

COLONY-FOUNDING AMONG TETRAMORIUM (HYMENOPTERA  
FORMICIDAE) IV: REMARKS ON ALLOMETROSIC BEHAVIOUR  
IN HAPLOMETROSIC FEMALES

Bruno Poldi, viale Leopold 2, Mantua , Italy.

I began my research into the behaviour of females of the genus Tetramorium, as the result of three general observations, (Poldi 1963a, b):

- 1) If one observes the early relationships between close, newly founded nests, it is clear that eventually only one survives. The members of this colony sack the broods of the others and adopt their workers. Often there is no killing, not even of the other females.
- 2) Sometimes at the season of the nuptial flights one can often observe wandering, delated queens, of greatly reduced body weight.
- 3) During artificial breeding one can sometimes notice cases of death amongst queens soon after nest-founding.

These observations led me to suppose that:

- a) there may be queens which leave their nests which are then invaded and sacked
- b) there may be nests which are orphaned by the early death of the queen.

As, at the end of the nuptial flight, "macrohabitat selection" (Kannowski 1959) brings the swarms to settle in definite zones, often with a high density of females per unit of area, the above-mentioned points are taken into account and form the basis of my research into:-

- A) the study of the behaviours of the females, after the exhaustion of the protidical and lipidical supplies of their organism, with particular reference to the activities of the parasitic species
- B) the verification of the possibilities of adoption - on behalf of an orphan nest- of a female belonging to the same or another species

The latter is of interest, when considering phylogenetic interpretations, of dulosis and parasitism.

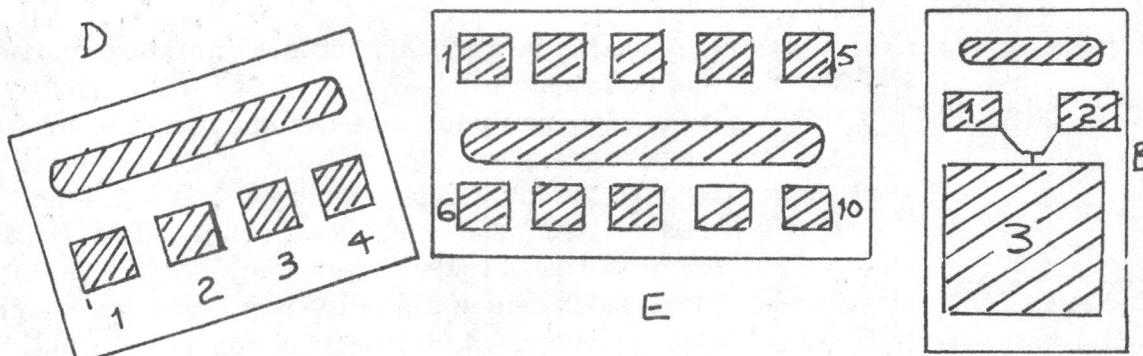
MATERIAL AND METHODS

I refer to what has already been written (Poldi 1963a) on the subject. The females used after the founding period had generally been gathered in the streets of the old centre of Mantova, one of them in Ravenna, (Tetramorium caespitum L.). Others were found on the Adriatic Coast, on the sides of tree-lined avenues near the beach of San Mauro Mare and Riccione (Province of Forlì): Tetramorium impurum Em.\*

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\* This was kindly suggested by Kutter 1972 (in litt.) = Tetramorium impurum Förster sensu Emery 1925. This matter will be dealt with in another work.

Nests made of plaster, of the Janet type, with many cells, (Fig. 1), suitable for breeding many females, have been employed. The cells have been numbered as it is shown below. Type B - nests have proved useful for the study of populations during the first year of life of the nest.



The collected ♀♀ were put - alone or in groups - into breeding nests. At the end of the founding period (end of August - beginning of September) some of these nests were orphaned by removing the queen.

Then we observed behaviour following the bringing in a foreign queen to each nest.

#### SUMMARY AND DISCUSSION ON -

- I: Experiments on populations of *Tetramorium impurum* Em.
- II: Experiments on populations of *T. caespitum* L.
- III: Crossed experiments between *T. caespitum* L. and *T. impurum* Em.
- IV: A case of spontaneous adoption

In the literature there are reports of adoptions of queens by nests of the same species\*. Experimental adoptions include:-

- 1) queens in full lay.
- 2) nests in an advanced degree of development.

While the positive reports can be considered significant in the case of some polygynic species, in other cases they seem to have a low degree of probability.

Actually, queens are often killed by workers of the same species\*\*: according to Passera (1963) this takes place in 80% of experiments with *Plagiolepis pygmaea* Latr., nearly the same percentage as found by Passera (1964) in experimented adoptions of *Plagiolepis xene* Staerke.

\* Similarly, with different points of view, Stumper 1923; Goesswald 1933 for ants of *rufa* group, Ledoux 1949 for *Oecophylla longinoda* Latr., Soulie 1962 for *Crematogaster scutellaris* Ol., Passera 1963 for *Plagiolepis pygmaea* Latr.

\*\* in polygynic species, too, as in the case of *Pl. pygmaea* Latr. As regards to the possibilities of adoption in monogynic species see Baroni Urbani 1966 1968 Baroni Urbani and Soulie 1962.

In the present work - on the contrary - we have used queens that have been unable to find a nest again by themselves (therefore in similar conditions to those queens of parasitical species) and populations of newly founded nests, which show lower reactivity and more readily accept new relationships (this matter will be dealt with in another work). The observed behaviour:

- a) allows us to see the relationship between parasitical and host species in a new light.
- b) points out the opportunity for a re-examination of foundation schemes in parasitical species, at least in some cases\*.
- c) seem to support the intuitions of Emery (1909) about the origins of parasitism, supplying an experimental basis, the lack of which Dobrzanski (1965) regretted.

The conclusions which can be drawn from the experiments concerning the queens who have survived the period of colony-founding, and the workers of the first generation, can be summarized as follows:

- 1) the adoption of a queen, mated or unmated, by a neo-founded orphan nest of Tetramorium genus, seems easy enough.
- 2) in the case of T. impurum Em.-a species with a very mild character- the adoption was practically immediate when the queen was put into the small cell which housed the brood. When the queen was put into the light cell (i. e. the big cell, outside the proper nest) the adoption involved appeasing rituals: touching of antennae, lapping of workers of the consenting queen or seizure of a hostage by the queen.
- 3) T. caespitum L. has a more aggressive character: adoptions are more or less difficult.
- 4) the adoption ritual of caespitum queens shows - in its most complete form - the succession of the following behaviour patterns\*\*:
  - a) quiet attitude, slow movements
  - b) beating of the head of workers with antennae
  - c) release from seizing by legs and antennae
  - d) lapping of workers held by fore-legs
  - e) seizure of workers by the thorax or peduncle and use of them as a pheromonal shield
  - f) reaction and threat towards over-aggressive assailants
  - g) (eventual) killing of a worker that is too aggressive.
- 5) Experimentally, caespitum queens can also be adopted by populations of T. impurum Em., with a behaviour like the one adopted in caespitum nests (in an experiment not fully

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\* Gagniant 1970 has made reservations on the modalities of nest-founding in Bothriomyrmex (see Santschi 1906).

\*\* a comparison with adoption modalities of myrmecophilous insects is extremely interesting: see Le Masne 1961, Le Masne and Torosian 1965.

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