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A New Fatty Acid from Royal Jelly

It has been shown by Butler, Callow and Johnston¹ that queen honey-bees (*Apis mellifera*) secrete material which affects bees in two ways, inhibiting the development of ovaries in workers and influencing their behaviour by inhibiting queen rearing. Callow and Johnston² have determined that the active principle in the material is 9-oxodec-2-enoic acid. It is referred to as 'queen substance'.

The close structural relationship between this 'queen substance' and 'royal jelly acid', 10-hydroxydec-2-enoic, found abundantly in royal jelly, would lead one to assume that the latter is a precursor of the former. Moreover, it would seem reasonable to predict that 9-hydroxydec-2-enoic acid might be an intermediate, and possibly occur in small amounts in royal jelly.

We observed that the carboxylic acid mixture, isolated from royal jelly by the procedure described by Brown and Freure³, gives a weak iodoform reaction but no test for the carbonyl function with 2,4-dinitrophenylhydrazine. Oxidation of this acid mixture with aqueous chromic acid gave a product which, on treatment with aqueous 2,4-dinitrophenylhydrazine reagent, yielded a small amount of a 2,4-dinitrophenylhydrazone. This derivative has an infra-red absorption spectrum identical with that of the 2,4-dinitrophenylhydrazone of 9-oxodec-2-enoic acid.

Thus it appears that 9-hydroxydec-2-enoic acid is present in royal jelly in minute amounts. A more detailed account of the investigation will be published later.

Authentic samples of 9-oxodec-2-enoic acid and its 2,4-dinitrophenylhydrazone were supplied by Dr. R. K. Callow and Miss Norah C. Johnston, for which we are grateful.

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PHYSIOLOGY

Oscillatory Flow in a Fluid-filled Elastic System

THERE is a pronounced tendency for a fluid-filled elastic tube to oscillate when the fluid is caused to flow by a small head of pressure. This may be demonstrated with a model (Fig. 1) which stems from a new theory of the action of the heart, published by me¹.

Water flows from the tap into a reservoir where a constant level is maintained, then down a rigid tube connected at the lower end to a rubber tube lying horizontally on a small platform. The distal end of the rubber tube is connected to a short length of rigid tubing, through the other end of which fluid is allowed to escape freely into the sink. Provision is made to vary the height of the reservoir and of the outlet.

Arranged parallel to the platform is a metal bar on which three springs are mounted which can be moved at will. These are of mild steel, twisted around the bar and secured at one end by a clamp. The other end of each is drawn out into a straight extension that presses against the rubber tube, with a force equivalent to a weight of 50 gm. approximately, the tension being adjusted by twisting the spiral part of the spring with the clamp.

Latex tubing is employed (0.7 cm. in diameter) with a volume pressure curve almost linear up to a pressure of 150 cm. of water. A suitable length, to start with, is 97 cm., the reservoir being set 1 m. above, and the outflow 4 cm. below, the level of the platform.

The position and pressure of the springs are adjusted until maximum oscillation occurs, when each is found to be at a critical distance from the distal end of the tube. A water hammer now develops, associated with momentary interruption and even regurgitation of flow. A sharp sound is heard at each pulse,

Fig. 1. The oscillator