

Missing Web: Reporting a Gap in Fish Predation by Spiders (Arachnida: Araneae) in Indonesia

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Abstract

Indonesia, one of the world's most biodiverse countries, hosts a staggering array of ecosystems and species, many of which remain undocumented, particularly spider (Arachnida: Araneae). While spiders are widely recognized for preying on insects and small animals, fish predation by spiders is a rare behavior predominantly associated with semi-aquatic species such as *Dolomedes*. This study reports three instances of fish predation by spiders in Indonesia, observed across North Sumatra Province, Bangka Belitung Islands Province and East Kalimantan Province during biodiversity fieldwork in 2004, 2022 and 2024. Spider and fish species involved were identified using taxonomic keys and photographic documentation, revealing interactions between *Dolomedes* sp. and fish from taxa such as Cyprinid, Common Snakehead *Channa striata* and Licorice Gourami *Parosphromenus* sp. These findings provide valuable insights into this understudied phenomenon and highlight the need for further research into spider predation in Indonesia's freshwater habitats.

Keywords: Arachnida, Araneae, fish predation, Indonesia, semi-aquatic spider.

Introduction

Indonesia is one of the most biodiverse countries in the world, boasting a staggering variety of ecosystems that range from mangroves, coastal forests, lowland forests and montane forests (Iqbal *et al.* 2020, 2023; Arifah *et al.* 2025). This biodiversity hotspot is home to thousands of unique species, many of which are endemic to the region (Setiawan *et al.* 2018, 2020; Setiawan *et al.* 2022). Among its extraordinary wildlife, Indonesia harbors an impressive diversity of arachnids and insects, with many species yet to be discovered and documented, making it a crucial area for arachnological and entomological research (Pashkevich *et al.* 2022; Aprillia *et al.* 2025).

One of the most overlooked aspects of Indonesia's incredible biodiversity is its spiders (Rachman *et al.* 2024; Dhiya'ulhaq *et al.* 2025). Indonesia's spiders are astonishingly diverse, ranging from strikingly colorful jumping spiders (Salticidae), which exhibit complex hunting behaviors, to orb-weaving spiders (Araneidae) that create intricate webs to trap prey (Dhiya'ulhaq *et al.* 2023, 2024). Despite being critical components of ecosystems, spiders often get overshadowed by larger, more charismatic fauna like Sumatran Tiger *Panthera tigris sondaica*, Orangutans *Pongo* spp. or Komodo Dragons *Varanus komodoensis* (Ysnel *et al.* 2009; Milano *et al.* 2021).

Across its lush rainforests, winding mangroves, and diverse freshwater systems, Indonesia hosts a myriad of species engaged in remarkable predator-prey dynamics (Iqbal *et al.* 2025a, 2025b). Among these, spiders have long been recognized as formidable hunters, preying on insects and small animals (Ratz *et al.* 2023; Saksongmuang *et al.* 2024). Fish predation by spiders is a rare but remarkable

phenomenon, primarily associated with semi-aquatic spider species like those in the genus *Dolomedes* (Bleckmann & Lotz 1987; Figiel & Miller 1994). In this paper, we address the previously undocumented occurrence of fish predation by spiders in Indonesia, reporting a significant gap in knowledge regarding this behavior and its ecological implications in the region.

Methods

To investigate the gap in fish predation by spiders in Indonesia, field observations were conducted across three distinct regions: East Kalimantan Province, North Sumatra Province and Bangka Belitung Islands Province (Fig. 1). All observations are based on incidental observations of fish predation by spiders across three locations in Indonesia. These observations occurred during biodiversity fieldwork, where instances of spider behavior targeting fish were unexpectedly recorded. While the observations were not part of a structured study, they provide valuable insight into a rarely documented predator-prey interaction. Spider species were identified based on taxonomic keys and descriptions provided by Koh & Ming (2014), Koh & Bay (2019) and Koh *et al.* (2022); while fish species were identified following Sumatran fish references (Iqbal *et al.* 2018, 2020; Arifah *et al.* 2025).



Figure 1. The map displays the distribution of incidental observations of fish predation by spiders across three sites in Indonesia during the years 2004, 2022, and 2024. Yellow circles mark the locations, with numbers on the map corresponding to entries in Table 1.

All observations were documented with photographs, and detailed field notes, including information on the location, habitat type, spider behavior, and the size/species of fish involved (where identifiable). While the unstructured nature of these observations limits the scope of analysis, they provide a foundation for future investigations into spider predation on fish in Indonesia.

Results and Discussion

Three instances of fish predation by spiders were recorded in East Kalimantan, North Sumatra, and Bangka Belitung Islands Province, showcasing the phenomenon in varied locations across Indonesia, as presented in Table 1. All of spiders are documented as *Dolomedes* species. *Dolomedes* is closely related to *Nilus*, a genus of waterside fishing spiders. In the field, *Dolomedes* are recognizable by their shorter abdomen and distinctive velvety fringes on the sides of their carapace and abdomen, setting them apart from *Nilus* (Koh & Ming 2014; Koh *et al.* 2021). *Dolomedes* species from East Kalimantan features a black body adorned with frequent white spots on both its body and legs (Fig. 2). In contrast, the *Dolomedes* spider from North Sumatra exhibits a plain yellow coloration without any distinct patterns or spots (Fig. 3). Meanwhile, the *Dolomedes* spider from Bangka Island resembles the East Kalimantan variant but lacks the white spots on its body and legs (Fig. 4).

Table 1. A record of incidental observations of fish predation by spiders at three locations in Indonesia, spanning the years 2004, 2022, and 2024.

No.	Date	Location/Province	Spider (species)	Fish (species)
1	Undated, 2004	East Kalimantan	<i>Dolomedes</i> sp.	Cyprinid (Cyprinidae)
2	26 October 2022	North Sumatra	<i>Dolomedes</i> sp.	Common Snakehead <i>Channa striata</i>
3	8 September 2024	Bangka Island	<i>Dolomedes</i> sp.	Gourami <i>Parosphromenus</i> sp.

The fish species from the three locations represent distinct taxa. In East Kalimantan, the fish is an unidentified cyprinid species, whereas the fish from North Sumatra is a juvenile Common Snakehead *Channa striata*. On Bangka Island, the fish is identified as a Gourami *Parosphromenus* sp.. These differences in fish taxa highlight the diverse aquatic ecosystems across Indonesia. The variation in prey species may also suggest unique hunting adaptations among *Dolomedes* spiders in different regions.



Figure 2. The spider *Dolomedes* sp. fed a cyprinid fish species in East Kalimantan Province in 2024 (Photograph: Riza Marlon).



Figure 3. A spider *Dolomedes* sp. fed on a young Common Snakehead *Channa striata* on 26 October 2022 in North Sumatra Province (Photograph: Akhmad Junaedi Siregar).



Figure 4. A spider *Dolomedes* sp. fed on a Licorice Gourami *Parosphromenus* sp. on 8 September 2024 in Bangka Island, Bangka Belitung Islands Province, Sumatra." (Photograph: Swarlanda).

The results demonstrate that fish predation by spiders, though incidental and infrequent, does occur in Indonesia's diverse aquatic habitats. These findings align with global reports of similar behavior in semi-aquatic spiders, such as those in the *Dolomedes* genus (Nyffeler & Pusey 2014). However, this study provides some of the first documented evidence of such interactions in Indonesian ecosystems, involving known fish species such as cyprinids, snakeheads, and gouramy. For *Dolomedes*—semi-aquatic spiders known for hunting on water surfaces—scientists may still face challenges in identifying species, distinguishing them from similar ones, and organizing them into clear categories, likely due to limited studies, overlapping characteristics, or insufficient genetic data, leaving many species within the genus undocumented, poorly described, or even undiscovered (Tanikawa & Miyashita 2008; Cazanove *et al.* 2025).

The observation from East Kalimantan suggests that peat swamp forests, with their waterlogged habitats and dense vegetation, may provide an ideal environment for spider predation on cyprinids. Cyprinids are often abundant in these slow-moving waters (Iqbal *et al.* 2017a, 2017b), making them accessible prey for spiders. Similarly, the rainforest riverbank in North Sumatra revealed predation on snakeheads, which are air-breathing fish commonly found in shallow water (Qin & Fast 1996). This suggests that spiders may exploit the snakehead's surface activity for successful predation. In Bangka Belitung, the predation of gouramy in heat forest (kerangas) or peat swamp forest highlights the adaptability of spiders to nutrient-poor and acidic environments, where juvenile gouramy are often found navigating the roots and shallow waters (Iqbal 2011).

The scarcity of such observations may be attributed to several factors. First, fish predation by spiders is likely a rare or opportunistic behavior, making it difficult to observe during structured studies. Second, the behavior may occur more frequently in remote or underexplored habitats, which are challenging to access. Finally, ecological pressures such as habitat degradation or pollution could be reducing the prevalence of such interactions in certain regions. These findings open up opportunities for further research. Structured studies focusing on semi-aquatic spiders in Indonesia could provide more comprehensive data on the frequency, prey preference, and ecological significance of fish predation. Additionally, understanding how environmental factors like water quality or vegetation density influence this behavior could enhance our knowledge of predator-prey dynamics in aquatic ecosystems.

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