

### Short scientific note

Submitted: April 19<sup>th</sup>, 2025 – Accepted: June 15<sup>th</sup>, 2025 – Published: June 30<sup>th</sup>, 2025  
DOI: 10.13133/2284-4880/1778

## Dangerous prey: a case of cannibalism between workers of *Polistes jokahamae* (Hymenoptera: Vespidae, Polistinae)

Kazuo YAMAZAKI

Osaka Institute of Public Health, 1-3-3 Nakamichi, Higashinari, Osaka 537-0025, Japan – kazuo-yamazaki@iph.osaka.jp

### Abstract

Workers of paper wasps (Polistinae) typically hunt insects, such as caterpillars, to provision their larvae and rarely attack conspecific workers when foraging. In an urban park in central Japan, a worker of *Polistes jokahamae* Radoszkowski, 1887 was observed disarticulating the body of a conspecific worker. This observation represents a rare case of cannibalism between workers in paper wasps.

**Key words:** cannibalism, hunting behavior, paper wasp, prey repertoire, urban park.

### Introduction

Adult hornets, yellow jackets, and paper wasps (Hymenoptera: Vespidae) hunt a variety of arthropod prey, including caterpillars, flies, spiders, grasshoppers, and cicadas, to provision their offspring. They feed on flower nectar, tree sap, hemipteran honeydew, and sugary trophallactic liquids provided by their larvae (Richards 1971; Richter 2000; Schmidt 2009). Due to their carnivorous behavior, numerous instances of intraguild predation, including cannibalism (predation on conspecific individuals), have been documented in Vespidae. For example, the foundresses (queens) of some polistine species hunt larvae and pupae from other conspecific nests to feed their own larvae in incipient nests during the spring (Kasuya 1980; Miyano 1980; Legan et al. 2023). Hornet workers, such as *Vespa ducalis* Smith, 1852 and *V. mandarinia japonica* Radoszkowski, 1857, have been reported to rob larvae and occasionally workers of paper wasp nests (Sakagami & Fukushima 1957; Ono 1997). In *V. mandarinia japonica*, workers also prey on conspecific male wasps, as well as on other vespid wasps and honeybees in autumn (Ono 1997). However, workers of vespid wasps rarely feed on

conspecific workers, as vespid workers bear stings and strong mandibles (Boppré et al. 2017). The author observed a potential case of cannibalism between workers of a polistine species in central Japan, and reports the behavior below.

### Observation report

This observational study was conducted in an urban park, Nagai Park (34.36.52N, 135.31.2E, 7.3 m), in Osaka Prefecture, central Japan. On the evening of 14 July 2024, at 18:07, while walking along a path adjacent to a grove of *Juniperus chinensis* L. ‘Kaizuka’, the author observed a worker of *Polistes jokahamae* Radoszkowski, 1887 (Hymenoptera: Vespidae) grasping the cervix of another conspecific worker with its mandibles (Fig. 1A). The subdued worker with its mandibles (Fig. 1A). The subdued worker appeared fresh but motionless. After violently chewing at the cervix, the attacking wasp severed the head of the subdued wasp at 18:13 (Fig. 1B). The attacker then proceeded to extract the thoracic muscles with its mandibles (Fig. 1C). Pedestrians and cyclists repeatedly passed through the area, and possibly due to these disturbances,



**Fig. 1** – Cannibalistic behavior observed in *Polistes jokahamae*: **A**, a worker chewing the cervix of a conspecific worker; **B**, the head of the conspecific worker; **C**, the attacker extracting thoracic muscles from the decapitated worker; **D**, *Formica japonica* ant worker carrying the wasp head. Scale bars: 10 mm.

the attacking worker flew away at 18:29, leaving behind the remains of the conspecific individual. Subsequently, an ant worker of *Formica japonica* Motschoulsky (Hymenoptera: Formicidae) carried off the detached head (Fig. 1D). On July 21, 2024, the author searched for paper wasp nests within a 20 m radius of the observation site, but did not locate any.

This observation represents a very rare case of cannibalism in worker paper wasps. *Polistes jokahamae* typically prey on lepidopteran caterpillars, such as swallowtail butterflies and spongy moths (Yamasaki et al. 1980; Hirose & Takagi 1980; Furuta 1983). Given the defensive adaptations possessed by worker wasps, conspecific workers would appear to be unmanageable prey. Further, since intra-colony conflict is maladaptive, it is likely that the two workers were not nestmates. Alternatively, as the initial interaction between the workers was not observed, it is possible that the attacking worker encountered and used a moribund or freshly deceased conspecific, although necrophagous behavior has not been documented in this species.

Boppré et al. (2017) recently proposed that the avoidance of attacks on other wasps by vespid workers may explain the evolution of accurate wasp mimicry in certain Arctiinae moths and other insects. This mimicry likely evolved not only to deter vertebrate predators through their learned recognition of dangerous models, such as vespid wasps, but also to reduce the risk of attack by vespid wasps themselves due to a visual resemblance to vespid workers. To evaluate this hypothesis, it is necessary to examine the frequency of cannibalism between workers in the field. Since vespid workers transport prey to their nests in the form of masticated tissue balls, quantifying the species composition of their prey in the field would be challenging. Although DNA barcoding of prey is a useful tool for analyzing the diet composition of vespid wasps (Howse et al. 2022), conspecific DNA may be underrepresented or overlooked in such analyses. Consequently, additional observational reports are necessary to obtain a more comprehensive understanding of prey preference and the occurrence of cannibalism in vespid wasps.

**Acknowledgments** – This study was supported by a Grant-in-Aid from JSPS KAKENHI (Grant No. JP 24K08962). I thank FORTE Science Communications (<https://www.forte-science.co.jp/>) for English language editing.

## References

- Boppré M., Vane-Wright R.I., Wickler W. 2017. A hypothesis to explain accuracy of wasp resemblances. *Ecology and Evolution*, 7: 73–81. Doi: <https://doi.org/10.1002/ece3.2586>
- Furuta K. 1983. Behavioral response of the Japanese paper wasp (*Polistes jadwigae* Dalla Torre; Hymenoptera: Vespidae) to the gypsy moth (*Lymantria dispar* L.; Lepidoptera: Lymantriidae). *Applied Entomology and Zoology*, 18: 464–474.
- Hirose Y., Takagi M. 1980. Attraction of two species of *Polistes* wasps to prey wounded by them. *Applied Entomology and Zoology*, 15: 108–110. Doi: <https://doi.org/10.1303/aez.15.108>
- Howse M.W.F., McGruddy R.A., Felden A., Baty J.W., Haywood J., Lester P.J. 2022. The native and exotic prey community of two invasive paper wasps (Hymenoptera: Vespidae) in New Zealand as determined by DNA barcoding. *Biological Invasions*, 24: 1797–1808. Doi: <https://doi.org/10.1007/s10530-022-02739-0>
- Kasuya E. 1980. Behavioral ecology of Japanese paper wasps, *Polistes* spp. (Hymenoptera: Vespidae) I. Extranidal activities of *Polistes chinensis antennalis*. *Researches on Population Ecology*, 22: 242–254. Doi: <https://doi.org/10.1007/BF02530848>
- Legan A.W., Vogt C.C., Sheehan M.J. 2023. Postural analysis reveals persistent changes in paper wasp foundress behavioral state after conspecific challenge. *Ecology and Evolution*, 13: e 10436. Doi: <https://doi.org/10.1002/ece3.10436>
- Miyano S. 1980. Life tables of colonies and workers in a paper wasp, *Polistes chinensis antennalis*, in central Japan (Hymenoptera: Vespidae). *Researches on Population Ecology*, 22: 69–88. Doi: <https://doi.org/10.1007/BF02513536>
- Ono M. 1997. *Science of Japanese Hornets (Vespa spp.)*. Kaiyusha, Tokyo, 174 pp. [in Japanese]
- Richards O.W. 1971. The biology of the social wasps (Hymenoptera, Vespidae). *Biological Reviews*, 46: 483–528. Doi: <https://doi.org/10.1111/j.1469-185X.1971.tb01054.x>
- Richter M.R. 2000. Social wasp (Hymenoptera: Vespidae) foraging behavior. *Annual Review of Entomology*, 45: 121–150. Doi: <https://doi.org/10.1146/annurev.ento.45.1.121>
- Sakagami S.F., Fukushima K. 1957. Some biological observations on a hornet, *Vespa tropica* var. *pulchra* (du Buysson), with special reference to its dependence on *Polistes* wasps. *Treubia*, 24: 73–82.
- Schmidt J.O. 2009. Wasps, pp. 1049–1052. In: Resh V.H., Cardé R.T. (eds), *Encyclopedia of Insects*, Second Edition. Academic Press.
- Yamasaki M., Yamaguchi K., Iga M. 1980. Predation of *Papilio xuthus* larvae by *Polistes* wasps in relation to the colony development of the principal predator, *Polistes jadwigae* Dalla Torre (Hymenoptera: Vespidae). *Japanese Journal of Applied Entomology and Zoology*, 24: 28–30, [in Japanese with English summary]. Doi: <https://doi.org/10.1303/jjaez.24.28>

