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Original Research Article

New records of spiders Araneae, Corinnidae, Thomisidae, and Theridiidae: impact of environmental degradation analysis in Peshawar Valley, Pakistan

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Abstract: The genus Sinothomisus Tang, Yin, Griswold & Peng, 2006, previously known only from South China and represented by Sinothomisus hainanus (Song, 1994), is recorded here for the first time from Pakistan, where it shows a clumped population distribution. The genus Monaeses Thorell, 1869, is also newly documented in the study area, represented by Monaeses israeliensis Levy, 1973, a species widely reported from the Middle East and observed with an even population distribution. Additionally, the Central Asian ant-mimicking spider Castianeira arnoldii Charitonov, 1946, is reported for the first time in Pakistan and exhibits a clumped distribution pattern. The species Theridion melanostictum O. Pickard-Cambridge, 1876, is newly recorded from the subtropical northwestern Hindu Kush region of the Peshawar Valley and demonstrates a uniform population distribution. Environmental pressures in the region are increasing due to agricultural expansion, intensive mining, land-use change, habitat degradation, and overgrazing in scrub mountain ecosystems. Infrastructure development and increasing anthropogenic activities further intensify these disturbances, significantly affecting predatory arthropods, particularly spiders. Such environmental changes may reduce suitable habitats for endemic species while promoting the spread of eurytopic species, potentially leading to the displacement of specialized stenotopic taxa. Photographs of habits and genital structures are provided for identification.

Keywords: Araneae, Corinnidae, Thomisidae, Theridiidae, New spider record, District Swabi, Tarbela Dam, Peshawar valley, Pakistan.

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1. Introduction

Pakistan is recognized as one of the countries with high biological diversity; however, biodiversity conservation and management have not received adequate priority. In response to international commitments under the Convention on Biological Diversity (CBD), Pakistan introduced its first Biodiversity Action Plan (BAP) in 1999 (GOP, 2001). Despite this initiative, national efforts toward biodiversity conservation remain limited. The implementation of the BAP has been constrained by weak institutional frameworks at both national and provincial levels (Wani, 2002), resulting in restricted progress in addressing biodiversity-related challenges (Lashari et al., 2021; GOP, 2014). Moreover, the species diversity and abundance reported in the Biodiversity Action Plan and Pakistan's Sixth National Report to the CBD (MCCP, 2016) document approximately 5,000 insect species, yet lack comprehensive inventories of endemic or threatened taxa (UNEP, 2015; MCCP, 2019). Notably, other arthropod groups, particularly ecologically and economically important predatory spiders, remain largely unaddressed. Climate change, environmental degradation, and increasing anthropogenic pressures—including intensive agricultural practices, habitat destruction, and the expansion of human activities into natural landscapes such as refuges, mountainous terrains, and transitional ecosystems—have further exacerbated biodiversity loss. These disturbances have resulted in the displacement of wildlife populations, forcing some species to migrate into adjacent habitats. In contrast, others have failed to adapt to synanthropic pressures, leading to population decline or local extinction (UNEP, 2019). Such ecological disturbances pose serious threats to habitat specialists and endemic species, while simultaneously facilitating the expansion of generalist taxa.

Recent additions to the spider fauna of the sub-mountainous Hindu Kush region of the Peshawar Valley contribute significantly to bridging knowledge gaps regarding the distribution of Eurasian and African eurytopic, Stenotopic, and endemic species in this region. To date, no comprehensive or systematic effort has been undertaken in Pakistan to document spider diversity, endemism, or conservation status (Ali, 2023; 2025; Ali et al., 2016; 2018; Dyal, 1935; Khan et al., 2025; Logunov et al., 2011; Li, 2020; UNEP, 2019). Therefore, taxonomic investigations such as the present study provide essential baseline data for biodiversity assessment, conservation planning, and ecological monitoring. The aim and objective of the current paper are: 1) the first record of the Chinese Oriental distributed genus *Sinothomisus* Tang, Yin, Griswold & Peng, 2006 and genus *Monaeses* Thorell, 1869, 2) Central Asian species *Castianeira arnoldii* Charitonov, 1946 and *Theridion melanostictum* O. Pickard-Cambridge, 1876 are recorded as new spiders for the Peshawar valley, 3) Reporting that agricultural lands and anthropogenic extension pressure in Peshawar Valley have a noted impact on predatory spider species.

2. Materials and methods

Spiders were sampled across a wide range of habitat types to capture the diversity of species occurring in different ecological settings of the district of Swabi. The selected habitats included dwarf shrub heath refuges, structurally complex dry grasslands, scrub mountain ecosystems, ecotonal transition zones, sub-temperate mountainous regions, the Indus River basin, and the extended reservoir area of Tarbela Dam. These habitats represent important ecological gradients that support diverse vegetation structures and microclimatic conditions suitable for various spider assemblages. Dwarf shrub heath areas provide low, dense vegetation that offers shelter and web-building sites for small ground-dwelling and foliage-associated spiders. Dry

grasslands with complex plant architecture create microhabitats for hunting spiders and web-builders, while scrub mountain ecosystems support species adapted to rocky substrates, shrubs, and seasonal vegetation. Ecotonal zones, which occur at the boundaries between two habitat types, were also included because they often support higher biodiversity due to the overlap of species from adjacent ecosystems. Additionally, the sub-temperate mountainous landscapes and riparian habitats associated with the Indus River basin provide moist microhabitats and diverse structural complexity that are favorable for many spider taxa. The extended reservoir zone of Tarbela Dam was also investigated, as fluctuating water levels and surrounding vegetation create ecological conditions that may influence spider distribution and community composition.

Specimens were collected using active search methods across different localities in the district of Swabi. Field sampling was carried out by carefully inspecting vegetation, ground litter, stones, tree bark, and other potential microhabitats where spiders are commonly found. Individuals were gently captured using soft forceps or aspirators to minimize damage to delicate morphological structures important for identification. The collected specimens were immediately preserved in labeled vials containing 70% ethanol to maintain their morphological integrity for further examination and long-term storage. In the laboratory, preserved specimens were examined using an OMAX stereomicroscope or a light microscope to observe diagnostic morphological characters. Particular attention was given to the structure of the cephalothorax, abdomen, legs, eye arrangement, and genital organs, which are critical for accurate species identification in spider taxonomy. Detailed photographs of the habitus (overall body structure) and genitalia were taken using a 3-megapixel OMAX digital camera attached to the stereomicroscope or light microscope at the Department of Zoology. Multiple angles and magnifications were used to ensure that important taxonomic features were clearly visible and properly documented. All examined specimens were carefully curated and preserved in 70% ethanol after documentation. The reference specimens have been deposited in the Department of Zoology, Women University Swabi (DZWUS), Swabi, Pakistan, where they are maintained as part of the institutional zoological collection. The collection is curated by Pir Asmat Ali and serves as a reference for future taxonomic, ecological, and biodiversity studies on spiders and other arthropods in the region.

3. Results and discussion

3.1. Taxonomy

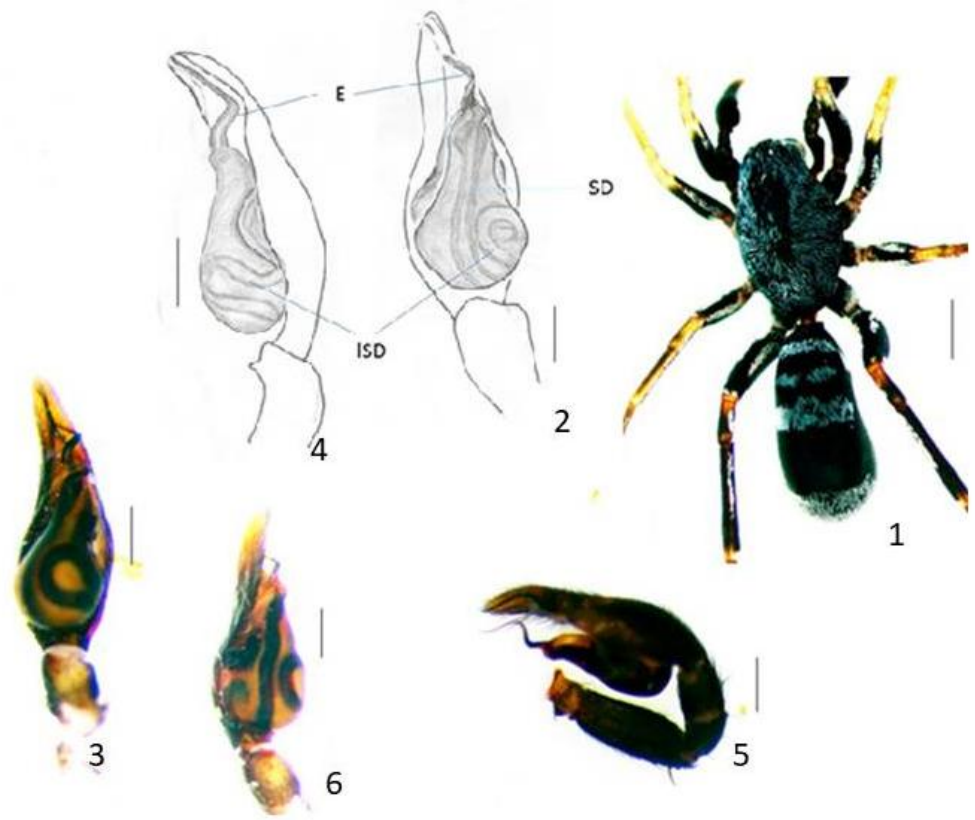
3.1.1. *Corinnidae* Karsch, 1880

Castianeirinae Reisking (1969).

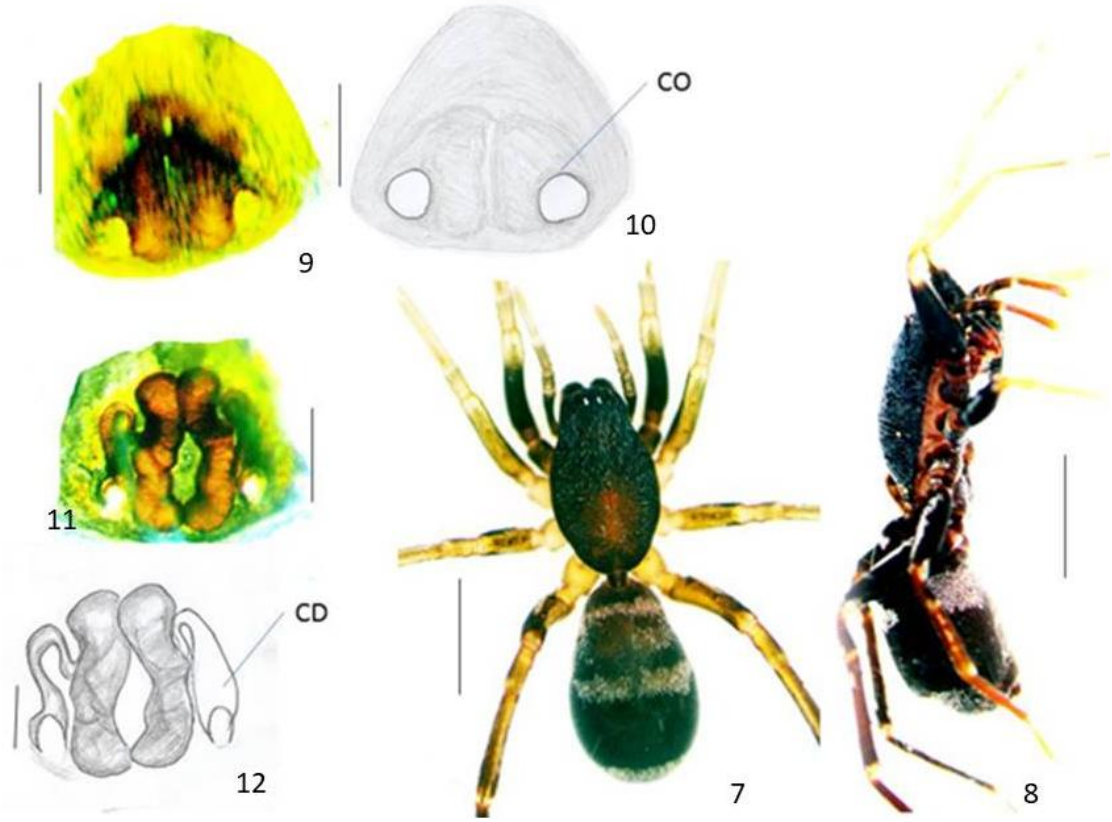
Castianeira Keyserling, 1879

Castianeira arnoldii Charitonov, (1946). (Figs. 1–12)

Measurements: Male. Carapace length 3.40, width 2.40. abdomen length 4.30, width 1.90. AER 1.10, AME width 0.70, PER 1.20, PME width 0.90. Leg I: femur 1.50, Patella 0.70, Tibia 1.40, Metatarsus 1.60, Tarsus 0.80. Leg II: femur 1.50, patella 0.70, Tibia 1.50, Metatarsus, 1.80; Tarsus, 1.00. Leg III: Femur 2.20, patella 0.70, Tibia 1.00, Metatarsus 1.10; Tarsus, 1.10. Leg IV: femur 2.20, Patella, 1.00, Tibia, 0.90 metatarsus 2.40, tarsus 1.50.



Figs. 1-6: *Castianeira arnoldii* Charitonov, 1946 male. 1. dorsal view of body; 2-3. left palp, ventral view; 4-5. left palp, retrolateral view; 6. prolateral view of palp. Scale bar for (1) 2mm, (2-6) 0.35mm.



Figs. 1-6: *Castianeira arnoldii* Charitonov, 1946 female. 7. dorsal view of body; 8. lateral view of body; 9-10. epigyne; 11-12. endogyne. Scale bar for (7-8) 2mm, (9-12) 0.35mm.

Comments: *Castianeira arnoldii* Charitonov, 1946, described from Turkmenistan and distributed in Afghanistan, Uzbekistan, and Iran (Marusik & Mikhailov, 2010; WSC, 2025). This central asian species was first reported from Pakistan.

3.1.2. Family Thomisidae Sundevall, 1833

Monaeses israeliensis Levey, 1973 (Figs. 17-19)

Monaeses paradoxes Strand, 1915c: 147 (misidentified per Levy, 1973: 111)

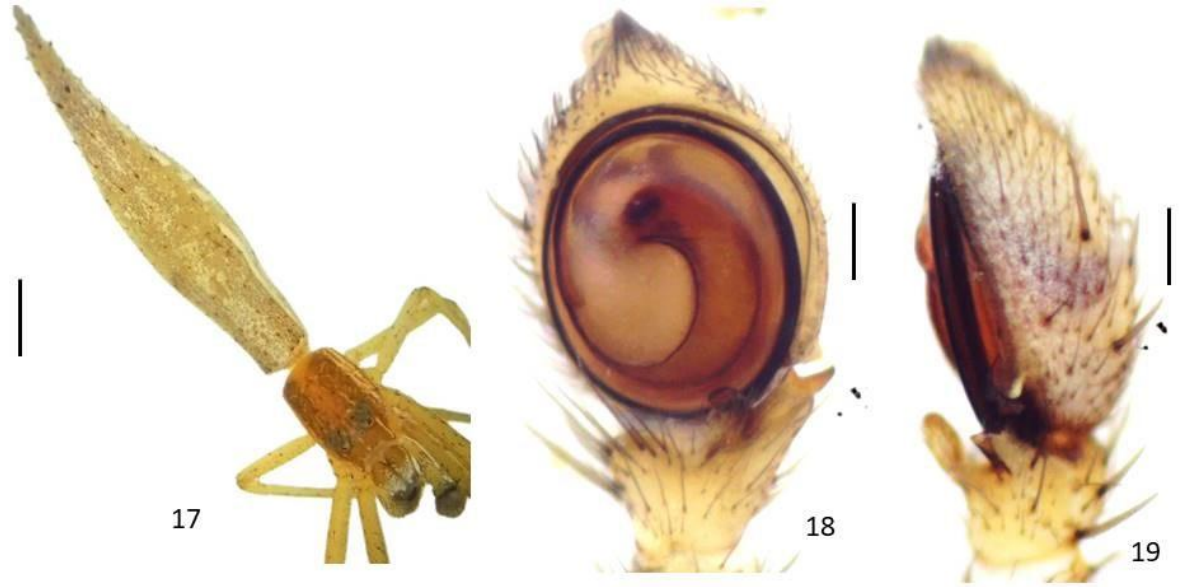
Monaeses israeliensis Levey, 1973:111.8-11 (♂♀)

Monaeses israeliensis Bayram et al., 2007a:132.3-D (♂)

For a complete list of taxonomic references, see World Spider Catalog (2025)

Materials examined: Pakistan: Khyber Pakhtunkhwa: District Swabi (Kala), 1♂, Swabi town, 34°11'N 72°45"E, 640 m, hills 16. 08.2021. District Swabi (Kala), 1♂, Swabi town, 34°11'N 72°45"E, 640 m, hills 16. 08.2023. District Swabi (Kala), 1♀, Swabi town, 34°11'N 72°45"E, 640 m, hills 16. 08.2022. District Swabi (Kala), 1♀, Swabi town, 34°11'N 72°45"E, 640 m, hills 16. 08.2022

Comments: This Eurasian eurytopic and reported from diverse habitats in China, India, Sri Lanka, and the Philippines (Bayram et al., 2007a; WSC, 2025), features of the male palpal organ are surprisingly variable. The species primarily inhabits scrub mountains and is associated with dried bushes throughout the year. Eurythermal spider young and adults can be found year-round in subtropics and in all seasons.



Figs 17-19. *Monaeses israeliensis* Levey, 1973, male, 17. dorsal view; 18. Palp ventral view. 19. Palp retrolateral view. Scale bar for (17) 2mm, (18-19) 0.3mm.

Sinothomisus hainanus (Song, 1994) (Figs. 20-23)

Xysticus hainaanus Song, 1994b: 121. 3A-E (♀)

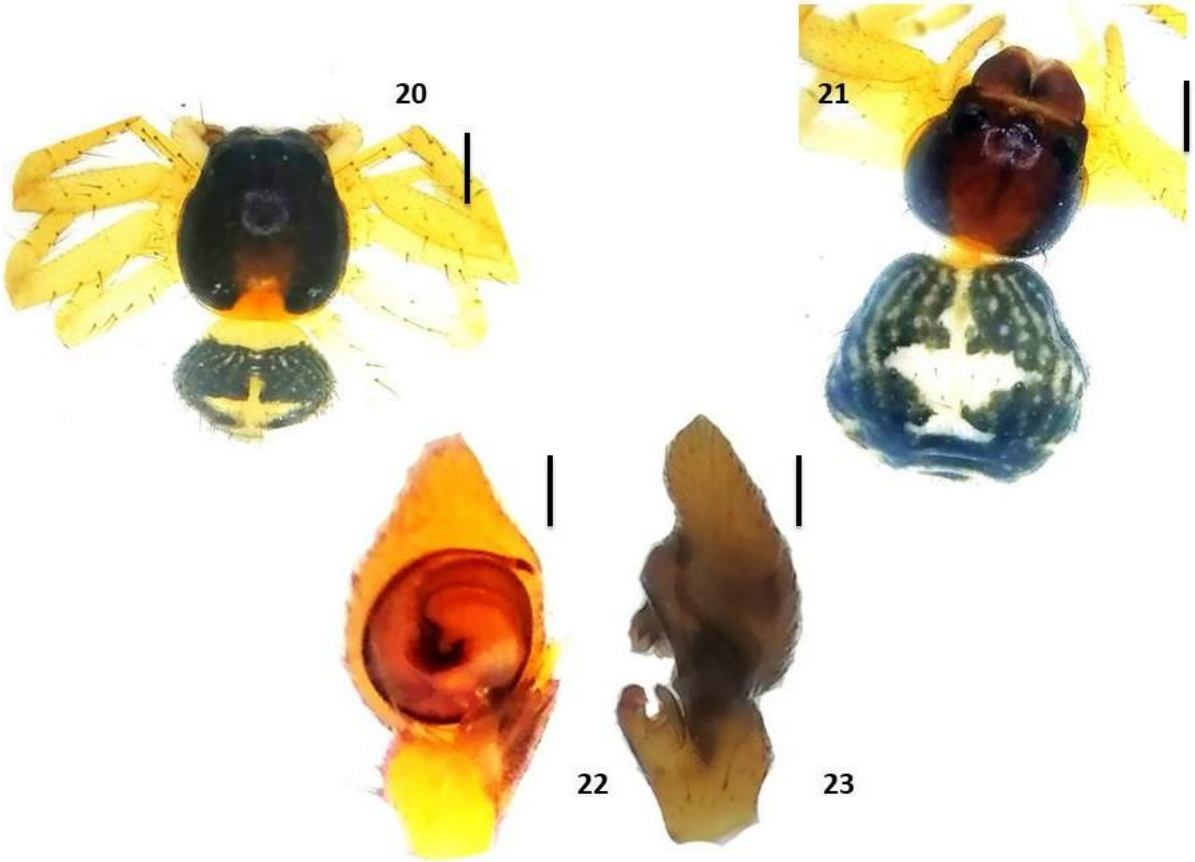
Xysticus hainaanus Song & Zhu, 1997: 85: 3A-E (♂♀)

Xysticus hainaanus Song, Zhu & Chen, 1997:502. 285H, 286J (♂♀)

Sinothomisus hainanus Tang& Li, 2010a: 45A-, 46A-D, 47 A-B (♂♀)

Material examined: 3♀, 5♂, Swabi, Kala hills, 34.14 N, 72.26E, 390m a.s.l. 15.07. 2021. Pir Asmat Ali. 3♀, 2♂, Swabi, Ambar, 34.09 N, 72.28E, 314m a.s.l. 16.07. 2021. Pir Asmat Ali. 4♀, 3♂ Swabi, Gadoon, 34.18 N, 72.68E, 670m a.s.l. 12.08. 2021. Pir Asmat Ali. 3♀, 3♂Swabi, Gadoon (Pir Gali), 34.12 N, 72.48E, 1050m a.s.l. 12.08. 2021. Pir Asmat Ali

Comments: To date, it was previously known from China's tropical Hainan Island and Southeast Asia (GIBF). *Sinothomisus hainanus* (Song, 1994) exhibits a discontinuous biogeographical distribution, with new records from the northwestern range of the Peshawar valley (Swabi), Pakistan. Recently, another Southeast Asian eurytopic jumping spider, Evarcha pulchella (Thorell, 1895) (Araneae: Salticidae), was reported from this valley, underscoring the need for taxonomic work to reflect current species numbers, endemism, and environmental factors affecting spider diversity.



Figs. 20-23. *Sinothomisus hainanus* (Song, 1994). 20. male habitus; 21. female habitus; 22. Left palp ventral view; 23. palp retro-lateral view. Scale bar for (717. 2mm) (18-19) 0.35mm.

3.1.3. Family Theridiidae Sundevall, 1833

Theridion melanostictum O. Pickard-Cambridge, 1876 (Figs. 24-26) (Map)

Theridion melanostictum O. Pickard-Cambridge, 1876b: 570 (♀)

Theridion purcelli Benoit, 1977i: 1423, 60a-d *(*♂♀ misidentifies per Sherwood et al., 2024c: 1272*)*

Theridion Miami Levi, 1990b: 336, 3–9 (♂♀)

Theridion melanostictum, Ley & Amitai, 1982a: 99, 32-37 (♂♀)

For a complete list of taxonomic references, see World Spider Catalog (2025)

Material examined: 3♀, 5♂, Swabi, Kala hills, 34.14 N, 72.26E, 390m a.s.l. 15.07. 2021. Pir Asmat Ali. 3♀, 2♂, Swabi, Ambar, 34.09 N, 72.28E, 314m a.s.l. 16.07. 2021. Pir Asmat Ali. 3♀, 4♂ Swabi, Gadoon, 34.18 N, 72.68E, 670m a.s.l. 12.08. 2021. Pir Asmat Ali. 6 ♀, 4♂Swabi, Gadoon (Pir Gali), 34.12 N, 72.48E, 1050m a.s.l. 12.08. 2021. Pir Asmat Ali

Comments: The species has an extension in distribution from Macaronesia, Mediterranean to Egypt, India, Central Asia, China, Japan, and was introduced to the USA, Canada, Galapagos (Bodkhe et al., 2015; El-Hennawy, 2017b; WSC, 2025), and is new to the ecotones of Hindukush with the river Indus basin of Pakistan.

Figs. 24-26. *Theridion melanostictum* O. Pickard-Cambridge, 1876 Male. 24. Habitus dorsal view; 25. Palp ventral view. 26. Palp prolateral view. Scale bar for (24) 2mm (24-26) 0.3mm.

4. Conclusion

The results indicate that several widely distributed Old World spider species have been newly recorded from Pakistan. Pakistan encompasses a wide range of ecosystems and habitats that support high levels of floral and faunal diversity. Biogeographically, the country represents a transitional zone where three of the world's major biotic realms converge. Palearctic elements primarily inhabit upland regions, whereas species of the Oriental realm dominate the Indus Plains and Himalayan foothills. In contrast, the arid southwestern regions exhibit faunal affinities with the Ethiopian (Afrotropical) realm (UNEP, 2019).

The present study documents noteworthy range extensions and distributional patterns of several spider taxa. *Castianeira arnoldii* Charitonov, 1946 represents a Central Asian element exhibiting localized stenotopic distribution within the study area. The previously Oriental genus and species *Sinothomisus hainanus* (Song, 1994), predominantly known from East Asian regions, is herein reported for the first time from trans-Indus and trans-Himalayan localities, indicating a broader ecological amplitude and a shift from stenotopic to eurytopic distribution. Furthermore, *Monaeses israeliensis* Levy, 1973, an Old-World eurytopic species, demonstrates a wide distribution across the trans-Indus and trans-Himalayan–Hindu Kush regions.

Despite Pakistan's biogeographic significance, no comprehensive or systematic assessment has yet been conducted to document the diversity, endemism, or conservation status of its flora and fauna (Mian et al., 2024; Ali et al., 2018; Ali, 2024). Within spiders, however, repeated records indicate the northward expansion of Afrotropical and Eurasian taxa into the sub-mountainous Hindu Kush region of the Peshawar Valley. Notably, *Theridion melanostictum* O. Pickard-Cambridge, 1876, primarily Eurasian in distribution, has also been reported from western Africa, highlighting complex biogeographic connectivity and dispersal patterns.

Declaration of conflict of interest

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