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SHORT COMMUNICATION

LONGEVITY OF *Apis mellifera* WORKERS MAINTAINED UNDER ARTIFICIAL CONDITIONS

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Adequate nutrition is one of the most important factors influencing the longevity of newborn bees (De Groot, 1951). However, the presence of a queen (Roger and Pain, 1966) and of other bees also affects the life span of worker bees (Sitbon, 1967a).

In 1944, Grassé and Chauvin, in studies on bees kept under experimental conditions, noted that isolated workers died more rapidly than workers living in groups, and denoted this phenomenon "group effect" (on mortality). Later studies by Chauvin (1952, 1972, 1973, 1974) showed that contact among individuals is needed for group effect to occur. Sitbon (1967a, b; 1968a,b; 1971) concluded that group effect is not related to food or metabolism, since isolated bees consume the same amount of food and water when compared with bees living in groups. Thus, the origin of group effect was hypothesized to be either neurohormonal (Sitbon, 1971) or chemical (Chauvin, 1974). Rinderer and Baxter (1978), when studying groups of 10, 20, 30, 40, 50 and 100 bees, noted no statistically significant differences in longevity in groups of bees containing more than 20 insects.

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In the present investigation, worker bees were placed in cages with an area of approximately 130 cm^2, containing water and a piece of comb with pollen and honey. Three experiments were carried out, each using 15 cages. The cages were divided into five groups of three, each containing 1, 2, 5, 10 and 20 bees per cage. Thus each grouping had two repetitions, with a total of 3 cages each. All bees were taken from the same colony and the experiments were carried out simultaneously.

In the first experiment, newly emerged workers were placed in the experimental cages, whereas in the other two experiments workers aged 4 and 6 days of age, respectively, were used. Each cage was inspected daily. The longevity data are expressed as the number of days needed for half the bees present in the experimental cages to die. Humidity and temperature were recorded in addition to longevity, and showed no large variation during the experimental period.

Figure 1 shows that longevity increased with the number of individuals per group (group effect). The Figure also shows that workers placed in the experimental cages after 6 days of life in the colony had greater longevity than those placed in the cages immediately after emergence or 4 days later. This result agrees with previous reports by Pershad (1966) and Doualt *et al.* (1975) who pointed out that trophallactic interactions are more intense during the first five days of life among worker bees and are very important for their later survival.

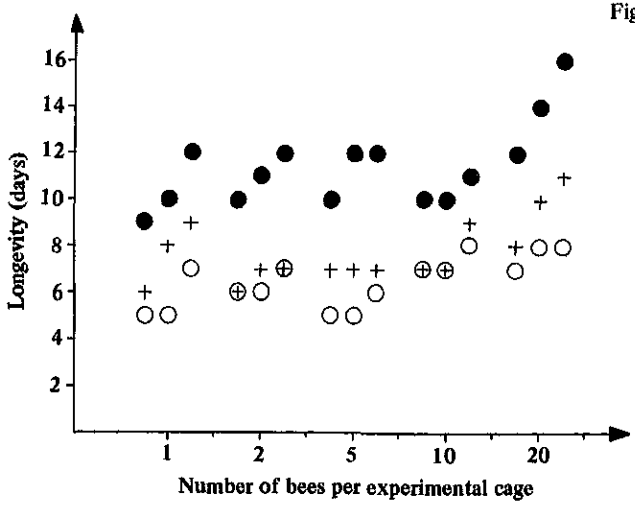


Figure 1 - Longevity of worker bees maintained in 5 groups of experimental cages, containing 1, 2, 5, 10 and 20 bees per cage, respectively. ●, Bees placed in the cages 6 days after emergence; +, bees placed in the cages 4 days after emergence; o, bees placed in the cages immediately after emergence.

Arnold (1978) postulated that annual variations in group effect occur among workers and attributed an alimentary origin to the effect, at least during the first days of life.

In the present study, bees placed in the cages after 4 days of permanence in the colony had the same longevity as the newly emerged groups or intermediate between them and the groups placed in the boxes after 6 days of age.

In conclusion, we may suggest that there is a group effect on the longevity of small groups of worker bees. In addition, longevity is greater among bees taken from the hive after a few days of life in it and seems to increase with the duration of this previous time spent in the hive. This increased survival with length of life in the hive may be due to the fact that young bees need the intensive trophallactic interactions that occur during this phase until they complete their physiological maturation, which, according to Sekiguchi and Sakagami (1966), occurs by the 5th day after emergence. This might explain why there was practically no difference in longevity between the groups of newly emerged bees and the groups of 4-day old bees, but a great difference between the former and the groups of 6-day old bees.

However, this fact should not rule out the chemical origin of the group effect proposed by Chauvin (1974), also considering that bees experimentally raised in cages never used for this purpose have a lower longevity when compared with confined bees maintained in cages previously used to maintain other groups (Chauvin, 1972).

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