University of Florida Book of Insect Records
Chapter 18 *Highest Lifetime Fecundity*

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15 December 1995

An Australian ghost moth, Trictena atripalpis*, is the insect with the highest recorded fecundity among nonsocial species. One female was reported to lay 29,100 eggs, and when dissected, 15,000 fully developed eggs were found in the ovaries. Among eusocial insects, queens of the African driver ant* Dorylus wilverthi *can lay broods with up to 3-4 million eggs every 25 days. This is probably the species with the highest lifetime fecundity among eusocial insects.*

Life history theory predicts a trade off between fecundity and parental care (Roff 1992), both of which vary considerably among insects. Although lifetime fecundity varies from less than ten to several millions of eggs, most insects lay between one or two hundred and a couple of thousand eggs (Hinton 1981). There are different reasons why some insects have unusually high fecundities. To explain this variation it is easiest to discuss separately eusocial insects and insects with no social organization.

Methods

Biological Abstracts (1989-1994) was searched. Most information came from textbooks in entomology and general books about social insects (Clausen 1940, Wilson 1971, Holldöbler & Wilson 1990). The extensive table with data on insect fecundity in Hinton (1981) was especially useful.

Results and Discussion

Nonsocial insects

Leschenaultia adusta (Diptera, Tachinidae), a parasite of salt marsh caterpillar (*Estigmene acrea*), has been reported to lay 4572 eggs (Jackson et. al. 1970). The eggs are laid on plant foliage, and must be ingested by the host larvae. A wax scale insect, *Ceroplasses pseudoceriferons* (Hemiptera, Coccidae), is capable of laying more than 10,000 eggs (Sankaran 1954). It infests a number of plants, including the economically important mango. The hymenopterans *Kapala terminalis* and *Stilbula cynipiformis* (Eucharitidae), can lay up to 15,000 eggs (Clausen 1940). All Eucharitidae are internal or external parasitoids of immature stages of ants. They lay large numbers of eggs on vegetation. The larvae that emerge attach themselves to ants. It is not clear if they search for ants or if they just wait for ants to pass nearby (Gauld and Bolton 1988). When they reach the ant nest they actively seek out ant larvae which they attach themselves to or enter. Further development usually occurs when the ant larvae reach the prepupal stage.

The highest lifetime fecundity among non-social insects appears to be a lepidopteran. An Australian ghost moth female, *Trictena atripalpis* (Hepialidae), captured at Adelaide, laid 29,100 eggs (Tindale 1932), and when it was dissected 15,000 eggs were found in the ovaries. These moths oviposit while in flight and tend to lay their eggs in the vicinity of the red gumtree (*Eucalyptus rostrata*), on the roots of which their larvae feed. There are other ghost moths that are larger, which may have an even higher fecundity, but I've found no literature on egg number in these species.

Most of the nonsocial insects with extremely high fecundity have an uncommon life cycle. None of these species have parental care. Both *L. adusta* and *K. terminalis* rely upon chance encounters between eggs or larvae and their intended hosts. This is also true for *T. atripalpis,*

although it drops its eggs in the general vicinity of the host tree. The species seem to share an unusually risky oviposition strategy with unavoidably high juvenile mortality, which selects strongly for high fecundity.

Eusocial insects

The highest recorded fecundities are found in the eusocial insects. Indeed most eusocial insects have high fecundity. Fenton (1952) states in his textbook that the queen of the termite *Termes bellicosus* (=*Macrotermes natalensis*) lays an estimated 30,000 eggs each day and, on average, lives 10 years. This calculates to more than 109 million in a lifetime. However, Fenton gives no primary source for his estimates, making it difficult to evaluate their worth. The honey bee queen (*Apis mellifera*), can produce up to 200,000 eggs each year (Bodenheimer & Nerya 1937), and has a life span of 3-4 years.

Army ants and driver ants appear to have the highest fecundities among ants, though the longevity of the queens is not known. The army ant *Eciton burchelli*, can lay a new brood of 120,000 eggs every 36 days (Schneirla 1957). Queens of the African driver ant *Dorylus wilverthi* can lay broods with up to 3-4 million eggs every 25 days (Raigner and van Boven 1955). Other driver ants have similar fecundity, 1-2 million eggs in a month (Holldöbler and Wilson 1990). The queens are the largest among the ants and have up to 15,000 ovarioles. They lay egg more or less continually, but with bursts of high production every three weeks that last for five or six days.

All values for egg number in eusocial insects are fairly rough estimates. The insect with the highest fecundity is certainly eusocial, but it is impossible to say which is really highest. The best candidate so far is *D. wilverthi*.

The eusocial insects have a highly organized social system, usually with only one female that does all of the egg laying (Wilson 1971). The other members of the colony provide her with food, and tend her eggs as well as doing all of the foraging and nest defense; instead of laying their own eggs, they help the queen to achieve as high a fecundity as possible. Generally, increasing parental care is associated with decreasing fecundity (Roff 1992). In eusocial insects we have intensive care of offspring, but not by the mother, who is freed of all responsibilities other than egg-laying. This division of labor makes it possible for a queen to have extreme specializations for fecundity.

Acknowledgments

I thank Bianca Nygård for help with the research and Lawrence Kirkendall for review of the chapter. T.J. Walker helped obtain the hepialid information.

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