# EJECTION AND INGESTION OF THE SPERMATOPHORE BY THE FEMALE LADYBIRD BEETLE, *HARMONIA AXYRIDIS* PALLAS (COLEOPTERA: COCCINELLIDAE)

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Sperm transfer in the aphidophagous ladybird beetle, *Harmonia axyridis* Pallas, is by a spermatophore (unpublished data). Although the utilization of spermatophores in insects has been considered to be a more primitive method of insemination than direct sperm transfer, males of many orders produce spermatophores (Chapman 1969; Gerber 1970; Leopold 1976). The remains of the spermatophore, after the sperm has migrated to the spermatheca, is ejected by the female in some species and dissolved within the female genital tract in others (Chapman 1969; Leopold 1976). In Coccinellidae, Fisher (1959) reported on spermatophore formation of *Chilocorus* spp. and indicated that the female ejected the empty spermatophore 18–24 h after copulation. In this paper evidence is presented that *H. axyridis* females not only eject the empty spermatophore but also feed on it.

Pupae and prepupae of *H. axyridis* were collected in Kyoto City and the adults of each sex were kept separate in the laboratory with aphids. Virgin adults that were 10–14 days old were used for observation. A male and female were introduced into a round plastic cage (8 cm diameter by 2.5 cm high), together with aphid-infested leaves of *Erigeron anuus*, and were allowed to copulate. The females were killed at various intervals after genital separation and dissected to determine whether there was a spermatophore in the bursa copulatrix. The results are shown in Table 1. All females contained a spermatophore immediately after copulation, but within 1 h most females no longer contained one. As these results suggested that the females might eject the spermatophore a short time after copulation, the behavior of 20 females was observed for 1 h after genital separation, 14 after the first copulation and 6 after the second copulation. The spermatophore usually was emptied and ejected within 30 min (14.8 ± 6.91 min) after copulation. The females ate the ejected spermatophore in all cases except one.

Table 1. Incidence of a spermatophore in the bursa copulatrix of *H. axyridis* at various intervals after genital separation

| Time after genital separation | Spermatophore in bursa copulatrix | | No. of females examined |
|---|---|---|---|
| | Present | Absent | |
| 0 min | 20 | 0 | 20 |
| 15 min | 4 | 3 | 7 |
| 30 min | 6 | 4 | 10 |
| 45 min | 1 | 4 | 5 |
| 60 min | 1 | 4 | 5 |
| 3–24 h | 0 | 20 | 20 |

The spermatophore was not eaten by female *Chilocorus* after ejection but was abandoned in the culture cage (Fisher 1959). The female of *H. axyridis* may eat the spermatophore to gain nutrient, as in case of the female *Melolontha melolontha* L. in which the resorbed spermatophore seems to be nutritive (Landa 1960, cited in Leopold 1976). It is unknown whether this curious behavior of female *H. axyridis* is rare in Coleoptera, as only a few studies on the disposition of the spermatophore have been reported (Zacharuk 1958; Gerber *et al.* 1971). This is the first known report on the ingestion of the spermatophore by the female after its ejection in Coleoptera.

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