

BRIEF COMMUNICATION

TOWARDS STRATEGY CONCEPTS IN FLOWER ECOLOGY AS EXEMPLIFIED BY THE FIG-WASP SYMBIOSIS

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For a discussion of its various aspects¹, it is convenient to recognize flower ecology as passing through three phases. Initially, in a descriptive phase, special instances of reproductive behaviour and their mechanisms are described. Then follows a phase of reflection, allowing of some inductive generalization e.g., recognition of pollination syndromes. In a third phase, by comparing the phenomena placed in a taxonomic arrangement (as a repository of their phylogeny), one can pose explanatory hypotheses in the form of strategies for optimally deploying available resources and adaptive mechanisms.

For example, the first two phases can be taken together in the story of fig wasps pollinating the flowers of figs (*fig. 1*, taken from WIEBES 1979, *fig. 1*). *Fig. 2* illustrates the mechanism in that it visualizes how the fore feet manipulate the pollen around the pollen pockets in the mesosternum. In one group of fig wasps we find another mode of pollen transport and pollination i.e., by carrying the pollen in a fold of the hypopygium or in intersegmental and pleural invaginations that form in the shrunken body of the wasp following loss of water in the old fig, to regain the swollen form in the young fig. The recent-most addition to our knowledge of fig-pollination was made by OKAMOTO & TASHIRO (1981). As a generalization one would suppose two groups of wasps and figs, characterized by either of the two modes of pollination. This is defied, however, by the current classification of fig wasps, as well as by a claim of a third mode found with *Tetrapus*-wasps i.e., ingestion of pollen when in the old fig, followed by regurgitation in the young one. Yet, *Tetrapus* appears to have what looks like incipient pollen pockets on the mesosternum (*fig. 3*) and could be considered a first stage of the first mode.

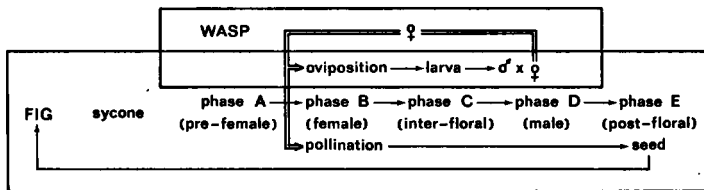
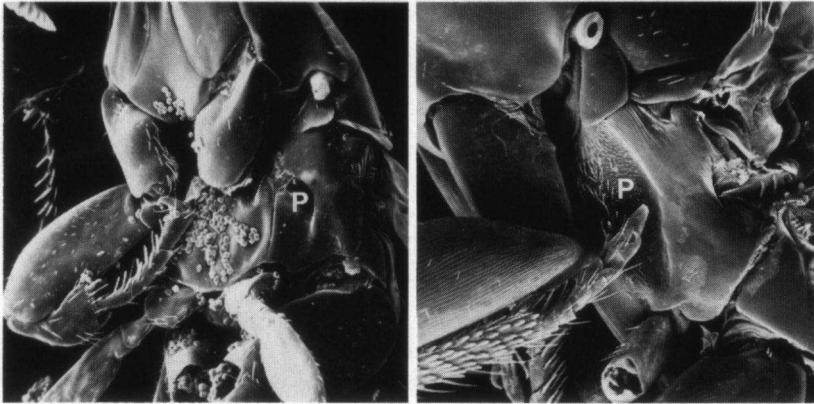


Fig. 1. Generalized cycle of a monoecious fig and its pollinator wasp. The developmental phases of the fig (A-E) are indicated in the lower rectangle, those of the wasp in the upper.

¹This note results from a lecture read at the meeting of the Royal Botanical Society of The Netherlands on May 8, 1981.



Figs. 2 and 3. Oblique ventral view of the thorax of fig wasps, showing the fore legs (bent at the knees) and the pollen pockets (P). At the left, *Platyscapa etiennei*, showing the axial side of the right fore leg, and the left pocket; at the right, *Tetrapus spec.*, showing the antiaxial side of the left fore leg, and the left pocket.

A strategy can be seen as the formalization of a phylogenetic scenario, which is a phylogenetic tree with an overlay of adaptational narrative, as ELDREDGE (1979: 168) defined it. A strategy, once formulated, allows of extrapolation and thus prediction: as such it is the only phase in our set of three in which a hypothesis can be falsified. In our example it has to explain how the symbiosis of figs and wasps came into being, how it succeeds in existing and how it may develop. We are, however, far from formulating it, as so many factors are involved, some of which (pollinators, lodgers, parasites, seed-predators) are indicated in *fig. 4*. For one species of fig the number of Chalcidoidea developing in the receptacles amounts to twenty-eight (BOUČEK et al. 1981)! Very important as seed-predators and seed-dispersal agents are bats, birds, and various bugs. Once completed, the study of our fig-symbiosis will be an example of how (flower-)ecological data should be integrated into a testable hypothesis of reproductive strategy.

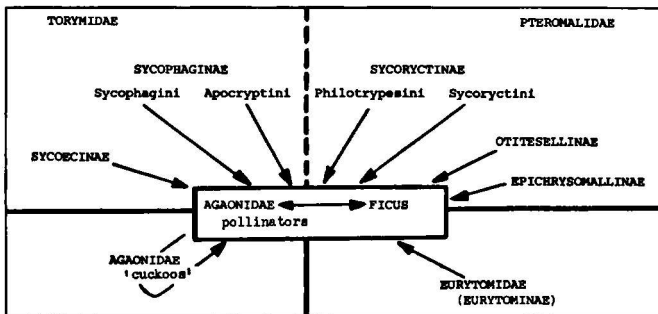


Fig. 4. The various groups of Hymenoptera Chalcidoidea attacking the symbiosis of figs and their pollinating Agaonidae.

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