CHEMICAL BASIS OF HONEYBEE CASTE FORMATION

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Queens, intermediate forms, and workers are obtained by rearing 1 day old worker larvae on royal jelly - the food of three-day old queen bee larvae - in an incubator. The Queen to worker ratio and rate of survival depend on the quality of the queen food, primarily on its content of a queen bee determining principle (Rembold and Hanser, 1964). The labile determinator is contained in the water soluble dialysate fraction and can be extracted from this by ethanol. Further purification, corresponding to a 10^5-fold enrichment, is achieved by column chromatography (Rembold et al., 1973). This highly purified component of royal jelly is responsible for queen bee establishment; its removal from queen food yields an inactive test food, to which other components can be added. Using this feeding test, the presence of queen bee determinator activity was demonstrated in silkworm pupae and adults (Rembold, 1969 a, b). Biological activity is also elicited in a series of other insects, which do not form castes (Rembold, 1973a). The high biological activity - equivalent to that of royal jelly - makes silkworm pupae a good medium for further purification of the queen bee determinator. In the laboratory the compound has been purified 10^7- fold through this medium, corresponding to 100 µg per kg of pupae. An extraction on a technical scale, starting with 300 kg. of silkworm pupae, is in progress. The data presented will be discussed in favour of a hypothesis, which postulates an adenotropic action of the queen bee determinator (Rembold, 1969a, 1973b).

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