



FAUNAL DIVERSITY OF SPIDER FAMILIES DICTYNIDAE, DYSDERIDAE, ERESIDAE AND FILISTATIDAE (ARANEOMORPHAE: ARANEAE: ARACHNIDA) IN INDIA

Akhilesh Sharma¹, Garima Singh², and Rajendra Singh^{3*}

¹Department of Zoology, S.P.P.G. College, Shoharatgarh, Siddharthnagar, U.P., India

²Department of Zoology, University of Rajasthan, Jaipur, Rajasthan, India

³Department of Zoology, Deendayal Upadhyay University of Gorakhpur, U.P., India

Article History: Received 29th October 2020; Accepted 08th December 2020; Published 22nd January 2021

ABSTRACT

The present article deals with the faunal diversity of four families of araneomorph spiders, viz. Dictynidae, Dysderidae, Eresidae and Filistatidae (Araneae: Arachnida) in different Indian states and union territories. None of the spider species of these families is recorded from Bihar, Himachal Pradesh, Jharkhand, and northeast India (Arunchal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura). Two families Dictynidae and Filistatidae are represented by 16 and 13 species, respectively. Other families are very poorly represented, single species in Dysderidae and five species in Eresidae. However, the species of Eresidae are widely distributed in the country, particularly, *Stegodyphus sarasinorum* Karsch, 1892. Maximum number of spider species were recorded in Maharashtra (15 species) followed by Gujarat (14 species), Jammu & Kashmir (8 species), Tamil Nadu (7 species), Karnataka, Kerala and Madhya Pradesh (6 species each), Rajasthan (5 species) and less number in other states and union territories. Of the 31 species from these four families, 17 species are endemic to India.

Keywords: Spiders, Faunal Diversity, Dictynidae, Dysderidae, Eresidae, Filistatidae, India, Checklist.

INTRODUCTION

Spiders are the members of the order Araneae of class Arachnida with 49,084 described species under 4,205 genera and 128 families (WSC, 2021). Earlier, (Keswani *et al.*, 2012) updated the Indian spider fauna listing 1686 species belonging to 438 genera in 60 families, out of which 1238 species belonging to 340 genera were reported to be endemic. Recently, Indian spider fauna was updated up to 1855 species belonging to 477 genera in 61 families (Caleb & Sankaran, 2021). However, there are likely many species that have escaped the human eye to this day and many specimens stored in collections waiting to be described and classified. It is estimated that only 20-30% of existing species have been described. In spite of current researches on diversity and distribution of spiders in India, their number is insufficient as compared to other parts of the world. Recently, the species distribution of 21 families of spiders was updated in India (Sharma *et al.*, 2020a, b;

Singh & Singh, 2020; Singh *et al.*, 2020a, b, c, d, e, f, 2021).

The present article deals with the faunal distribution of four families of Araneomorphae spiders, Dictynidae, Dysderidae, Eresidae and Filistatidae in different Indian states and union territories. Although a moderate amount of knowledge of these families is available in India but the literature are all scattered and so far no consolidated account is available regarding their distribution pattern across the country. Therefore, this present work was undertaken to provide up-to-date information of these families in the light of modern taxonomic concept. Several species reported and described from India appear to be misidentified and the records are reported erroneously as these species are said to be identified by using existing literature without a re-examination of the corresponding types and without consulting any spider taxonomist of the

*Corresponding Author: Dr. Rajendra Singh, Professor, Department of Zoology, Deendayal Upadhyay University of Gorakhpur (U.P.), India, Email: rsinghpu@gmail.com, Mobile: +91 7007691043

country (Singh & Singh, 2020). Hence, such reports need re-examination. Also, in most of the literature, published earlier, there are several errors in their scientific names even in the recent ones because such contents become outdated quickly and, due to their perceived comprehensiveness, researchers sometimes fail to notice newer sources of data. In addition, researches continue to add knowledge on spider taxonomy with the description of new taxa, their modified status, and other nomenclatural decisions (Singh *et al.*, 2020b).

MATERIALS AND METHODS

This checklist is prepared on the basis of published literature in surveys, books, journals, theses and World Spider Catalogue (WSC) up to 10 January, 2021. In the present checklist, attempts have been made to correct such errors in the scientific names of the spiders. Only those synonymies were referred that were reported in India. For other synonymies, WSC (2021) may be consulted. All the endemic species are marked with (*). Seemingly erroneous records are marked with (†). If the spider species is not endemic, its elsewhere distribution is also provided.

RESULTS AND DISCUSSION

A. Family Dictynidae O. Pickard-Cambridge, 1871

Dictynidae is a moderately large family of cribellate, hackled band-producing spiders, commonly known as meshweavers. The family comprises 470 species described under 52 genera worldwide (WSC, 2021). These spiders usually spin irregular and complex web on the tops of small bushes or the dry standing remains of weeds, making a tangle of silken fibers, sometimes with zig-zag lines. The mesh weavers are small, less than 4 mm long and sometimes they are difficult to notice as they hide in a silk retreat near the center of the tangle. These spiders may be either eyeless, or have six or eight eyes in two rows; their anterior lateral spinnerets are separated and the posterior lateral spinnerets are longer than the anterior lateral spinnerets. Some species of meshweavers live in different kind of social organization (Jackson, 1979).

In India, its representation is very poor. Only 16 species belonging to 8 genera are reported from only 11 Indian states and 3 union territories and two-third of the species (10 species) are endemic. Two species, *Nigma walckenaeri* (Rower, 1951) and *Nigma puella* (Simon, 1870) seem to be erroneous record from India. Few species of the family reported by Caporiacco (1935) from Jammu & Kashmir remained unnoticed (Caleb & Sankaran, 2021). Maximum species (7) of these spiders were recorded in Maharashtra. Following is the detail list of these spiders distributed in Indian states and union territories and elsewhere.

1. *Ajmonia bedeshai* (Tikader, 1966)*

=*Dictyna bedeshai* Tikader, 1966

=*Dictynomorpha bedeshai* (Tikader, 1966)

- Andaman & Nicobar Islands (Tikader, 1977)

- Maharashtra (Tikader, 1966a, 1977)

2. *Ajmonia marakata* (Sherriffs, 1927)*

=*Dictyna marakata* Sherriffs, 1927

=*Dictyna tungabhadrai* Tikader, 1966

=*Dictynomorpha marakata* (Sherriffs, 1927)

- Karnataka (Tikader, 1966a)
- Maharashtra (Tikader, 1966a)
- Tamil Nadu (Sherriffs, 1927)

3. *Ajmonia velifera* (Simon, 1906)

=*Dictyna velifera* Simon, 1906

=*Ajmonia patellaris* Caporiacco, 1934

- Jammu & Kashmir (Caporiacco, 1935)
 - Sikkim (Simon, 1906a; Sherriffs, 1927; Tikader, 1977)
- Elsewhere: China

4. *Anaxibia folia* Sankaran & Sebastian, 2017*

- Kerala (Sankaran & Sebastian, 2017)

5. *Anaxibia rebai* (Tikader, 1966)*

=*Dictyna rebai* Tikader, 1966, only female

- Andaman & Nicobar Islands (Tikader, 1977)
- Maharashtra (Tikader, 1966a, 1977)

6. *Archaeodictyna consecuta* (O. Pickard-Cambridge, 1872)

=*Dictyna consecuta* O. Pickard-Cambridge, 1872

- Jammu & Kashmir (Caporiacco, 1935)
- Elsewhere: Caucasus, Central Asia, China, Europe, Iran, Russia

7. *Devade dubia* Caporiacco, 1934*

- Jammu & Kashmir (Caporiacco, 1934)

8. *Dictyna chandrai* Tikader, 1966*

- Maharashtra (Tikader, 1966a)

9. *Dictyna turbida* Simon, 1905

=*Brigittea turbida* (Simon, 1905)

- Kerala (Simon, 1905)
- Maharashtra (More & Sawant, 2013)
- Tamil Nadu (Sherriffs, 1927)
- Uttar Pradesh (Hore & Uniyal, 2008)

Elsewhere: Sri Lanka

10. *Dictyna umai* Tikader, 1966*

=*Brigittea umai* (Tikader, 1966)

- Maharashtra (Tikader, 1966a)

11. *Dictyna* sp.

- Gujarat (Patel & Vyas, 2001; Yadav *et al.*, 2017)
- Kerala (Patel, 2003a)
- Odisha (Choudhury *et al.*, 2019)
- Tamil Nadu (Kapoor, 2008)
- Uttarakhand (Quasin & Uniyal, 2010; Gupta & Siliwal, 2012)

12. *Lathys sindi* (Caporiacco, 1934)*

=*Auximus sindi* Caporiacco, 1934

- Jammu & Kashmir (Caporiacco, 1934, 1935)

13. *Nigma albida* (O. Pickard-Cambridge, 1885)

=*Dictyna albida* O. Pickard-Cambridge, 1885

- Uttar Pradesh (Hore & Uniyal, 2008)
- Elsewhere: China, Pakistan

14. *Nigma puella* (Simon, 1870) (★)

- Karnataka (Nijagal *et al.*, 2020)
- Elsewhere: Europe, Azores, Madeira, Canary Is.

15. *Nigma shiprai* (Tikader, 1966)*

=*Dictyna rebai* Tikader, 1966, only male

=*Dictyna shiprai* Tikader, 1966

- Gujarat (Patel & Pillai, 1988)
- Madhya Pradesh (Tikader, 1966a; Gajbe P., 2003; Patil, 2012)
- Maharashtra (Tikader, 1966a)
- Rajasthan (Lawania & Trigunayat, 2015)
- Uttar Pradesh (Lawania & Mathur, 2014)

16. *Nigma walckenaeri* (Roewer, 1951) (★)

- Gujarat (Thumar, 2019)

Elsewhere: Caucasus, Europe, Turkey

17. *Nigma* sp.

- Chhattisgarh (Ekka & Kujur, 2015)
- Odisha (Choudhury *et al.*, 2019)

18. *Sudesna grossa* (Simon, 1906)*

=*Dictyna grossa* Simon, 1906

- Himalayan plateaus (Simon, 1906b)

B. Family Dysderidae C.L. Koch, 1837

The family Dysderidae, commonly known as woodlouse hunters, sowbug-eating spiders, and cell spiders, comprises 578 species belonging to 25 genera worldwide (WSC, 2021). They are largely found in Eurasia, extending into North Africa with very few species occurring in South America. These spiders vary in size between 5 to 14 mm and have an elongated body. They can be diagnosed by having six eyes arranged in a semicircle, large and stout chelicerae, stout legs with few or none spines and females without a sclerotized epigyne (haplogyne). These spiders are nocturnal and spend day under stones in a silken cell. Eggs are laid inside these cells.

In India, its representation is very poor, only one species, *Dysdera cylindrica* O. Pickard-Cambridge, 1885, described from Pakistan, is reported from Jammu & Kashmir and remained unnoticed till now (Marusik, 2017; Caleb & Sankaran, 2021).

1. *Dysdera cylindrica* O. Pickard-Cambridge, 1885

- Jammu & Kashmir (Caporiacco, 1935)

Elsewhere: Pakistan

C. Family Eresidae C.L. Koch, 1845

The family Eresidae, commonly known as velvet spiders, is a small group of spiders comprising 101 species belonging to 9 genera (WSC, 2021). They are almost distributed in Europe, Africa, and Asia, but there are records from Brazil. They have eight-eyed spiders and females have a genital plate (entelegyne). They are cribellate and construct

unkempt webs using wooly silk. Some species are nearly eusocial (Seibt & Wickler, 1988) and work together in preying and in brood rearing. After the birth of brood, the mother spider dissolves her internal organs and regurgitates this material as food. Members of the genus *Stegodyphus* Simon, 1873 typically build silken nests in vegetation while others live in silk tubes under barks, stones or underground (Miller *et al.*, 2012).

In India, only 5 species of a single genus *Stegodyphus* are reported from 16 states and 4 union territories and, out of them, 2 species are endemic. All the 5 species are recorded in Maharashtra while 4 species are recorded in Gujarat. *Stegodyphus sarasinorum* Karsch, 1892 is most widely distributed species in the country. Following is the detail list of these spiders distributed in Indian states and union territories and elsewhere.

1. *Stegodyphus hisarensis* Arora & Monga, 1992*

- Haryana (Arora & Monga, 1992)
- Maharashtra (Rithe, 2012)

2. *Stegodyphus mirandus* Pocock, 1899*

- Gujarat (Siliwal *et al.*, 2003b)
- Maharashtra (Pocock, 1899, 1900; Bastawade & Khandal, 2006)

3. *Stegodyphus pacificus* Pocock, 1900

=*Stegodyphus semadohensis* Shivaji, 2013

- Andhra Pradesh (Palem *et al.*, 2016)
 - Delhi (Malik *et al.*, 2015)
 - Gujarat (Patel, 2003b; Patel & Vyas, 2001; Solanki *et al.*, 2020; Yadav *et al.*, 2017)
 - Karnataka (Gajbe, 2007)
 - Madhya Pradesh (Gajbe, 2003, 2007)
 - Maharashtra (Gajbe, 2007; Pocock, 1900; Shivaji, 2013; Tikader, 1966b)
 - Rajasthan (Jangid *et al.*, 2019; Kashmeera *et al.*, 2020; Tikader, 1966b)
 - Tamil Nadu (Karthikeyani *et al.*, 2017)
- Elsewhere: Iran, Jordan, Pakistan

4. *Stegodyphus sarasinorum* Karsch, 1892

- Andhra Pradesh (Bastawade & Khandal, 2006; Majumder, 2005; Rao *et al.*, 2005)
- Chhattisgarh (Gajbe, 2003, 2004; Gajbe & Sharma, 1994)
- Goa (Bastawade & Khandal, 2006)
- Gujarat (Majumder, 2004; Parmar *et al.*, 2015; Patel, 2003b; Sherriffs, 1928; Siliwal *et al.*, 2003a, b; Simon, 1905; Yadav *et al.*, 2017; Yadav & Kumar, 2019)
- Jammu & Kashmir (Thakur *et al.*, 1995)
- Karnataka (Bastawade & Khandal, 2006; Gajbe, 2004; Nautiyal *et al.*, 2017; Sherriffs, 1927; Tikader & Biswas, 1981)
- Kerala (Adarsh & Nameer, 2016; Bastawade & Khandal, 2006; Jose *et al.*, 2018; Sebastian *et al.*, 2005, 2011; Subrahmanyam, 1953; Sivaperuman *et al.*, 2002)
- Madhya Pradesh (Gajbe, 2003, 2004, 2007; Patil *et al.*, 2013; Sharma *et al.*, 2010)

- Maharashtra (Bastawade & Khandal, 2006; Biswas & Biswas, 1992; Gajbe, 2007; Majumder, 2004, 2005; More & Sawant, 2013; Nerlekar *et al.*, 2016; Patil, 2012; Pocock, 1900; Rithe, 2012; Tikader & Biswas, 1981)
 - Odisha (Biswas, 1987; Biswas & Biswas, 1992; De & Palita, 2018; Gajbe, 2004; Gravely, 1921; Majumder, 2005; Tikader & Biswas, 1981)
 - Puducherry (Simon, 1905)
 - Punjab (Biswas & Biswas, 1992; Gajbe, 2004; Majumder, 2004, 2005; Tikader & Biswas, 1981)
 - Rajasthan (Gajbe, 2007; Jangid *et al.*, 2019; Saha *et al.*, 2015; Sen *et al.*, 2009; Sivaperuman & Rathore, 2004)
 - Tamil Nadu (Bastawade & Khandal, 2006; Biswas & Biswas, 1992; Caleb, 2020a, b; Karthikeyani *et al.*, 2017; Majumder, 2004, 2005; Sherriffs, 1919)
 - Telangana (Sailu *et al.*, 2017)
 - Uttar Pradesh (Kumar *et al.*, 2017; Tandon & Lal, 1983)
 - Uttarakhand (Biswas & Biswas, 2010)
 - West Bengal (Biswas & Biswas, 1992; Majumder, 2004, 2005; Tikader & Biswas, 1981)
- Elsewhere: Myanmar, Nepal, Sri Lanka

5. *Stegodyphus tibialis* (O. Pickard-Cambridge, 1869)

=*Eresus tibialis* O. Pickard-Cambridge, 1869

=*Stegodyphus socialis* Pocock, 1900

- Andhra Pradesh (Palem *et al.*, 2016)
 - Gujarat (Patel, 2003b; Patel & Vyas, 2001; Siliwal *et al.*, 2003b; Yadav *et al.*, 2017)
 - Karnataka (Abhijith, 2019; Gajbe, 2004, 2007; El-Hennawy, 2016; Pickard-Cambridge, 1869; Pocock, 1900; Sherriffs, 1928)
 - Madhya Pradesh (Gajbe P, 2003, 2004, 2007)
 - Maharashtra (El-Hennawy, 2016; Gajbe, 2004, 2007; Kraus & Kraus, 1989; More, 2015; More & Sawant, 2013)
 - Tamil Nadu (Caleb *et al.*, 2016; El-Hennawy, 2016; Karthikeyani *et al.*, 2017; Kraus & Kraus, 1989; Phaniel, 1963; Sherriffs, 1919)
 - Telangana (Gunti *et al.*, 2016)
- Elsewhere: China, Myanmar, Thailand

6. *Stegodyphus* sp.

- Chhattisgarh (Ekka & Kujur, 2015)
- Gujarat (Yadav *et al.*, 2017)
- Karnataka (Mubeen & Basavarajappa, 2018; Murali *et al.*, 2017)
- Rajasthan (Chauhan *et al.*, 2009)

D. Family Filistatidae Simon, 1864

Filistatidae, considered primitive family in Araneomorphae spiders, contains cribellate web-weaving spiders or crevice weaver spiders. Their web is so designed that it looks like a sheet that narrows to a silk-lined retreat in a tube or crevice. It contains 19 genera and 185 species worldwide (WSC, 2021). The diagnostic character is the unusual upward bend near the femur of the first pair of legs that not only help in jumping but also helpful in holding the spider to the side walls of the crevices if some larger prey

ever tries to pull it. In addition, these spiders are characterized by an oval or narrow heart-shaped carapace. They are weavers of funnel or tube webs in cracks in walls and under stones. They are mostly distributed in southern hemisphere but few are recorded in the Mediterranean area.

In India, only 13 species of 5 genera were recorded in 10 states and 3 union territories, out of which 7 are endemic. Record of one species, *Sahastata sinuspersica* Marusik *et al.*, 2014, recorded from Gujarat, seems to be erroneous. About half of the species were recorded in Gujarat. Following is the detail list of these spiders distributed in Indian states and union territories and elsewhere.

1. *Filistata* sp.

- Gujarat (Parmar, 2018; Siliwal *et al.*, 2003b)
- Ladakh (Uniyal, 2006)
- Odisha (Gravely, 1921)

2. *Pholcoides chiardolae* (Caporiacco, 1934)

=*Filistata chiardolae* Caporiacco, 1934

- Jammu & Kashmir (Caporiacco, 1934, 1935)
- Elsewhere: Pakistan

3. *Pholcoides seclusa* (O. Pickard-Cambridge, 1885)*

=*Filistata seclusa* O. Pickard-Cambridge, 1885

- Ladakh (O. Pickard-Cambridge, 1885)

4. *Pritha dharmakumarsinhji* Patel, 1978*

- Gujarat (Patel, 1978; Yadav *et al.*, 2017)

5. *Pritha insularis* (Thorell, 1891)*

=*Filistata insularis* Thorell, 1891

- Andaman & Nicobar Islands (Thorell, 1891)
- Maharashtra (More, 2015; More & Sawant, 2013)

6. *Pritha nana* Simon, 1868

- Maharashtra (Kamble *et al.*, 2018)
- Elsewhere: Mediterranean countries

8. *Pritha napadensis* (Patel, 1975)*

=*Filistata napadensis* Patel, 1975

- Gujarat (Parmar & Patel, 2015; Patel, 1975; Patel & Vyas, 2001; Yadav *et al.*, 2017)

9. *Pritha nicobarensis* (Tikader, 1977)*

=*Filistata nicobarensis* Tikader, 1977

- Andaman & Nicobar Islands (Gajbe, 2007; Tikader, 1977)
- Chhattisgarh (Gajbe, 2003)
- Madhya Pradesh (Gajbe, 2007)

10. *Pritha poonaensis* (Tikader, 1963)*

=*Filistata poonaensis* Tikader, 1963

- Chhattisgarh (Gajbe, 2003; Gajbe, and Sharma, 1994)
- Gujarat (Gajbe, 2007; Yadav *et al.*, 2017)
- Madhya Pradesh (Gajbe, 2003, 2007)
- Maharashtra (Gajbe, 2007; Tikader, 1963)

11. *Pritha* sp.

- Gujarat (Parmar, 2018; Parmar *et al.*, 2015)
- Karnataka (Nautial *et al.*, 2017; Prashanthakumara & Venkateshwarlu, 2017)

- Kerala (Sebastian *et al.*, 2005, 2011)
- Maharashtra (Bhuvad *et al.*, 2011)
- Rajasthan (Jangid *et al.*, 2019; Lawania & Mathur, 2017).
- Uttarakhand (Gupta & Siliwal, 2012)

12. *Sahastata ashapuriae* Patel, 1978*

- Gujarat (Parmar, 2018; Patel, 1978)

13. *Sahastata nigra* (Simon, 1897)

- Tamil Nadu (Simon, 1911)
- Elsewhere: Mediterranean countries

14. *Sahastata sinuspersica* Marusik *et al.*, 2014 (♣)

- Gujarat (Yadav *et al.*, 2017)
- Elsewhere: Iran

15. *Zaitunia rufa* (Caporiacco, 1934)

=*Filistata rufa* Caporiacco, 1934

- Jammu & Kashmir (Caporiacco, 1934, 1935)
 - Kerala (Adarsh & Nameer, 2016)
- Elsewhere: Pakistan

CONCLUSION

The diversity of four families of araneomorph spiders, viz. Dictynidae, Dysderidae, Eresidae and Filistatidae in Indian states and union territories is reported. Two families Dictynidae and Filistatidae are represented by 15 and 13 species, respectively. Other families are very poorly reported, single species in Dysderidae and 5 species in Eresidae. Out of 31 species recorded from these 4 families, 17 species are endemic to India. Despite spiders being the most diverse group of predators and crucial to the health of terrestrial ecosystems, none of the species recorded in India is listed in IUCN Red List. Extensive survey for these spiders is urgently required.

ACKNOWLEDGMENT

We thank to Dr. Shelley Acharya, Scientist E and Dr. J.T.D. Caleb, Zoological Survey of India, M-Block, Kolkata, India for providing valuable literatures.

REFERENCES

- Abhijith APC. <https://www.mysorenature.org/mysore-nature/Spiders-of-Mysore-Area>, as on 5 October, 2019
- Adarsh, C.K., & Nameer, P.O. (2016). A preliminary checklist of spiders (Araneae: Arachnida) in Chinnar Wildlife Sanctuary, Western Ghats, India. *Journal of Threatened Taxa*, 8(4), 8703-8713.
- Arora, P., & Monga, K. (1992). A new species of *Stegodyphus* Simon (Araneida: Eresidae). *Haryana Agricultural University Journal of Research*, 22(3), 139-140.
- Bastawade, D.B., & Khandal, D. (2006). Arachnida: Araneae (Spiders). In: *Invertebrate Fauna of Sanjay Gandhi National Park Borivali, Mumbai, Conservation Area Series*. Zoological Survey of India, 26, 139-184.
- Bhuvad, N.V., Patil, V.K., Bhawe, S.G., Narkhede, S.S., Jalgaonkar, V.N., & Mhaiske, V.M. (2011). Spider diversity attributes in a cultural landscape dominated by field crops and fruit orchards in the Konkan region of Maharashtra. *ENVIS Bulletin, Arthropods and their Conservation in India (Insects & Spiders)*, 14(1), 21-33.
- Biswas, B. (1987). Araneae-spiders (Families, Araneidae, Gnaphosidae and Salticidae). In: *Fauna of Orissa, State Fauna Series* (Ed. Director), Zoological Survey of India, Kolkata, 257-272.
- Biswas, B., & Biswas, K. (1992). Araneae: spiders. *State Fauna Series 3, Fauna of West Bengal*, (Ed. Director), Zoological Survey of India, Kolkata, 3, 357-500.
- Biswas, B., & Biswas, K. (2010). Araneae: spider. In: *Fauna of Uttarakhand, State Fauna Series, 18* (Ed. Director), Zoological Survey of India, Kolkata, 3, 243-282.
- Caleb, J.T.D. (2020a). Spiders (Arachnida: Araneae) from the vicinity of Araabath Lake, Chennai, India. *Journal of Threatened Taxa*, 12(1), 15186-15193.
- Caleb, J.T.D. (2020b). Spider (Arachnida, Araneae) fauna of the scrub jungle in the Madras Christian College campus, Chennai, India. *Journal of Threatened Taxa*, 12(7), 15711-15766.
- Caleb, J.T.D., & Sankaran, P.M. (2021). Araneae of India, version 2021. <https://indianspiders.in/>
- Caleb, J.T.D., Karthikeyani, R., & Muthuchelian, K. (2016). Social spiders (Araneae, Eresidae, *Stegodyphus*) in Tamil Nadu, India. *International Journal of Applied BioResearch*, 27, 4-6.
- Caporiacco, L.di (1934). Aracnidi dell'Himalaia e del Karakoram raccolti dalla Missione Italiana al Karakoram (1929-VII). *Memorie della Società Entomologica Italiana, Genova*, 13, 113-160.
- Caporiacco, L.di. (1935). Aracnidi dell'Himalaia e del Karakoram raccolti dalla Missione Italiana al Karakoram (1929-VII). *Memorie della Società Entomologica Italiana, Genova*, 13, 161-263.
- Chauhan, R., Sihag, V., & Singh, N.P. (2009). Distribution and biocontrol potential of chosen spiders. *Journal of Biopesticides*, 2(2), 151-155.
- Choudhury, S.R., Siliwal, M., & Das, S.K. (2019). Spiders of Odisha: a preliminary checklist. *Journal of Threatened Taxa*, 11(9), 14144-14157.
- De, K., & Palita, S.K. (2018). A checklist of spiders from six sacred groves in southern Odisha, India. *Serket*, 16(1), 30-40.
- Ekka, A., & Kujur, R. (2015). Spider diversity of Ram Jharna, Raigarh district, Chhattisgarh, India. *Research Journal of Pharmacy and Technology*, 8(7), 813-819.
- El-Hennawy, H.K. (2016). *Stegodyphus tibialis* (O. Pickard-Cambridge, 1869) in central India (Araneae:

- Eresidae), with notes on Indian *Stegodyphus* species. *Indian Journal of Arachnology*, 5(1), 28-35.
- Gajbe, P. (2003). Checklists of spiders (Arachnid: Araneae) of Madhya Pradesh and Chhattisgarh. *Zoos' Print Journal*, 18(10), 1223-1226.
- Gajbe, U.A. (2004). Studies on some spiders of the families Oecobiidae, Eresidae, Hersiliidae, Uroctidae and Uloboridae (Araneae: Arachnida) from Madhya Pradesh, India. *Records of the Zoological Survey of India*, 103(1-2), 131-142.
- Gajbe, U.A. (2007). Araneae, Arachnida. In: *Fauna of Madhya Pradesh (including Chhattisgarh): State Fauna Series* (Ed. Director). *Zoological Survey of India, Kolkata*, 15(1), 419-540.
- Gajbe, U.A., and Sharma, H.S. (1994). On some spiders (Araneae, Arachnida) from Bastar district (Madhya Pradesh) India. *Records of the Zoological Survey of India*, 94(2), 233-245.
- Gravely, F. (1921). The spiders and scorpions of Barkuda Island. *Records of the Indian Museum, Calcutta*, 22, 399-421.
- Gunti, P., Srinivasulu, C., & Devender, G. (2016). New locality data for *Stegodyphus tibialis* (O. Pickard-Cambridge, 1869)(Araneae: Eresidae) from Telangana state, India. *Check List*, 12(5, 1960), 1-3.
- Gupta, N., & Siliwal, M. (2012). A checklist of spiders (Arachnida: Araneae) of Wildlife Institute of India campus, Dehradun, Uttarakhand, India. *Indian Journal of Arachnology*, 1(2), 73-91.
- Hore, U., & Uniyal, V.P. (2008). Effect of prescribed fire on spider assemblage in Terai grasslands, India. *Turkish Journal Arachnol*, 1, 15-36.
- Jackson, R.R. (1979). Comparative studies of *Dictyna* and *Mallos* (Araneae, Dictynidae) II. The relationship between courtship, mating, aggression and cannibalism in species with differing types of social organization. *Revue Arachnologique*, 2(3), 103-132.
- Jangid, A.K., Dewasi, S.R., Kumar, L., Yadav, D., Sharma, V., & Upadhyay, M. (2019). Diversity of spiders (Arachnida: Araneae) from central Aravalli Range, Rajasthan. *Serket*, 17(1), 61-67.
- Jose, A.C., Sudhin, P.P., Prasad, P.M., & Sreejith, K.A. (2018). Spider diversity in Kavvayi River Basin, Kerala, Southern India. *Current World Environment*, 13(1), 100-112.
- Kamble, S.S., Bodkhe, A.K., Sarkar, I.D., & Kale, S.S. First record of *Pritha nana* Simon, 1868 of (Araneae: Filistatidae) from India. In: *Biodiversity and Bioprospects, Indian Scenario and Perspectives* (Eds. Rao, P.N., Saxena, A., Pandey, B.N. & Kulkarni, G.K.). Today and Tomorrow's Printers and Publishers, New Delhi, pp. 145-154.
- Kapoor, V. (2008). Effects of rainforest fragmentation and shade-coffee plantations on spider communities in the Western Ghats, India. *Journal of Insect Conservation*, 12(1), 53-68.
- Karthikeyani, R., Caleb, J.T.D., Gajbe, U.A., & Muthuchelian, K. (2017). Checklist of spiders (Arachnida: Araneae) of the state of Tamil Nadu, India. *Munis Entomology & Zoology*, 12(1), 180-193.
- Kashmeera N.A., Drisya-Mohan, O.M., & Sudhikumar A.V. (2020). Spiders of rocky desert in Kailana, Rajasthan, India. *Serket*, 17(3): 201-206.
- Keswani, S., Hadole, P., & Rajoria, A. (2012). Checklist of spiders (Arachnida: Araneae) from India-2012. *Indian Journal of Arachnology*, 1(1), 1-129.
- Kraus, O., & Kraus, M. (1989). The genus *Stegodyphus* (Arachnida, Araneae). Sibling species, species groups, and parallel origin of social living. *Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg (NF)*, 30, 151-254.
- Kumar, A., Kanaujia, A., Kumar, A., Kumar, V., & Mishra, H. (2017). Araneofauna of Nawabganj bird sanctuary, Unnao, Uttar Pradesh, India. *Journal of Entomology and Zoology Studies*, 5(4), 1952-1955.
- Lawania, K.K., & Mathur, P. (2014). Baseline studies on the spider fauna (Araneae) of Braj region (Braj-Bhoomi), India. *International Journal of Basic and Applied Biology*, 2(1), 137-141.
- Lawania, K.K., & Mathur, P. (2017). Biodiversity and habit preference of spider fauna in eastern region of Rajasthan and its catchment area. *International Journal of Scientific Development & Research*, 2(6), 475-484.
- Lawania, K.K., & Trigunayat, M.M. (2015). A comparative study of the spider (Araneae) fauna in Keoladeo National Park (KNP), Nahargarh Wildlife Sanctuary (NWS) and Sursarovar Bird Sanctuary (SBS) India. *International Journal on Agricultural Sciences*, 6(1), 141-146.
- Majumder, S.C. (2004). Taxonomic Studies of some spiders from mangrove and sem-mangrove areas of Sundarban. *Memoires of the Zoological Survey of India*, 20(2), 1-42.
- Majumder, S.C. (2005). Studies on some spiders from eastern coastal region of India. *Memoires of the Zoological Survey of India*, 20(3), 1-57.
- Malik, S., Das, S.K., & Siliwal, M. (2015). Spider (Arachnida: Araneae) fauna of Delhi with first report of cobweb spider *Argyrodes bonadea* (Karsch, 1881) from India. *Indian Journal of Arachnology*, 4(2), 31-36.
- Marusik, Y.M. (2017). Redescription of *Dysdera cylindrica* (Aranei: Dysderidae) from Pakistan with notes on the distribution of the family. *Arthropoda Selecta*, 26(4), 310-314.
- Miller, J.A., Griswold, C.E., Scharff, N., Řezáč, M., Szűts, T., & Marhabaie, M. (2012). The velvet spiders: an

- atlas of the Eresidae (Arachnida, Araneae). *ZooKeys*, 195, 1-144.
- More, S. (2015). Diversity of spider fauna from Bamnoli region of Koyna Wildlife Sanctuary. *International Journal of Science and Research*, 4(6), 1690-1693.
- More, S., & Sawant, V. (2013). Spider fauna of Radhanagari wildlife sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary. *Indian Journal of Arachnology*, 2(1), 81-92.
- Mubeen, M., & Basavarajappa, S. (2018). Density, abundance and per cent occurrence of spider species (Arachnida: Araneae) in and around Mysore city, Karnataka, India - a case study. *IOSR Journal of Pharmacy and Biological Sciences*, 13(3), 31-40.
- Murali, S., Jalali, S.K., Shylesha, A.N., Shivalinga Swamy, T.M., & Gandhi Gracy, R. (2017). Predatory spider fauna in brinjal crop, their abundance and composition. *Journal of Entomology and Zoology Studies*, 5(5), 675-681.
- Nautiyal, S., Khan, Y.D.I., Kaechele, H., & Bhaskar, K. (2017). Diversity and distribution of spiders in Gogi, Yadgir district, a semi-arid landscape in southern India. *International Journal of Ecology & Environmental Sciences*, 43(3), 195-204.
- Nerlekar, A.N., Warudkar, A.M., Gowande, G.G., Salve, S.S., Raut, A., Patankarand, S.R., & Nalavade, S.B. (2016). A review of the faunal diversity of the Fergusson College campus, Pune, India. *Zoos' Print Journal*, 31(10), 4-25.
- Palem, H., Kanike, S., & Purushottam, V.R.S. (2016). Diversity of spider fauna (Arachnida: Araneae) in different ecosystems, Eastern Ghats, Southern Andhra Pradesh, India. *South Asian Journal of Life Science*, 4(2), 51-60.
- Parmar, B. (2018). Preliminary study of spiders (Order: Araneae) from Satlasana taluka. *International Journal of Pharmacy and Biological Sciences*, 8(3), 735-740.
- Parmar, B.M., Patel, K.B., Joshi, J.D., & Chaudhari, N.R. (2015). Faunastic study of spider diversity from islands and costal areas of gulf of Kutch, India. *Life Sciences Leaflets*, 67, 12-23.
- Patel, B.H. (1975). Some spiders of the families Filistatidae and Scytodidae from Gujarat, India. *Oriental Insects*, 9(4), 425-429.
- Patel, B.H. (1978). Studies on Indian filistatid spiders (Araneae: Arachnida). *Journal of the Bombay Natural History Society*, 75, 183-189.
- Patel, B.H. (2003a). Fauna of protected areas - a preliminary list of spiders with description of three new species from Parambikulam Wildlife Sanctuary, Kerala. *Zoos' Print Journal*, 18(10), 1207-1212.
- Patel, B.H. (2003b). Spiders of Vansada National Park, Gujarat. *Zoos' Print Journal*, 18(4), 1079-1083.
- Patel, B.H., & Pillai, G.K. (1988). Studies on the spider fauna of groundnut fields in Gujarat, India. *Journal of Biological Control*, 2(2), 83-88.
- Patel, B., & Vyas, R. (2001). Spiders of Hingolghadh Nature Education Sanctuary, Gujarat, India. *Zoos' Print Journal*, 16(9), 589-590.
- Patil, S.R. (2012). Spiders of Jabalpur district (Arachnida: Araneae): updated checklist 2011. *Indian Journal of Arachnology*, 1, 143-149.
- Phanuel, G.J. (1963). *Stegodyphus tibialis* (Cambridge) (Family Eresidae: Araneida) from Madras. *Journal of the Madras University, Section B*, 33(3), 305-310.
- Pickard-Cambridge, O. (1885). Araneidea. In: Scientific results of the second Yarkand mission; based upon the collections and notes of the late Ferdinand Stoliczka, Ph. D., Government of India, Calcutta, pp. 115.
- Pickard-Cambridge, O. (1869). Descriptions and sketches of some new species of Araneidea, with characters of a new genus. *Annals and Magazine of Natural History*, 3(13), 52-74.
- Pocock, R.I. (1899). Diagnoses of some new Indian Arachnida. *Journal of the Bombay Natural History Society*, 12, 744-753.
- Pocock, R.I. (1900). *The Fauna of British India including Ceylon and Burma: Arachnida*. Taylor and Francis, London, pp. 279.
- Prashanthakumara, S.M., & Venkateshwarlu, M. (2017). Preliminary study of spiders (Araneae: Arachnida) in Gudavi Bird Sanctuary, Shivamogga, Karnataka. *International Journal of Recent Scientific Research Research*, 8(8), 19277-19281.
- Quasin, S., & Uniyal, V.P. (2010). Preliminary investigation of spider diversity in Kedarnath Wildlife Sanctuary, Uttarakhand, India. *Indian Forester*, 136(10), 1340-1346.
- Rao, K.T., Bastawade, D.B., Javed, S.M.M., & Krishna, I.S.R. (2005). Arachnid fauna of Nallamalai Region, Eastern Ghats, Andhra Pradesh, India. *Records of the Zoological Survey of India, Occasional Papers*, 239, 1-42.
- Rithe, K. (2012). Spider diversity from relocated area of Melghat Tiger reserve. *Indian Journal of Arachnology*, 1(2), 92-105.
- Saha, S., Dhali, D.C., & Raychaudhuri, D. (2015). Spider fauna (Araneae, Arachnida) of Rajasthan with special reference to Ranthambore National Park, Rajasthan, India. *Indian Journal of Arachnology*, 4(1), 30-40.
- Sailu, G., Narayana, B.L., Ramaiyan, D., Naresh, B., Rao, V.V., Adepu, H., Khandelwal, R., Devulapalli, P., & Krishna, P. (2017). Faunal diversity of Ameenpur Lake, Telangana state, India: A biodiversity heritage site. *Journal of Entomology and Zoology Studies*, 5(1), 512-526.

- Sankaran, P.M., & Sebastian, P.A. (2017). *Anaxibia folia* spec. nov - a new litter-dwelling dictynid spider from India (Araneae: Dictynidae: Dictyninae). *Zootaxa*, 4363(3), 441-444.
- Sebastian, P.A., Mathew, M.J., Beevi, S.P., Joseph, J., & Biju, C.R. (2005). The spider fauna of the irrigated rice ecosystem in central Kerala, India across different elevational ranges. *The Journal of Arachnology*, 33(2), 247-255.
- Sebastian, P.A., Mathew, M.J., & Murugesan, S. (2011). Spider fauna in the forest and agricultural ecosystems of central Kerala, India. In: Arthropods and their Conservation in India (Insects & Spiders) (Eds. Uniyal, V.P., & Shrivastava, A.). *ENVIS Bulletin : Wildlife & Protected Areas*, 14, 159-174.
- Seibt, U., & Wickler, W. (1988). Interspecific tolerance in social *Stegodyphus* spiders (Eresidae, Araneae). *Journal of Arachnology*, 16, 35-39.
- Sen, S., Saha, S., & Raychaudhuri, D. (2009). Spiders of Ranthambore National Park, Rajasthan. *Insect Environment*, 16(4), 172-173.
- Sharma, A., Singh, G., & Singh, R. (2020a). Faunal diversity of Liocranidae, Mimetidae, Miturgidae, Nesticidae and Oecobiidae (Arachnida: Araneae) of India. *Serket*, 17(3), 270-283.
- Sharma, A., Singh, G., & Singh, R. (2020b). Faunal diversity of Linyphiidae (Araneomorphae: Araneae: Arachnida) in India. *Asian Journal of Conservation Biology*, 9(2), 304-314.
- Sharma, S., Vyas, A., & Sharma, R. (2010). Diversity and abundance of spider fauna of Narmada river at Rajghat (Barwani) (Madhya Pradesh) India. *Researcher*, 2(11), 1-5.
- Sherriffs, W.R. (1919). A contribution to the study of South Indian Arachnology. *Annals and Magazine of Natural History*, 9(4), 220-253.
- Sherriffs, W.R. (1927). South Indian Arachnology. Part II. *Journal of Natural History*, 9(19), 533-542.
- Sherriffs, W.R. (1928). South Indian Arachnology. Part III. *Annals and Magazine of Natural History*, 10(8), 177-192.
- Shivaji, D.U. (2013). *Stegodyphus semadohensis*, a new species from family Eresidae, recorded from Satpuda, Maharashtra, India (Arachnida, Araneae, Eresidae). *Environment Conservation Journal*, 14(3), 109-111.
- Siliwal, M., Suresh, B., Dhuru, S., & Pilo, B. (2003a). Spider diversity of riparian zone of river Vishwamitri, Gujarat. *Journal of Current Science*, 3(2), 429-434.
- Siliwal, M., Suresh, B., & Pilo, B. (2003b). Fauna of protected areas-3. Spiders of Purna Wildlife Sanctuary, Dangs, Gujarat. *Zoos' Print Journal*, 18(11), 1259-1263.
- Simon, E. (1905). Voyage de M. Maurice Maindron dans l'Inde méridionale (mai à novembre 1901). 7me Mémoire. Arachnides (1re partie). *Annales de la Société Entomologique de France*, 74(1-2): 160-180.
- Simon, E. (1906a). Etude sur les araignées de la section des cribellates. *Annales de la Société Entomologique de Belgique*, 50, 284-308.
- Simon, E. (1906b). Arachnides (2e partie). In Voyage de M. Maurice Maindron dans l'Inde meridionale. *Annales de la Société Entomologique de France*, 75, 279-314.
- Simon, E. (1911). Catalogue raisonné des arachnides du nord de l'Afrique (1re partie). *Annales de la Société entomologique de France*, 79(3, 1910), 265-332.
- Singh, R., & Singh, G. (2020). Diversity of mygalomorph spiders (Araneae: Opisthothelae) in India. *International Journal of Biological Innovations*, 2(2), 178-201.
- Singh, R., Singh, G., & Sharma, A. (2020a). Diversity of yellow sac spiders (Cheiracanthiidae: Araneae: Arachnida) in India. *Journal of Entomology and Zoology Studies*, 8(6), 118-126.
- Singh, R., Singh, G., & Sharma, A. (2020b). Faunal diversity of Hahniidae, Hersiliidae and Homalonychidae (Arachnida: Araneae: Araneomorphae) in India. *Serket*, 17(3), 240-251.
- Singh, R., Singh, G., & Singh, B.B. (2020c). Diversity of Asemoneinae, Eupoinae, Hisponinae, Lyssomaninae, Onomastinae and Spartaeinae (Arachnida: Araneae: Salticidae) in India: a checklist and bibliography. *Research Journal of Life Sciences, Bioinformatics, Pharmaceuticals & Chemical Science*, 6(5), 29-46.
- Singh, R., Singh, G., & Singh, B.B. (2020d). Diversity of Amycoida and Astioida (Arachnida: Araneae: Salticidae: Salticinae) in India. *Journal of Entomology and Zoology Studies*, 8(5), 1478-1488.
- Singh, R., Singh, G., & Singh, B.B. (2020e). Diversity of Marpissoida, Chrysillini and Hasariini (Arachnida: Araneae: Salticidae: Salticinae) in India. *Research Journal of Life Sciences, Bioinformatics, Pharmaceuticals & Chemical Science*, 6(6), 15-42.
- Singh, R., Singh, G., & Singh, B.B. (2020f). Diversity of simonid spiders (Araneae: Salticidae: Salticinae) in India. *International Journal of Biological Innovations*, 2(2), 247-276.
- Singh, R., Singh, G., & Singh, B.B. (2021). Faunal diversity of jumping spiders (Salticidae: Araneae: Arachnida) in India. *International Journal of Biological Innovations*, 3(1), 1-37.
- Sivaperuman, C., & Rathore, N.S. (2004). A preliminary report on spiders in Desert National Park, Rajasthan, India. *Zoos' Print Journal*, 19(5), 1485-1486.
- Sivaperuman, C., Easa, P.S., & Swetharanyam, S. (2002). Preliminary studies on spider diversity and their webs in selected sacred groves in Kerala. *Journal of Bombay Natural History Society*, 99(1), 144-148.

- Solanki, R., Siliwal, M., & Kumar, D. (2020). A preliminary checklist of spiders (Araneae: Arachnida) in Jambughoda Wildlife Sanctuary, Panchmahal district, Gujarat, India. *Journal of Threatened Taxa*, 12(11), 16576-16596.
- Subrahmanyam, T.V (1953). On the habits of Indian eresid spiders *Stegodyphus sarasinorum* Karsch. *Journal of the Bombay Natural History Society*, 51(4), 520-522.
- Tandon, P.L., & Lal, B. (1983). Predatory spiders associated with insect pests of mango in India. *Bulletin of Entomology*, 24(2), 144-147.
- Thakur, J.N., Singh, J.P., Verma, O.P., & Diwakar, M.C. (1995). Spider fauna in the rice ecosystem of Jammu. *Journal of Biological Control*, 9(2), 125-126.
- Thorell, T. (1891). Spindlar från Nikobarerna och andra delar af södra Asien. *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, 24(2), 1-149.
- Thumar, R.H. (2019). Biodiversity and taxonomic study of predacious spiders of some orchard plants in and around Navsari district, Gujarat. Ph. D. thesis, Veer Narmad South Gujarat University, Surat, Gujarat, pp. 261.
- Tikader, B.K. (1963). Studies on some spider fauna of Maharashtra and Mysore states - Part I. *Journal of University of Poona*, 24, 29-54.
- Tikader, B.K. (1966a). Studies on some spiders of the genus *Dictyna* (Family: Dictynidae) from India. *Proceedings of the Linnean Society of London*, 177(1), 45-53.
- Tikader, B.K. (1966b). On a collection of spiders (Araneae) from the desert area of Rajasthan (India). *Records of the Indian Museum, Calcutta*, 59, 435-443.
- Tikader, B.K. (1977). Studies on spider fauna of Andaman and Nicobar islands, Indian Ocean. *Records of the Zoological Survey of India*, 72(1-4), 153-212.
- Tikader, B.K., & Biswas, B. (1981). Spider fauna of Calcutta and vicinity, Part-I. *Records of the Zoological Survey of India, Occasional Paper*, 30, 1-149.
- Uniyal, V.P. (2006). Records of spiders from Indian trans-Himalayan region. *Indian Forester*, 132(12a), 117-181.
- WSC (2021). World Spider Catalog. Version 21.5. Natural History Museum Bern, online at <http://wsc.nmbe.ch>, accessed on 10 January, 2021.
- Yadav, A., & Kumar, D. (2019). Diversity and distribution of spider species in different habitats of Champaner-Pavagadh Archaeological Park, a world heritage site of Gujarat. *International Journal of Scientific Research and Reviews*, 8(2), 85-95.
- Yadav, A., Solanki, R., Siliwal, M., & Kumar, D. (2017). Spiders of Gujarat: A preliminary checklist. *Journal of Threatened Taxa*, 9(9), 10697-10716.