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On the Plasticity of the Nesting Habit of a Hunting
Wasp, *Pemphredon lethifer fabricii* Müller¹⁾

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Pemphredon (Dineurus) lethifer fabricii Müller is widely distributed in the Palaearctic region. In Japan this Pemphredonid wasp burrows into the pithy stem of *Rubus palmatus*, *Miscanthus sinensis* and some other plants, and provisions several aphids for larvae.

Some biological studies on this wasp have been made in Japan by Ohgushi (1950) and Tsuneki (1952), but there are some disagreement in their observations with respect to the nesting habit. Tsuneki observed in Hokkaido that, each larval cell in the nest was separated from a neighbouring one with a pithy wall, but by my observations in Kyoto the partitions of cells were either omitted or scarcely recognizable.

Since that time I have striven for collecting the nests of this rare wasp, and it is my present opinion that there are considerable variations in the nest building. There may be a distinct partition between two cells to nothing.

In this paper are explained the variations of nesting habit of this species with some discussions on their ethological meaning.

My hearty thanks are due to Dr. Kunio Iwata for his kind guidance in my study of comparative ethology on wasps, to Dr. Katsuji Tsuneki for his kind identification of materials and valuable suggestions, and to Prof. Denzaburo Miyadi for his kindness in reading the original manuscript.

Observations and discussions

From 1949 to 1953, 10 nests of this wasp were found at Kurama in the northern suburbs of Kyoto, and 2 other nests at Kobe.

The results of observations on the construction of these nests, especially with

1) This research was aided by the Scientific Research Expenditure of the Department of Education.

reference to the presence or absence of separating walls and to their arrangement, are given in Table 1, and some of the nests are illustrated in Fig. 1.

Table 1. Construction of nests examined

No. of nest	No. of larvae	No. of partitions	No. of empty cells	Presence (+) or absence (-) of outmost partition
1	4	0		--
2	7	1		-
3	5	2		+
4	3	1		-
5	6	5		+
6	2	2		+
7	3	3		+
8	8	8		+
9	3	4	1	+
10	1	2	1	+
11	4	5	1	+
12	2	3	1	+

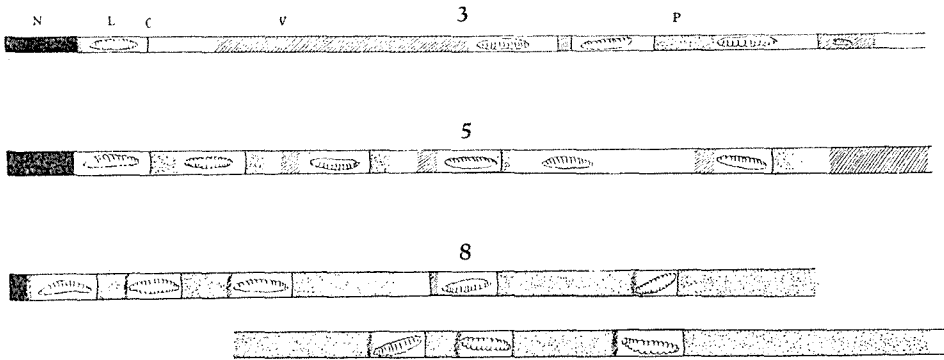


Fig. 1. Structure of nests.

- N: Natural state of pith
- L: Larva
- C: Partition made by a larva
- V: Refuses of food (carcasses of aphids)
- P: Partition made of pithy substances by a mother

The data in Table 1 show that the number of partitions are often smaller than the number of cells, that is the partitions are more or less omitted between

two larvae. The four cases in which the number of partitions are larger than that of the larvae are due to the presence of empty cells.

The variation in the relative number of larvae and partitions, however, seems to be continuous. It may be said from this finding that the difference, seen in the nesting habit, is not attributable to the difference of subspecies or ecotype.

The nests of pith-diggers and tube renters, both of wasps and bees, are generally so constructed as to separate each larva with partitions of various materials such as pithy substance, pulp, resin etc. But exceptionally, some species of genus *Allodape*, *Sphex harmandi*, *Crabro brevinodus*, *Crabro crassinodus*, *Stigmus* sp. etc., have been reported to construct no partition between the larvae. No observation, however, has ever been made on a species which constructs the nests having various modes of partition.

It is shown in Table 1 that the outmost wall is omitted in 3 examples. This omission of the last partition may have some relations with the behaviour of the mother wasps, that is, they sometimes remain alive in the nests with their heads directing toward the entrance even after the larvae have become fullgrown, as is shown in Fig. 2.

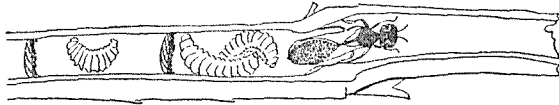


Fig. 2. A case in which the mother is remaining at the entrance of the nest instead of constructing the outmost wall.

I saw in another case that a mother had died in this position.

The cannibalism was not observed among the larvae in the same nest.

According to many studies of former authors, the habits of wasps and bees are fundamentally well fixed and characteristic to each species. The examples given in this paper seem to indicate that remarkable variations may take place in one species living in the same area.

The present observations suggest that the knowledge on plasticity of habit must be taken into consideration in the ethological investigation of insect behaviour. Furthermore, I wish to point out some of the characteristic facts about this wasp, such as the survival of the mother wasp often after the fullgrown stage of her larvae, and the contact of the mother with her breeds. These facts seem to suggest the dawn of the social behaviour.

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