Changes in the Fur and Skin of Rats in a Nitrogenous Atmosphere

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The effect of environmental oxygen deficiency on the fur of the rat was investigated.

To this aim rats were clamped at the neck and the whole animal except the head enveloped in a plastic bag of the trade mark "Melinex" polyesterfilm (kindly supplied by I. C. I., Rotterdam). This poly-esterfilm is practically impermeable to oxygen (only 434 ml/m² /24 h passes through at 38° C, 90% R. H.).

Through this bag a constant flow of nitrogen (100 ml/min.) was led. The animal was allowed to eat, drink and consume air-oxygen ad libitum. The urine, as well as the small overpressure of nitrogen

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could escape through a small hole at the lowest point of the bag. The bag was renewed several times during the experiment.

Analysis of the gas contents of the bag showed:

O₂ = 2.6%, CO₂ = 0.23% and N₂ = 97.2%.

After 3 weeks it appeared that the rat's weight had fallen from 160 to 120 grams.

The hairs could all be easily extracted by small traction with the fingers, whereas in normal animals this has to be done in anesthesia with a forceps, giving rise to more or less traumatization depending on the stage of the haircycle giving rise to a transudate with crusta-formation.

Microscopy of the skin compared with the normal animal of the same age and species shows a total disappearance of the panniculus adiposus and the bulbi of hair in the nitrogen rat. In the cutis there are wide venules and arterioles with a mononuclear infiltrate and some polynuclear cells.

The collagen connective tissue has a cloudy appearance; the bundles of collagenous fibrils cannot be recognized anymore; the epithelium shows an acanthosis with marked stratum granulosum; a strong hyperkeratosis is seen. If normal conditions are restored these rats completely recover in the course of some weeks. In control animals in which no gas had been led through the plastic bag the hairs have loosened less. A biopsy shows that the panniculus adiposus had disappeared, the bulbi of the hair in the hypodermis were less numerous than in the normal rat, but no other histological deviations were observed.

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