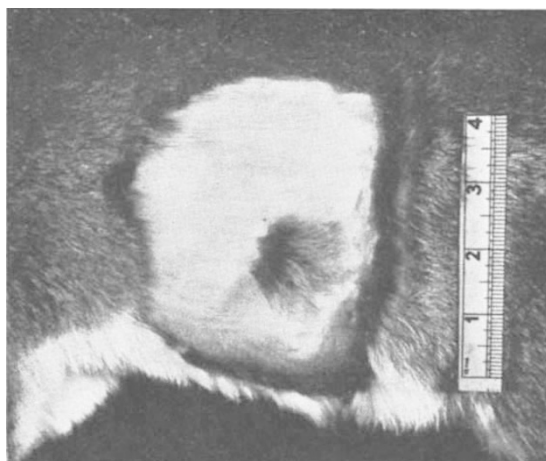


Fig. 1

over the flanks. Hair replacement on the abdomen occurs quite independently of the main dorso-lateral cycle. The progress of a cycle over the trunk creates linear bilaterally symmetrical bands of active growth which can be demonstrated clearly in the clipped animal.

There are many differences between such active and quiescent skin. Hair follicles in the active zone show significantly more mitoses than follicles in the quiescent zones⁹. Proliferative pathological lesions can also be induced more readily in areas where hair growth is active. Thus, painting the rabbit flank with carcinogen produces tumours more quickly and abundantly in an active zone⁹. Inoculation of Shope papilloma virus into skin showing active hair growth and into quiescent skin results in the development of larger and more numerous tumours in the active skin¹⁰. Intravenous inoculation of vaccinia virus into rabbits showed that lesions almost invariably developed in the active zone¹⁰.

In the guinea pig and in man there is no gross hair-growth cycle as seen in the rat, mouse or rabbit. Nevertheless, each hair does show an independent cycle of growth and quiescence. Thus hairs in anagen, catagen, and telogen may be seen lying side by side in any small area of skin in the guinea pig, but they are grouped together in the rabbit and show as large zones of actively growing hair or resting hair.

The problem of growth of hair in man and laboratory animals is of importance not only because of its intrinsic biological significance^{6,11}, but also because the effect of agents such as X-rays¹ and nitrogen mustards² on growth of hair can only be rationally analysed against a background of the dynamic hair-growth cycles and patterns.

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