

## **Predation of a large orb-web spider by a crab spider, *Thomisus labefactus* (Araneae: Thomisidae)**

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### **Abstract**

In the present study, I reported that the female adult crab spider *Thomisus labefactus* preyed on a female adult of the wasp spider *Argiope bruennichi* in the centre of the web. To my knowledge, the case that a large orb-weaving spider *A. bruennichi* is fed upon by the crab spiders with web-invading is not known previously. It has been shown that *T. labefactus*, considered commonly as a sit-and-wait predator, also aggressively hunt *A. bruennichi*, the large web-building spider, attacking its prey at the centre of web.

**Keywords:** Araneae, Araneophagy, Web-invading.

### **Introduction**

The crab spider, Thomisidae species, is a sit-and-wait (ambushing) predator commonly found on flowers (e.g. Morse, 1984). Huseynov (2007) reported that *Thomisus onustus* Walckenaer, 1805 is a common polyphagous crab spider in Palaearctic realm, where it primarily captures Diptera and Hymenoptera (94.2% of total prey). It has been also revealed that *T. onustus* attacked species which are about twice the size of the spider itself. The crab spider also feed upon other spiders. Some spiders are araneophagic, i.e., they prey on other spider individuals (e.g. Jackson & Wilcox, 1998). Araneophagic cases by *T. onustus* were described that there were six individuals of Arachnida (Araneae), five of Thomisidae and one of Theridiidae. In these cases, all of the six spiders were cursorial and non-orb-weavers (Huseynov, 2007).

In Japan, Korea, and China, *Thomisus labefactus* Karsch, 1881 is a common crab spider (Ono & Ogata, 2018). Shinkai (2010) reported that *T. labefactus* preyed on a

female orb-web spider, *Neoscona mellottei* (Simon, 1895), without entering into the web. A photograph has shown that *T. labefactus* captured *Trichonephila clavata* (L. Koch, 1878) without web invasion (Ono & Ogata, 2018). From these reports, *T. labefactus*, a sit-and-wait (ambushing) predator, also hunt web-building spiders unlike *T. onustus*.

In the present report, I report that *T. labefactus* captures an adult female orb web spider *Argiope bruennichi* (Scopoli, 1772) at the centre of the web. The body size of the spider was also estimated. The spider *T. labefactus* observed in the present study could be considered to be the first report to prey on *A. bruennichi*, a large web-building spider, in terms of the web-invading behaviour. Such an invasion into the centre of web of *A. bruennichi* by the crab spider has rarely been observed. The wasp spider *A. bruennichi* has observed to be attacked by the European hornet *Vespa crabro* Linnaeus, 1758 (e.g. Bruggisser *et al.*, 2012), birds such as *Parus major* Linnaeus, 1758 and *Phoenicurus aureus* (Pallas, 1776) (Wang *et al.*, 1995), and mantis *Tenodera sinensis* (Saussure, 1871) (Ono & Ogata, 2018).

### Material and Methods

The observations of the predation were carried out in the Bunkyo Campus at Nagasaki University. The photographs were taken using a Canon digital camera IXY 630 (Tokyo, Japan).



Fig. 1. *Thomisus labefactus* preyed on *Argiope bruennichi* in its centre of the web.

## Results and Discussion

I observed that an adult female *T. labefactus* preyed on an adult female *A. bruennichi* in the centre of the web on azalea (*Rhododendron* sp.) plant at 17:14 pm on October 31, 2019 (Fig. 1). Though the hunting was already complete as at the time of the observation, the same place was visited the following day at 15:36 (November 1, 2019), and *T. labefactus* was observed to still be foraging on the prey. Further observation revealed that *T. labefactus* dropped the dead individual of *A. bruennichi* from the web and walked out along the radial thread. From three photographs (two individuals were not overlapped each other) taken on November 1, body sizes ratio was measured by ruler and mean ratio was determined to be 206%.

To my knowledge, it has not been reported previously in published articles that *A. bruennichi* was attacked by a crab spider with web-invasion. The movement behaviour of *T. labefactus* on the radial threads was cautious, and the reason may be the fact that crab spiders are not web-building spiders; rather, they are cursorial and ambushing predators.

This raises the question that how could *T. labefactus* spider invade the web and defeat an orb-weaver? *T. labefactus* probably invaded the web by jumping, as this species usually do when hunting on flowers. Perhaps *T. labefactus* could utilize the web to invade into the centre of web like spiders of *Argyrodes* sp., also called dewdrop spiders, which are known to be kleptoparasitic, i.e., they steal host spiders' prey, invade, and reside in their host's web (e.g. Whitehouse, 1988). In order to prey a large spider aggressively, strong venom components that *T. labefactus* must have would contribute to paralyze the victim effectively. The venom composition of *T. labefactus* is not studied yet (Kuhn-Nentwig *et al.*, 2011; Pineda *et al.*, 2018), so further research about toxins will be of interest.

Why couldn't *A. bruennichi* do prevent the attack by *T. labefactus*? *A. bruennichi* is known as a species that specialized in catching large sized invertebrates, mainly grasshoppers (Acrididae species) (e.g. Szymkowiak *et al.*, 2005). Crab spiders are usually smaller than *A. bruennichi*, so the specialized tactics that *A. bruennichi* spiders have in catching larger preys may do not function to avoid crab spiders. This may explain why *T. labefactus* could deceive large orb-building spider such as *A. bruennichi*.

*Argiope bruennichi*, one of the large web-building spiders, was preyed on by *T. labefactus*, which is believed to be a sit-and-wait predator, with web-invasion. In the context of tactics that crab spiders hunt other spiders, the web-invading behaviour to prey large orb-weavers aggressively described herein will be an important step to further understanding ecology of sit-and-wait predators in their foraging behaviours. In the meaning of taking risk for crab spiders to prey large web-building spiders with web-invading, it will be a challenging task to clarify the flexibility and versatility of araneophagy in the future.

## Acknowledgments

I would like to express gratitude heartily to Dr. Mohammad Ameri and Editage (www.editage.com) for encouragement and English language editing, and Mr. Satomichi Nagai for helpful discussion. I also appreciate Mr. Yuya Suzuki and Dr. Yuki Baba for providing critical comments on an earlier draft of this article.

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