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Nesting Biology of Bombus ruderatus Fab.

(Hymenoptera: Apidae)

A thesis presented in partial fulfilment of  
the requirements for the degree of  
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Nelson Pomeroy

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Thirty day old Bombus ruderatus colony

To the bumblebees,  
whose cooperation made the project  
possible.

## ABSTRACT

Most natural nests of Bombus ruderatus were found in underground locations. Underground domiciles were highly attractive to queens of B. ruderatus and B. terrestris, these two species occupying 93% of 45 domiciles. A design modified to simplify inspection and colony removal yielded 62% occupation by B. ruderatus only in 13 domiciles. These percentages compare favourably with overseas results (various other Bombus spp.) and surpass those obtained previously in New Zealand.

Colonies were transferred from domiciles to observation hives for study of their development. The observation hives were designed to provide the colonies' needs for warmth, ventilation, sanitation, and brood-comb support. The total number of bees produced per colony in both natural sites and observation hives ranged from 230 to 750 (mean = 420).

Egg production in B. ruderatus post-incipient colonies is regulated by the quantity of fresh cocoons, one egg clump being made per five (approx.) substrate cocoons. Egg clumps consist of 1 - 5 (mean = 1.5) egg cells, each cell containing 10 - 19 (mean = 14.3) eggs. Egg mortality, especially in multi-celled clumps, appeared to be high but could not be quantified.

Larval rejection caused the loss of 13% to 36% of the larval populations of five colonies in observation hives. The role of larval rejection appeared to be the control of adult size. It was very prevalent during colony decline when food shortages coincided with queen production.

B. ruderatus differs from most other "pocket makers" in having a clear size distinction between workers and queens. Larvae which became queens consumed at least twice as much pollen as most worker larvae. In most colonies there was an interim period of male-only rearing between worker and queen production. Colonies varied in their time of initiating male production, earlier male production being associated with less worker production and lower overall colony productivity. It is suggested that future research should attempt to elucidate the causes of male production in Bombus colonies.

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