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Pollen and Pollen Substitutes in the Nutrition of the Honeybee

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INTRODUCTION: VALUE OF POLLEN TO BEES

POLLEN plays an important part in the life of honeybees, supplying the necessary constituents for the growth and development of these insects.

A number of investigators have chemically analyzed pollen *(1, 6, 7, 30, 38, 39, 44, 48)*. A review of the chemical composition of pollen is given by Paton *(34)* and recently by Svoboda *(45)*. The protein content of pollen varies considerably (8-40 per cent). Lecithin and cholesterol are present. Pollen is rich in the mineral constituents (2.88 to 8.28 per cent), the amount of K and P being especially noticeable. It contains various enzymes. There was some indication *(31)* that pollens from the anemophilous plants contain less nitrogen (4.63 per cent) and phosphorus (1.76 per cent) than that of the entomophilous plants (7.49 and 3.05 per cent, respectively). However, recent analysis by Todd and Bretherick *(50)* did not show such relationship.

The composition of beebread—pollen stored in cells of combs by bees—does not differ appreciably from that of pollen, except that the nitrogen content is lower, that of carbohydrates is higher, and the pH is lower *(2, 6, 32, 42)*. It contains the following vitamins: A, thiamine chloride, riboflavin, pyridoxine, ascorbic acid, pantothenic acid, and nicotinic acid *(25, 26, 27)*. Vitamin E is present in insignificant amounts *(24)*. The lactic acid present in beebread is formed during the process of fermentation *(51)*.

Although the larvae are fed a special larval food or royal jelly, elaborated in the pharyngeal glands of the nurse bees, pollen grains in varying amounts are always found in the food given to all stadia *(8)*. The belief that the food of the queen larvae does not contain pollen is unfounded, for recent investigations showed that pollen grains are always found in the digestive tract of the queen larvae and that "the pollen was apparently an

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