International Journal of Zoology and Applied Biosciences **ISSN: 2455-9571**
Volume 11, Issue 2, pp: 47-53, 2026
https://doi.org/10.55126/ijzab.2026.v11.i02.007 **http://www.ijzab.com**

Research Article

A PRELIMINARY INVESTIGATION ON THE JUMPING SPIDER *PLEXIPPUS PAYKULLI* (ARANEAE: SALTICIDAE) FROM AKOLA DISTRICT, MAHARASHTRA, INDIA

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Article History: Received 24th December 2025; Accepted 15th February 2026; Published 1st March 2026

ABSTRACT

Jumping spiders belonging to the family Salticidae constitute the largest family within the order Araneae and play a significant role in natural pest regulation. The present study investigates the occurrence, habitat preference, and ecological importance of *Plexippus paykulli* in the Akola District of Maharashtra, India. Field surveys were conducted from June 2021 to August 2024 using hand picking, sweep netting, inverted umbrella technique, vegetation beating, litter sampling, and visual search methods. Specimens were identified using standard taxonomic keys and observed under stereo-zoom binocular microscopy. Both male and female specimens of *P. paykulli* were recorded, predominantly from human habitations, agro-ecosystems, and garden habitats. The species exhibited wide adaptability and significant abundance compared to other Salticidae members. *Plexippus paykulli* is commonly found in and around man-made structures, particularly on buildings; however, it has also been recorded from citrus groves and cotton fields. Globally, 49,159 species of spiders belonging to 4,207 genera and 128 families have been documented. Among these, the family Salticidae is the largest, comprising 6,334 species distributed across 659 genera. Spiders play a crucial role in natural insect pest control and contribute significantly to agro-ecosystem sustainability without causing ecological harm. The study highlights the importance of jumping spiders as efficient biological control agents and emphasizes the need for detailed regional spider diversity assessments.

Keywords: Jumping spider, Salticidae, *Plexippus paykulli*, Agro-ecosystem, Biological control, Akola District.

INTRODUCTION

Jumping spiders belonging to the family Salticidae are among the most fascinating arachnids due to their exceptional agility, advanced vision, and unique hunting strategies. The family Salticidae is the largest family within the order Araneae, comprising more than 600 described genera and over 6,000 species worldwide, accounting for approximately 13% of total global spider diversity (World Spider Catalog, 2021). Jumping spiders are diurnal, actively hunting predators that do not rely on webs for prey capture, which makes them taxonomically and ecologically distinct from other spider families (Jackson and Pollard, 1996). The Indian spider fauna comprises 181 species belonging to 62 genera of jumping spiders (Salticidae) (Siliwal *et al.*, 2005). In Maharashtra, jumping spiders are represented by 29 species across 18 genera, indicating considerable regional diversity (Asarkar and Ade, 2017). However, studies conducted in the agro-ecosystems of Akola District have reported the presence of only two species of Salticidae, highlighting a significant gap in region-specific documentation (Asarkar and Ade, 2017). They are widely distributed and occur in a variety of habitats including tropical and temperate forests, deserts, mountains, agro-ecosystems, gardens, leaf litter, tree canopies, sandy substrates, and human habitations (Foelix, 2011).

One of the most remarkable features of salticid spiders is their highly developed visual system, which is considered the most advanced among arthropods. Jumping spiders possess four pairs of eyes, including a movable principal pair known as the anterior median eyes (AME), which provide high-resolution vision and depth perception

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(Harland and Jackson, 2000). The retina of the AME contains multiple layers of photoreceptor cells, enabling complex image formation. Physiological studies suggest that salticids may exhibit tetrachromatic colour vision with sensitivity extending into the ultraviolet spectrum, allowing them to detect prey, predators, and courtship signals efficiently (Peaslee and Wilson, 1989). Morphologically, jumping spiders are well adapted for active predation and are capable of walking, running, and performing powerful jumps that may exceed 50 times their body length, facilitated by rapid changes in hemolymph pressure (Richman *et al.,* 1992).In addition to their predatory efficiency, jumping spiders exhibit complex courtship behaviour. Males perform elaborate visual displays involving foreleg waving, rhythmic movements, and the display of colorful chelicerae to attract females (Jackson and Pollard, 1996). Egg laying generally occurs in silken cocoons constructed in protected microhabitats such as crevices, beneath leaves, or within man-made structures (Foelix, 2011). Owing to their role as efficient insect predators, salticid spiders contribute significantly to natural biological control and help maintain ecological balance in agro-ecosystems without causing environmental harm (Caleb and Acharya, 2020). Akola District is characterized by major river systems such as the Katepurna, Purna, Morna, and Uma, which support extensive agricultural activities. Owing to this diverse landscape, spiders occur across multiple ecosystems including urban, agro-ecosystem, and forest habitats. As active insect predators, jumping spiders play an important role in regulating pest populations and possess considerable economic importance in sustainable agriculture. Therefore, the present study aims to document the diversity of Salticidae spiders in Akola District and to enhance understanding of their ecological significance within agro-based ecosystems

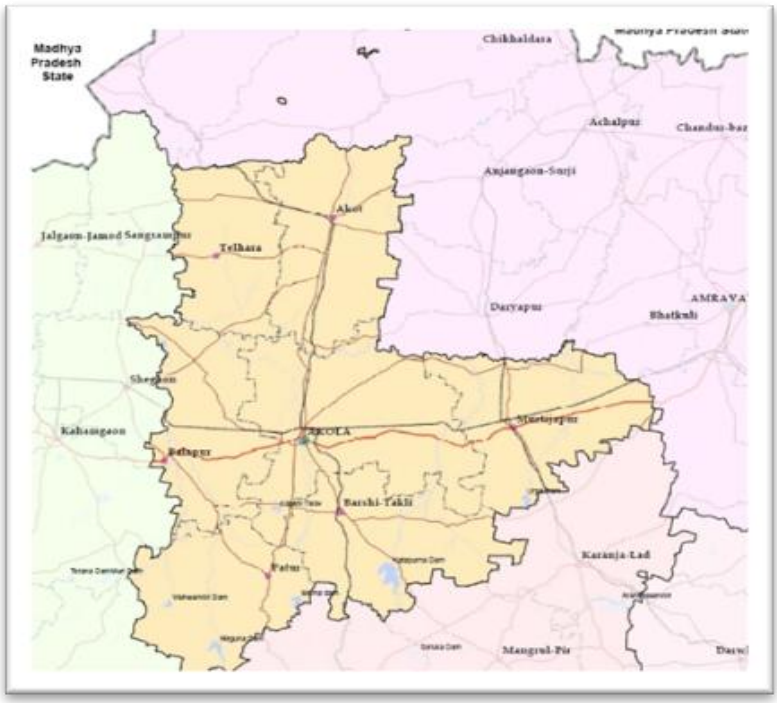

Figure 1. Akola Map showing study site**.**

MATERIAL AND METHODS

Study Area

Akola District is located in the central-eastern part of Maharashtra State, India, between 20.17° and 21.16° N latitude and 76.7° and 77.4° E longitude, covering a geographical area of approximately 5,428 km². The district is administratively divided into seven talukas, namely Akola, Akot, Balapur, Murtijapur, Telhara, Patur, and Barshitakl (Figure 1). Akola District is enriched by major river systems such as the Katepurna, Purna, Morna, and Uma, which support extensive agricultural activities across the region. Due to its diverse landscape, spiders are found across a variety of ecosystems in the district, including urban areas, agro-ecosystems, forest regions, and semi-natural habitats. Akot and Telhara talukas include portions of the Melghat Tiger Reserve, while Barshitakli taluka encompasses the well-known Katepurna Wildlife Sanctuary, providing suitable habitats for rich arachnid diversity. Considering this ecological heterogeneity, spider sampling was conducted at selected sites representing different habitat types across the district. As spiders are active insect predators and play a vital role in natural pest control, the present study focuses on assessing the diversity

of Salticidae spiders in Akola District and evaluating their ecological and economic importance within agro-based ecosystems.

Collection of Specimen

Spider specimens were collected from selected sampling sites representing different habitat types using standard and widely accepted arachnological sampling techniques. Multiple methods were employed sweep netting, ground hand collecting, aerial hand collecting, vegetation beating, litter sampling to ensure maximum coverage of microhabitats and to document the diversity of Salticidae spiders effectively.

Sweep Netting

Sweep netting was used to collect foliage-dwelling spiders from low-level vegetation, particularly shrubs and herbs up to 2 m in height. A sweep net consisting of a 90 cm handle and a 40 cm diameter ring was used. The net was moved systematically back and forth across vegetation to ensure thorough sampling of the ground-layer flora. Collected specimens were transferred onto a white canvas for easy observation. The net was emptied at regular intervals to prevent damage to specimens and to minimize sample loss.

Ground Hand Collecting

Ground hand collection was employed to collect spiders occurring from ground level up to knee height. This method involved direct searching and manual collection of visible spiders from soil surfaces, leaf litter, broken logs, stones, and rock crevices. This technique was particularly effective for capturing free-living and cursorial species inhabiting ground-level microhabitats.

Aerial Hand Collecting

Aerial hand collecting was carried out to collect spiders present from knee level to arm's reach height. This method targeted spiders inhabiting foliage, stems of living and dead shrubs, high herbs, and tree trunks. Both web-building and free-living species were collected carefully using forceps or soft brushes.

Figure 2 a. Male *Plexippus paykulli* (Araneae: Salticidae) b. Female *Plexippus paykulli* (Araneae: Salticidae).

Vegetation Beating

Vegetation beating was employed to sample spiders inhabiting bushes, shrubs, small trees, and tall herbaceous vegetation. Vegetation was gently beaten using a stick, and dislodged spiders were collected on a white cloth measuring approximately 1 m × 1.2 m spread beneath the vegetation. This method proved effective for collecting cryptic and foliage-dwelling species.

Litter Sampling

Litter sampling involved the manual collection of leaf litter and other organic debris from the forest floor and agro-fields. The collected litter was placed in a large tray and carefully sorted to extract spiders. This method facilitated the collection of litter-dwelling and juvenile specimens.

Observation, Photography, and Identification

Collected specimens were examined in the field using a stereo-zoom binocular microscope whenever necessary, particularly for small or minute spiders. Photographs were taken in their natural habitats using a Canon 60D digital camera equipped with a macro lens. Specimens were identified using standard taxonomic keys and published literature. Specimens intended for detailed morphological examination were preserved in 70% ethanol for the study of diagnostic characters, including leg measurements, pedipalps, and epigynes. After documentation and photography, live specimens were released back into their respective habitats wherever possible.

RESULTS AND DISCUSSION

Adult male and female specimens of *Plexippus paykulli* (Araneae: Salticidae) were successfully collected and examined during the present study. Specimens intended for detailed morphological examination were preserved in 70% ethanol and analyzed for diagnostic characters including body length, carapace dimensions, leg measurements, pedipalps, and epigynes. The present study revealed marked sexual dimorphism in *Plexippus paykulli*. Males measured approximately 9.0–11.0 mm in total body length and were characterized by a black to dark brown body with prominent white markings. The carapace in males was high and robust, and the abdomen displayed a broad white median longitudinal stripe (fig.2a) accompanied by lateral white stripes and two distinct white spots near the posterior end. Short greyish body hairs, occasionally with reddish accents, were observed. The anterior median eyes were conspicuous, and the forelegs were longer and stronger, playing an important role in courtship displays and prey capture. Male pedipalps were well developed and structurally modified for copulation. Females were slightly larger, measuring approximately 9.5 – 12.0 mm in body length, and exhibited a brownish-grey coloration (Figure 2b) . The carapace was comparatively broader and darker around the eye region. A broad tan median stripe extended from the carapace onto the abdomen, where it divided into two chevron-shaped markings, with two white spots present near the posterior end of the abdomen. Females possessed a distinct and well-developed epigyne, while the pedipalps remained unmodified. Behavioral observations indicated that females were responsible for egg sac construction and maternal care. The lens-shaped egg sac, measuring approximately 3 cm in diameter, typically contained 35–60 eggs, which were guarded by the female until spiderlings emerged within three to four weeks. These morphological and reproductive differences provide reliable criteria for distinguishing male and female *P. paykulli* in both field and laboratory conditions.

The morphological measurements of *Plexippus paykulli* reveal slight sexual dimorphism, with females generally larger than males. The total body length of male's ranges from 9.0 to 11.0 mm, while females measure slightly longer at 9.5 to 12.0 mm. The carapace of males is 4.2–4.8 mm long and 3.5–4.0 mm wide, compared to 4.5–5.2 mm in length and 3.8–4.4 mm in width in females. Similarly, the abdomen of females (5.0–6.8 mm in length and 3.2–4.0 mm in width) is larger than that of males (4.5–5.8 mm in length and 2.8–3.4 mm in width). Leg measurements show that males have longer first legs (10.5–13.0 mm) compared to females (9.0–11.5 mm), while the fourth legs are slightly longer in males (9.0–11.0 mm) than in females (8.5–10.5 mm). These differences in size and leg length may reflect variations in behavior, predatory efficiency, and reproductive roles between the sexes (Table 1). Field observations revealed that *Plexippus paykulli* is an active, diurnal predator frequently encountered on building walls, tree trunks, agricultural vegetation, and garden habitats. The species does not construct prey-capture webs but relies on visual detection, stalking, and rapid jumping to subdue insect prey. Throughout the study period, no harmful interactions with humans were observed, confirming that *P. paykulli* is harmless and ecologically beneficial.The presence of *P. paykulli* across agro-ecosystems highlights its importance as a natural biological control agent, contributing to the regulation of insect pest populations and supporting sustainable agricultural practices.

Table 1. Morphometric measurements of male and female ***Plexippus paykulli*** (mm).

Character	Male (mm)	Female (mm)
Total body length	9.0 – 11.0	9.5 – 12.0
Carapace length	4.2 – 4.8	4.5 – 5.2
Carapace width	3.5 – 4.0	3.8 – 4.4
Abdomen length	4.5 – 5.8	5.0 – 6.8

Abdomen width	2.8 – 3.4	3.2 – 4.0
Leg I length (longest)	10.5 – 13.0	9.0 – 11.5
Leg IV length	9.0 – 11.0	8.5 – 10.5

Jumping spiders (Araneae: Salticidae) are a diverse and ecologically significant family, exhibiting unique behavioral, morphological, and ecological adaptations that distinguish them from other spider families. Across the studies examined, several key aspects of their biology emerge, including habitat preferences, feeding behavior, locomotion, and distribution. The discovery of new species continues to expand our understanding of jumping spider diversity. Bao Hui You and Peng Jin Xian (2002) reported six novel species from Taiwan, highlighting the unexplored richness of regional spider fauna. Similarly, Caleb John and Acharya Shelley (2020) described new species from India, emphasizing that the Indian subcontinent remains an important area for Salticidae research. These studies collectively underscore the ongoing need for taxonomic and faunistic surveys to document species diversity, especially in understudied regions such as Pench National Park in Maharashtra, India (Gajbe, 2020). Feeding ecology and predatory behavior are crucial for understanding the ecological roles of jumping spiders. Jackson and Pollard (1996, 2001) demonstrated their specialized predatory strategies, including the ability to feed on nectar and vertebrate prey (Nyffeler *et al*., 2017), suggesting ecological flexibility and the potential for varied energy sources. Field-based studies, such as those by Schadegg and King (2024), confirm that prey selection is influenced by habitat and substrate, which aligns with observations of substrate-dependent vibration transmission in Habronattus species (Sun *et al*., 2021). These findings indicate that both microhabitat selection and foraging behavior are tightly coupled in Salticidae ecology. Morphologically, jumping spiders exhibit adaptations for precise locomotion and predation. The structure of their legs, particularly the hypertrophied anterior legs, facilitates remarkable jumping performance (David E. Hill, 2006), while their complex visual system supports advanced spatial navigation and prey detection (Heinze, 2014; Samuel Aguilar-Arguello & Nelson, 2021). Such traits contribute to their suitability as model organisms in comparative cognition studies, with research highlighting their learning, memory, and problem-solving abilities.

Conservation perspectives are increasingly relevant, particularly for species of special concern. Ehmann (2002) and Ehmaan *et al*. (2016) emphasized the vulnerability of certain Minnesota jumping spiders to habitat alteration, pointing toward the importance of monitoring and management strategies. In India, studies by Maheshwari & Chopda (2017) and Singh & Garima (2022) contribute baseline faunal records that are essential for local conservation planning. Overall, the collected literature highlights that jumping spiders are not only taxonomically diverse but also ecologically versatile and behaviorally sophisticated. Further studies integrating taxonomy, ecology, behavior, and conservation are essential for comprehensive understanding and effective preservation of Salticidae diversity. Additionally, their presence across varied habitats, from experimental forests in Taiwan (Bao Hui You & Peng Jin Xian, 2002) to urban and natural landscapes in India and North America, indicates their adaptability and potential as bioindicators of environmental health.

CONCLUSION

The present investigation documents the occurrence, habitat association, and ecological relevance of *Plexippus paykulli* in the Akola District of Maharashtra and contributes to the limited regional data on Salticidae diversity. The consistent presence of the species across human habitations, agro-ecosystems, gardens, and cultivated fields over the study period indicates high ecological plasticity and adaptability to both natural and anthropogenic environments. The recording of both sexes further suggests a stable and well-established population in the region. The dominance and wide distribution of *P. paykulli* highlight its potential role as an efficient predatory species within local ecosystems.

As an active visual hunter, this jumping spider contributes significantly to the suppression of insect pest populations, particularly in agricultural landscapes such as cotton and citrus fields. Its abundance in man-made structures and farmlands underscores its importance in natural pest regulation and supports its utility as a component of sustainable and environmentally benign pest management strategies. Considering the global diversity of spiders and the prominence of Salticidae as the largest family within Araneae, region-specific ecological studies are essential for understanding species-level contributions to ecosystem functioning. The findings of the present study reinforce the ecological significance of jumping spiders in maintaining trophic balance and promoting agro-ecosystem sustainability without adverse ecological consequences. In conclusion, *Plexippus paykulli* represents a key predatory arthropod with substantial biological control potential in the study area. The study emphasizes the need for comprehensive regional surveys and long-term monitoring of spider fauna to strengthen biodiversity documentation and inform conservation-oriented agricultural practices. Such efforts are crucial for integrating natural predators into sustainable agro-ecological frameworks and reducing reliance on chemical pest control measures.

ACKNOWLEDGEMENT

The present research paper represents the culmination of the work carried out by the first author under the expert supervision and valuable guidance of Dr. Prakash P. Ade**,** Professor and Head, Department of Zoology, Shri Shivaji College, Akola. The authors express their sincere gratitude to him for his constant encouragement, scholarly insights,

and constructive suggestions, which were instrumental in shaping the research and improving the quality of this study. The authors are also thankful to Dr. Rameshwar M. Bhise**,** Principal, Shri Shivaji College, Akola, for his invaluable support and for providing the necessary infrastructural and laboratory facilities required for the successful completion of this research work.

CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

FUNDING

This study received no specific funding from public, commercial, or not-for-profit funding agencies.

AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

REFERENCE

Ahmed, J., Khalap, R., Kumbhar, S., Hill, D. E., Pearce, R. J., & Mohan, K. (2019). Field notes on jumping spider *Telemonia dimidiata* in Maharashtra (Araneae: Salticidae; Plexippina). *Peckhamia*.

Aguilar-Arguello, S., & Nelson, X. J. (2021). Jumping spiders: An exceptional group for comparative cognition studies. School of Biological Sciences, University of Canterbury.

Asarkar, G. M., & Ade, P. P. (2017). Spider density and diversity in agroecosystem of Akola district (Vidarbha). *International Journal of Life Sciences*, Special Issue A8, 103–108.

Bao, H. Y., & Peng, J. X. (2002). Six new species of jumping spiders (Araneae: Salticidae) from Hui-Sun Experimental Forest Station, Taiwan.

Brandt, E. E., Yoshan, S., Damian, E. O., & Mhantre, N. (2021). Jump: A small jumping spider. University of California, Berkeley & University of Western Ontario.

Caleb, J. T. D., & Acharya, S. (2020). Jumping spiders of the genus *Phintelloides* from India, with the description of a new species (Araneae: Salticidae: Chrysillini).

Caleb, J. T. D., & Acharya, S. (2020). Jumping spiders (Araneae: Salticidae) of India: Diversity, taxonomy and biology. *Journal of Arachnology, 48*(3), 243–258.

Dar, A. F. (2015). Study of spider fauna from Wadali Lake, Amravati of Vidarbha region. Department of Zoology, Govt. Vidarbha Institute of Science & Humanities.

Ehmann, J. W. (2002). Conservation biology of special concern jumping spiders (Araneae: Salticidae) of Minnesota. Plattsburgh State University of New York.

Ehmann, J. W., Heins, C., Jacobsmeyer, D., Moravec, J., & Sandrich, M. (2016). New records for Minnesota jumping spiders (Araneae: Salticidae) including *Habronattus* spp. with consideration of future state special concern and threatened species listings.

Foelix, R. F. (1996). *Biology of spiders*. Oxford University Press.

Foelix, R. F. (2011). *Biology of spiders* (3rd ed.). Oxford University Press.

Forster, L. M. (1977). A qualitative analysis of hunting behaviour in jumping spiders (Araneae: Salticidae). *New Zealand Journal of Zoology, 4*(1), 51–62. https://doi.org/10.1080/03014223.1977.9517936

Gajbe, P. U. (2016). Record of some spiders (Arachnida: Araneae) from Karhandla in Nagpur District, Maharashtra. *Journal of New Biological Reports, 5*(3), 133–138.

Gajbe, P. U. (2020). First record of some jumping spiders (Arachnida: Araneae: Salticidae) from Pench National Park, Maharashtra State, India. *Arthropods, 9*(4), 171–174.

Harland, D. P., & Jackson, R. R. (2000). Eight-legged cats and how they see: A review of recent research on jumping spiders. *Ciba Foundation Symposium, 233*, 133–160.

Heinze, S. (2014). Neurobiology: Jumping spiders getting on board. Stanford University School of Medicine.

Hill, D. E. (2006). Jumping spider feet (Araneae: Salticidae) (Version 3).

Jackson, R. R. (2009). Predator–prey interactions between jumping spiders (Araneae: Salticidae) and *Pholcus phalangioides* (Araneae: Pholcidae). *Journal of Zoology, 220*(4), 553–559.

Jackson, R. R., & Pollard, S. D. (1996). Predatory behaviour of jumping spiders. *Annual Review of Entomology, 41*, 287–308.

Jackson, R. R., Pollard, S. D., Nelson, X. J., Edwards, G. B., & Barrion, A. T. (2001). Jumping spiders (Araneae: Salticidae) that feed on nectar.

Kanesharatnam, A., Nilani, & Suresh, B. P. (2018). New genus and three new species of jumping spiders (Araneae: Salticidae) from Sri Lanka. National Institute of Fundamental Studies.

Made, T., & Bumroongsook, S. (2017). Life history of jumping spider *Plexippus paykulli*. King Mongkut's Institute of Technology Ladkrabang.

Nyffeler, M., Edwards, G. B., & Krysko, K. L. (2017). A vertebrate-eating jumping spider (Araneae: Salticidae) from Florida, USA.

Peaslee, A. G., & Wilson, G. (1989). Spectral sensitivity of jumping spiders. *Journal of Comparative Physiology A, 164*, 359–363.

Richman, D. B., & Jackson, R. R. (1992). A review of the ethology of jumping spiders (Araneae: Salticidae).

Richman, D. B., Cutler, B., & Hill, D. E. (1992). Salticidae of North America. *Journal of Arachnology, 20*, 133–147.

Schadegg, P., & King, R. J. (2024). Feeding habits of the jumping spider *Anasaitis canosa* (Araneae: Salticidae) in the field. University of Central Florida.

Siliwal, M., Molur, S., & Biswas, B. K. (2005). Indian spiders (Arachnida: Araneae): Updated checklist 2005. *Zoos' Print Journal, 20*(10), 1999–2049.

Singh, R., Singh, G., & Singh, B. B. (2020). Diversity of Amycoida and Astioida (Arachnida: Araneae: Salticidae: Salticinae) in India: A checklist and bibliography. *Journal of Entomology and Zoology Studies, 8*(5), 1478–1488.

Singh, R., & Singh, G. (2022). Diversity of spiders (Chelicerata: Araneae) in Uttar Pradesh and Uttarakhand, India. Deendayal Upadhyaya University of Gorakhpur.

Sun, Y., Brandt, E. E., Damian, E. O., Rosenthal, M., & Kamath, A. (2021). Jumping spiders (*Habronattus clypeatus*) exhibit substrate preferences that partially maximize vibration transmission efficiency.

World Spider Catalog. (2021). *World spider catalog*. Natural History Museum Bern.