



SHORT NOTE

Multiple Use of an Old Nest by the European Paper Wasp *Polistes dominula* (Hymenoptera, Vespidae) in Central Poland

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Abstract

Refurbishing the old nest in order to prepare it for a new breeding season cycle has already been observed in few species of paper wasps. When future foundresses emerge from hibernacula they have choose between building a new nest or reusing an old one. In present paper I described a case of multiple use and further expansion an old nest by *Polistes dominula* (Christ, 1791) in Grodzisk Mazowiecki, Mazovia Region, Central Poland.

Introduction

Polistes dominula was found nearly all over Poland territory except Lublin and Roztocze Uplands (Eastern Poland), and Eastern Beskidy Mountains, it has wide climatic and ecological spectrum from wet forest and mountain meadows to strict city centers, however the species seems to be the most abundant in xeric and xerothermic biotopes, including urban and rural sites (Oleksa & Wiśniowski, 2006).

Social wasps of the genus *Polistes* are distinctive by building characteristic unenveloped (gymnodomous) comb made of chewed plant fibres from weathered wood and other sources.

The nest varies in architecture from single arrangements of cells suspended from single petiole to large horizontal combs supported by multiple petioles; mean size of mature nests ranging from about 50 to 500 depends on species. The nests are usually started in sheltered location such as under leaves or on tree trunks, and on man-made structures e.g.: undersides of bridges, roofs, eaves of buildings (Reeve, 1991).

Reutilization of old nest is restricted to nests placed in sheltered area, if old nests are exposed to weathering or even when the nest are intact, old nest are unclean, containing debris from former inhabitants, reuse may be impossible (Ito, 2012). Old nests may be facilitated by gynes which return to their natal site (phylopatry) before initiating a new colony (Rau, 1929; West-Eberhard, 1969; Strassmann, 1983; Abu Bakar et al., 2015). Nest reuse may represent an energy saving strategy although old nests are seldom reused, probably due to mentioned earlier factors which might influence both stability of the nest structure and the health of future immature brood (Abu Bakar et al., 2015).

Present paper describes the case of multiple using an old nest with the construction and reuse new comb on it.

Material and methods

Determinations of examined wasps were based upon collected specimens with use of Keys to the Determination of Polish Insects, part 24, Hymenoptera, *Vespidae* and *Masaridae*



by Wojciech Puławski. Collected specimens were also compared with specimens from entomological collection of Museum and Institute of Zoology Polish Academy of Sciences.

Observations were carried out in Grodzisk Mazowiecki (52°06'39.8"N – 20°36'42.5"E) in the Mazovia region, Poland. Observed nest is located on the west side of greenhouse between two glass walls (Figs B, C), nest is attached to metal frame. Outside wall of the greenhouse is overgrowing by *Parthenocissus tricuspidata* (Siebold and Zucc.) Planch (Fig A).

I started my observation of an old greenhouse in April 2004, since then I have expanded my research site to a radius circa 100 meters with particular attention to man-made structures in surrounding area. Investigated nest was discovered in 19th of May 2017 from then I have made further weekly routine observations.

The greenhouse was opened between 9 – 10 a.m. to 5 – 6 p.m. in April and May, and between 8 a.m. to 8.30 p.m. in summer months (June-half of September).

Highest temperature - measured 50 cm from the nest - reached 52 °C, maximum humidity reached 12 %. The measurements were made by using a simple electronic device combining the functions of a thermometer and a hygrometer.

Photographic documentation present here states from 2018 and 2020 and includes 3 photos.

Results

Investigated nest was established in the beginning of May 2017, when it was discovered it comprised of few cells and was similar in size to the other nests of *Polistes dominula* located in greenhouse. At the end of season nest comb reached 113 (measurement was made in April 2018) and it was one of two big nests left behind for the next season.

In 10th of April 2018 I saw that several females were sitting on the old nest, they chose the biggest ones of two left in previous season, in the same time two new nests began to be created nearby, although after few weeks there were abandoned in early phase of development. In the beginning of May 2018 females were starting to built new comb on the old one. At the end of season, the second comb reached 104 cells.

In 24th of April 2019 I observed first females sitting on the comb built in 2018, in the beginning of May I saw that females reusing both of two combs. In the third season the comb from 2018 was expanded and in the end of season reached 125 of which 21 were new cells.

Summarizing, the nest from 2017 was used 3 times, and the new comb built in 2018 was used 2 times and finally reached 125 cells in 2019 (Fig B).



Fig A. West side of the greenhouse (7.09.2019).



Fig B. View from outside the greenhouse (9.04.2020) with survived female individuals after overwintering.

Discussion

My results confirm that the habit of reusing old nests might occur in the European paper wasp *P. dominula*. In favorable local conditions like low level of humidity, vegetation giving a large amount of shadow and above all safe place not exposed to large animal and human activity, it is possible to reusing the same nest in the three consecutive years. The results are also consistent with finding by Abu Bakar et al. (2015) suggesting that reused nest was the biggest among the old ones left in the last season that might suggest when

foundresses opt for reusing old nests they choose the biggest ones. Probably the reuse of old nest is an energy saving strategy that might permit foundresses to rear in shorter time the first workers (Abu Bakar et al., 2015).

A noteworthy is the fact of high behavioral plasticity among *Polistes* wasps. In almost full controlled conditions, the glasshouse was open in certain times, the wasps family have built and expand new comb reaching significant number of individuals at the peak of family development which indicate high level of ability to use advantageous environmental conditions.



Fig C. Side view of the nests inside the greenhouse (1.08.2018).

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