

rats was about 180 g. The experimental time was 15 days. Liver extract was added to the bread in amounts calculated to give each animal the equivalent of 0.3 ml of extract, when the daily food consumption was about 18 g. The results are given in Table 1.

Table 1. Growth of rats on a mixed diet given as mouse bread fortified with liver extracts.

Group	No. of animals	Average daily food consumption	Average daily weight gain
Liver	15	18.4 + 0.18 *	0.49 ± 0.009*
Control	15	18.2 ± 0.15	0.48 ± 0.008

* The values in these columns are the means and the standard error.

There was no significant difference in the daily weight gain or in the daily food consumption between the liver and the control group.

There is an additional difference between the effect of the liver extract in growing and adult animals. In previous series¹⁻³ on growing animals it was observed that the rats which received only the commercial mouse bread showed a comparatively poor fur development. Animals which were given liver extracts were observed to have a more dense, lustrous underfur. In the previous and the present series of experiments on adult, or nearly full-grown animals, the liver extract had no obvious effect on the fur development.

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1. Ågren, G. *Acta Chem. Scand.* **4** (1950) 52.
2. Ågren, G. *Acta Chem. Scand.* **1** (1947) 69.
3. Ågren, G. *Acta Physiol. Scand.* **18** (1949) 337.

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6-Methyl-1,4-naphthaquinone Produced by *Marasmius graminum*

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It has been reported earlier, that a red crystalline substance active against *Staphylococcus aureus* has been isolated from the metabolism solution of *Marasmius graminum*^{1,2}. After further purification by steam distillation and repeated recrystallizations from petroleum ether the active principle was obtained as red needles m. p. 87–88° C. The molecular weight estimated by the Rast method indicated, that the red crystals could be a methyl-naphthaquinone. This was supported by other facts such as the absorption spectrum and the analyses data for 2,4-dinitrophenylhydrazone. Degradation of the red compound resulted in trimellitic acid which suggested that it might have been 6-methyl-1,4-naphthaquinone³.

Diene condensation of isoprene and *p*-benzoquinone, followed by isomerization and oxidation gave 6-methyl-1,4-naphthaquinone, which after recrystallization from dilute acetic acid melted at 90–91° C. The melting point of a mixture of 6-methyl-1,4-naphthaquinone with the red substance was 87–88° C. The ultra-violet absorption curves of the two compounds were practically identical in the region of 2 400–2 600 Å.

For further purification of the red material several chromatographic methods were tried and finally a complete separation of a yellow substance from a minor quantity of a dark red one was accomplished by using an acid-washed alumina column. Evaporation of a yellow-green fraction of the percolate left a biologically active, crystalline residue which was

further purified and recrystallized from dilute acetic acid. It yielded golden, yellow needles m. p. 90–91° C. There was no depression of the melting point when these yellow crystals were mixed with 6-methyl-1,4-naphthaquinone.

$C_{11}H_8O_2$ Calc. C 76.73 H 4.68
Found * 76.39 * 4.50

A detailed report will be published later.

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1. Bendz, G. *Acta Chem. Scand.* **2** (1948) 192.
2. Melin, E., Wikén, T., and Öblom, K. *Nature* **159** (1947) 840.
3. I. G. Farbenindustrie Akt.-Ges. *Chem. Zentr.* (1930 II) 809.

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