

which the chickens have received a certain diet.

The introduction of adsorption procedures show clearly that the labile activity of fresh plasma cannot be explained by the assumption of only one labile factor.

CoCO<sub>3</sub> added to plasma in increasing quantities causes only partial reduction of the labile activity — and the adsorption curve (curve B) indicates the adsorption of one factor with labile activity — the CoCO<sub>3</sub>-factor.

Al<sub>2</sub>O<sub>3</sub> will give quite another type of adsorption curve, which seems to be composed of two straight lines (curve C). It indicates the adsorption of probably two factors with labile activity. Both Cr(OH)<sub>3</sub> and ZnCO<sub>3</sub> give the same type of adsorption curve as Al<sub>2</sub>O<sub>3</sub> does, indicating their similarity in adsorption properties.

Other experiments have shown that the two Al<sub>2</sub>O<sub>3</sub>-factors responsible for the broken-line adsorption curve are not adsorbed by CoCO<sub>3</sub> and that the CoCO<sub>3</sub>-factor is not adsorbed by Al<sub>2</sub>O<sub>3</sub>, Cr(OH)<sub>3</sub> or ZnCO<sub>3</sub> in the quantities studied so far.

The full details of the Al<sub>2</sub>O<sub>3</sub>-curve in the range approaching 100 % adsorption are still an object of further study.

By testing other adsorbents we became aware that PbCO<sub>3</sub> would remove a coagulation factor from SrCO<sub>3</sub>-treated plasma which seems to be of a more stable nature than the factors mentioned above and is not adsorbed by Al<sub>2</sub>O<sub>3</sub> or CoCO<sub>3</sub>. The adsorption of this PbCO<sub>3</sub>-factor can be studied by the same technique when stored plasma from chicks deficient in this factor is used as substrate (curve A).

It is not yet evident which of the labile factors mentioned above eventually corresponds to factor V of Owren, plasma Agglobulin of Seegers or labile factor of Quick, but selective adsorption analysis of the kind described seems to offer a convenient method for classification of the components of the chick coagulation mechanism not adsorbed by SrCO<sub>3</sub> or

BaCO<sub>3</sub>. The selective adsorption also offers a method for preparation of the different factors. It has been found possible to elute the adsorbed factors from CoCO<sub>3</sub> and ZnCO<sub>3</sub> by elution with phosphate buffers of suitable pH and molarity.

In the opinion of the authors this adsorption analysis offers a method for quantitative estimation of the different adsorbable factors. The minimum amount of adsorbent, necessary for full adsorption of each component has been interpreted as a measure of the amount present.

Thus we have been able to start a search for the dietary principles which seem to determine in what amount each factor will be present in the chicken plasma. Such studies are in progress.

1. Dam, H., and Søndergaard, E. *Biochim. et Biophys. Acta* 2 (1948) 409.
2. Sørbye, Ø., Kruse, I., and Dam, H. *Acta Chem. Scand.* 4 (1950) 549.
3. Sørbye, Ø., Kruse, I., and Dam, H. *Acta Chem. Scand.* 4 (1950) 831.

Received May 5, 1951.

## A Note on the Food Sparing Effect of Liver Extracts on Adult Rats

GUNNAR ÅGREN

*Institute of Medical Chemistry, University of Uppsala, Uppsala, Sweden*

In a recent paper on the food sparing effect of liver extracts on growing rats<sup>1</sup> it was reported that a similar effect could not be observed on adult animals. A second series on nearly full-grown rats has now been carried out with the same negative result.

The animals were the same female rats as used in the last experiments on growing animals<sup>1</sup>, and the experimental procedures were the same as described for the second series in that paper. At the beginning of the present experiments the weight of the

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 series<sup>1-3</sup> 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.

The investigation was supported by a grant for medical research from the Swedish Medical Research Council. The technical assistance of Mr. T. Persson is gratefully acknowledged.

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.

Received May 5, 1951.

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

GERD BENDZ

Chemical Institute, University of Uppsala,  
Sweden

It has been reported earlier, that a red crystalline substance active against *Staphylococcus aureus* has been isolated from the metabolism solution of *Marasmius graminum*<sup>1,2</sup>. 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-naphthaquinone<sup>3</sup>.

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