REPEATED INTRA-MALE SPERM TRANSLOCATION IN *LESTES BARBARUS* (FABR.) (ZYGOPTERA: LESTIDAE)

The typical sequence of dragonfly mating includes tandem formation, intra-male sperm translocation and copulation, which is followed by oviposition. Minor variations of this scheme exist, as e.g., when sperm translocation is not performed between tandem formation and copulation (J.K. WAAGE, 1973, *Behaviour* 47: 240-256; A. KUMAR & M.PRASAD, 1977, *Odonatologica* 6: 163-171; C. UTZERI, 1985, *Odonatologica* 14: 227-238). In accordance with what is most frequently observed in dragonflies, in *Lestes barbarus* sperm translocation is performed only once after tandem formation, even though copulation can be interrupted and resumed several times (E. LOIBL, 1958, *Z. Tierpsychol.* 15: 54-81; C. UTZERI et al., 1987, *Fragm. entomol.* 20: 1-22). Nevertheless, we are herewith reporting on two exceptional observations of repeated intra-male sperm translocation in this species.

28-VIII-1975. — The tandem male translocated sperm to the accessory genitalia according to the usual pattern (UTZERI et al., 1987, *ibidem*), then the female attempted to lay eggs, but the pair shifted to another perch and the male again translocated sperm, after which copulation followed.

10-VIII-1979, 13:55 h. — After tandem formation, the male translocated sperm twice within some minutes, during 40 and 34 seconds, then he made some copulation attempts and again translocated sperm (35 s). The pair copulated the first time, which lasted 5 min 17 s. Shortly after, the male translocated sperm again (32 s) and copulated the second time (6 min 50 s). Following this, the female oviposited for about 40 min, after which the male translocated sperm twice again (10 and 29 s). Then the third copulation took place, which lasted 9 min 34 s, after which the female resumed oviposition. At this time (15:35 h) the observation was stopped.

Repeated sperm translocation behaviour is reported as the common occurrence in *Megaloprepus coerulatus* (O.M. FINCKE, 1984, *Adv. Odonatol.* 2: 13-27) and *Coenagrion scitulum* (C. UTZERI & G. SORCE, 1988, *Atti XV Congr. naz. ital. Ent.*, pp. 723-729). At present, nothing is known of the meaning of this behaviour and UTZERI & SORCE's (1988, *ibidem*) suggestions have not been tested so far. It is impossible to say if the *L. barbarus* males did actually translocate sperm to the accessory genitalia each time they performed the related behaviour. However, the duration of the six timed sperm translocation behaviours averaged 30 s, which is the same as that reported for *L. barbarus* by UTZERI et al. (1987, *ibidem*) This suggests that these behaviours were probably normal.

The above observations suggest that the amount of sperm a male of *L. barbarus* can produce within a short time may be enough for several copulations, even though males generally mate only once per day (UTZERI et al., *ibidem*). On the other hand, since at least the first female attempted to oviposit immediately following seizure, she had probably mated and likely preserved fresh sperm from another male. If the males actually loaded their penes with sperm each time, then they probably also transferred a greater amount of sperm to their females, than that relative to the single translocation action. This might be a system to overcome the negative effects to the male of sperm mixing in females' genitalia. J.K. WAAGE (1982, *Odonatologica* 11: 201-209) has shown that the male *L. vigilax* probably neither removes all previous sperm from the female, nor entirely fills the female's storage organ in a single insemination and M.T. SIVA-JOTHY (1989, *Behav. Ecol. Sociobiol.* 24: 39-45), in *Mnais p. pruinosa*, suggested that in cases of incomplete last-male sperm removal, penultimate males may gain sperm precedence in direct proportion to the quantity of their sperm that is present in the female, after a number of days, as long as the female does not remate. But in the latter species, a greater amount of sperm is transferred to, and a greater amount is removed from, the female by means of prolonged copulation.

In conclusion, the repeated intra-male sperm translocation behaviour in *L. barbarus* might on one hand be merely anomalous, on the other represent a particular system by which males increase their own potential for fertilizing eggs.

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