



NEW DISTRIBUTION RECORDS OF *Porcellionides pruinosus* (Brandt, 1833) AND *Cubaris murina* Brandt, 1833 (Isopoda: Oniscidea) FROM THE NORTH-WESTERN HIMALAYA, INDIA

Shahnaz Tabassum¹, Harmeen Kour¹, Seema langer^{1*} and Ghasem M. Kashani²

¹Department of Zoology, University of Jammu, Jammu – 180 001, Jammu & Kashmir (India)

²Department of Biology, Faculty of Science, University of Zanjan, Zanjan (Iran)

*e-mail: Seemalanger@jammuuniversity.ac.in

(Received 16 January, 2026; accepted 12 May, 2026)

ABSTRACT

Terrestrial isopods remain poorly documented in northern India. This study reports *Porcellionides pruinosus* (Brandt, 1833) and *Cubaris murina* Brandt, 1833 from Jammu and Kashmir, India. *C. murina* is recorded for the first time from the northern India, whereas *P. pruinosus* is reported for the first time from the Union Territory of Jammu and Kashmir (India), extending its known distribution in the region. Species identification was based on detailed morphological examination, and the identity of *P. pruinosus* was further confirmed through mitochondrial cytochrome C oxidase subunit I (COI) sequencing and phylogenetic analysis, which demonstrated its close affinity with previously reported global populations. These findings expand the known distribution of terrestrial isopods in the North-Western Himalaya and provide baseline morphological and molecular data for future taxonomic and biodiversity studies.

Keywords: *Cubaris murina*, India, Jammu & Kashmir, *Porcellionides pruinosus*, taxonomy, terrestrial isopods,

INTRODUCTION

Terrestrial isopods (Order Isopoda, suborder Oniscidea) are one of the few groups of crustaceans to have successfully colonized lands. The group has developed physiological and behavioral adaptations that enable them to flourish in terrestrial environment. They play key roles in the soil ecosystem as they accelerate the decomposition process, support soil aeration and nutrient cycling. A total of more than 4100 valid species of Oniscidean have been described worldwide which are classified into 568 genera and 38-39 families (Gongalsky *et al.*, 2025). Despite their wide global distribution and ecological importance, the faunistic and taxonomic research on terrestrial isopods in India is still scarce and dispersed as only a handful of species have formally been described (Collinge, 1914) and the majority of records are limited towards the southern and coastal regions such as Tamil Nadu, Kerala, Andaman and Nicobar whereas biogeographic regions like the North-Western Himalayas including Jammu and Kashmir remain poorly explored (Tabassum *et al.*, 2020).

Although species identification has traditionally relied on morphological characters, closely related taxa and intraspecific morphological variation may complicate species delimitation. Therefore, molecular characterization based on the mitochondrial cytochrome C oxidase subunit I (COI) gene has become an important complementary approach for confirming species identity and supporting phylogenetic inference in terrestrial isopods (Folmer *et al.*, 1994; Hassan *et al.*, 2024).

In India, 78 species (30 genera, 14 families) of isopods have so far been reported (Tabassum *et al.*, 2020). Earlier studies have formed a small but important baseline for the fauna of Jammu and

Kashmir (Tabassum *et al.*, 2020). In particular, two species, *Cubaris ignota* Arcangeli, 1934 and *Cubaris kashmiri* Jackson, 1935, have been reported from Kashmir region which were collected during the Italian duke of Spoleto Karakorum expedition in 1934 and Dutch Karakorum Expeditions of 1922, 1925 and 1929/1930, respectively. However, despite these isolated historical records from Kashmir, no species of terrestrial isopods has previously been documented from the Jammu division, leaving a complete faunistic gap in this region. The present study documents the occurrence of *Porcellionides pruinosus* and *Cubaris murina* from Jammu and Kashmir and provides diagnostic illustrations and molecular characteristics to facilitate their identification.

MATERIALS AND METHODS

The study was conducted in Jammu and Kashmir (India) between March 2023 and October 2024. *Porcellionides pruinosus* was collected from Jammu University Campus, Jammu (32.72056° N, 74.86700° E) and Hawal Colony, Kashmir (34.10940° N, 74.81441° E), while *Cubaris murina* was collected from Gharana Wetlands, Jammu (32.54155° N, 74.69034° E). Specimens were collected manually from beneath wooden debris, soil and stones, photographed in live, preserved in 70% ethanol and preserved at -20°C until examination. Morphological observations and dissections were carried out using an Olympus SZ61 stereomicroscope, and diagnostic characters were photographed using a Leica M205C stereomicroscope equipped with a Leica MC170HD camera. Live colouration was photographed using Canon PowerShot SX60 HS, (65x).

Genomic DNA of these species was extracted from pereopod muscle tissue using QIAamp DNA Blood and Tissue kit (Qiagen). A partial fragment of mitochondrial cytochrome C oxidase subunit I (COI) gene was amplified using the universal primers LCO1490 and HCO2198 (Folmer *et al.*, 1994). Although PCR was attempted for all the collected species under standardized conditions, successful amplification was achieved only for *P. pruinosus*. Despite repeated attempts and optimization of PCR conditions, amplification for *C. murina* was unsuccessful. PCR products were sequenced bidirectionally, edited using BioEdit (Hall, 1999), and aligned with reference sequences retrieved from GenBank using Geneious Prime v2023.1.2 (Kearse *et al.*, 2012). Bayesian phylogenetic analysis was performed in MrBayes under the GTR+G substitution model. Species identification was based on comparisons of diagnostic morphological characters with the published taxonomic descriptions and identification keys (Karasawa, 2012; Lillemets and Wilson, 2002; Cifuentes and Da Silva, 2024).

RESULTS AND DISCUSSION

Extensive field surveys were conducted, between March 2023 and October 2024, across different localities of Jammu and Kashmir to document the terrestrial isopod fauna of the region. Among the surveyed localities, *Porcellionides pruinosus* was recorded from the University of Jammu Campus, Jammu and Hawal Colony, Kashmir, whereas *Cubaris murina* was recorded only from Gharana Wetlands, Jammu. The voucher specimens were deposited in the Zoological Museum, University of Jammu *Porcellionides pruinosus*: Zoo280, Zoo280a; *Cubaris murina*: Zoo282. The collected specimens were identified based on diagnostic morphological characters using published taxonomic literature, and the identity of *P. pruinosus* was further confirmed through



Fig. 1: a) *Porcellionides pruinosus* (left-hand side), b) *Cubaris murina* (right-hand side)

mitochondrial COI sequence analysis and Bayesian phylogenetic inference. The newly generated COI sequences of *P. pruinosus* have been deposited in GenBank under accession numbers PV608440 and PV608441.

Taxonomy of *Porcellionides pruinosus* (Brandt, 1833)

Order : Isopoda Latreille, 1802

Suborder : Oniscidea Latreille 1802

Family : Porcellionidae Brandt and Ratzeburg, 1831

Material examined: 3 males & 2 females

Diagnosis: The species is a small to medium-sized porcellionid (up to 12 mm long and 5 mm wide) with an oblong body, fine dorsal granulation and a purplish-brown to powdery blue coloration (Fig. 2a, b). Antennae are annulated, extending beyond the third thoracic segment, with a two-segmented flagellum; the first flagellar article is twice the length of the second (Fig. 2c). The cephalon bears a distinct V-shaped supra-antennal line, reduced lateral lobes and no median projection; the compound eyes possess about 22 ommatidia (Fig. 2d, e). The pleon narrows abruptly relative to the pereon.

Male pereopods 1-3 bear brushes of stout setae on the ventral margin of the carpus (Fig. 2f; 3a, b). The telson is sub-triangular with an acute apex, while the uropodal exopods are rhomboid and approximately twice the length of the telson (Fig. 3c).

Pleopods 1-2 possess two pairs of lungs. Male pleopod 1 has a broad endopod tapering distally and a rounded exopod fringed with minute spine setae (Fig. 3d, e). Pleopod 2 bears a triangular exopod and a slender rod-like endopod with a transparent distal tip (Fig. 3f).



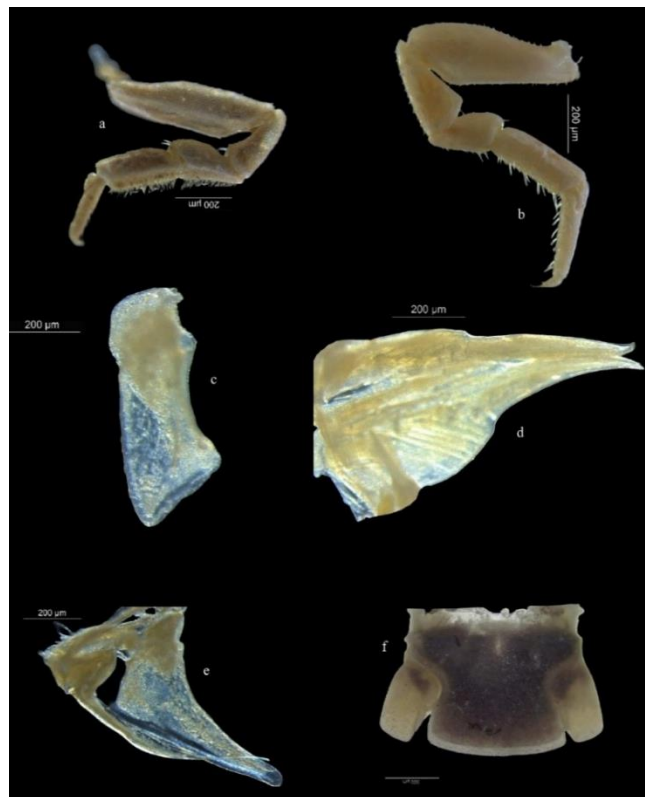
Fig. 2: *Porcellionides pruinosus*: a) dorsal view, b) lateral view, c) antennae, d) supra-antennal line, e) frontal lobes, and f) pereopod 1



Fig. 3: *Porcellionides pruinosus*: a) pereopod 2, b) pereopod 3, c) telson and uropods, d) pleopod 1 exopod, e) pleopod 1 endopod, and f) pleopod 2



Fig. 4: *Cubaris murina*: a) dorsal view, b) ventral view, c) conglobation d) antenna, e) cephalon, f) frontal shield, and g) quadrangular lobe



Taxonomy of *Cubaris murina* Brandt, 1833

Order : Isopoda Latreille, 1802

Suborder: Oniscidea Latreille 1802

Family : Armadillidae Brandt and Ratzeburg, 1831

Material examined: 3 males and 2 females

Diagnosis: Body oblong-oval, strongly convex and more than twice as long as wide. The first pereonite is largest, while the remaining pereonites are subequal with overlapping lateral margins. Dorsal surface bears distinct tubercles arranged in longitudinal rows; Ventral surface pale cream coloured (Fig. 4b). Colour varies from light grey to brown; in some specimens the uropod sympod is orange (Fig. 4a, Fig. 1b). The species exhibits endo-antennal conglobation (Fig. 4c).

Cephalon small with a trapezoidal frontal shield lacking a median lobe; vertex slightly bulging with lateral lobes (Fig. 4e, f). Compound eyes possess approximately 20-22 ommatidia (Fig. 4e).

Antennulae reduced with three articles. Antenna short, with article 2 longer than the others and article 5 the longest; the first four articles bear ventral grooves (Fig. 4d).

Pereonite 1 extends forward to the base of the eyes and bears a semicircular ventral lobe, whereas pereonite 2 bears a quadrangular lobe (Fig. 4g). Male anterior pereopods possess brushes of long setae on the ventral side of carpus and merus; pereopods are stout and spinose along the inner margin (Fig. 5a). Pereopod 7 ischium has a straight ventral margin (Fig. 5b).

Pleonites 1-2 are laterally reduced and concealed beneath pereonite 7, whereas pleonites 3-5 are enlarged and aligned with pereon margins. Pleopods are minute and translucent; pleopod 1 consists of a broad exopod and an endopod terminating in slightly divergent tips (Fig. 5c, d). Pleopod 2 minute, with a slender endopod (Fig. 5e).

Fig. 5: *Cubaris murina*: a) pereopod 1, b) pereopod 7, c) pleopod 1 exopod, d) pleopod 1 endopod, e) pleopod 2, and f) pleotelson and uropods

Pleotelson broad basally, constricted medially and broadly rounded, appearing quadrangular to truncate posteriorly. Sympod of the uropods expanded and flattened, approximately twice as wide as long. Exopod minute, inserted medially and not surpassing the pleotelson margin; endopod reduced and partially concealed and measures roughly half the pleotelson length (Fig. 5f).

The identification of *P. pruinosus* and *C. murina* was based on stable morphological characters, including cephalic structure, dorsal ornamentation, pereopod setation, uropods and male pleopods, following published taxonomic literature (Schmalfuss and Ferrara, 1983; Ramakrishna, 1965, 1995; Karasawa, 2012; Cifuentes and Da Silva, 2024; Segura- Zarzosa *et al.*, 2020). The examined specimens agreed well with previous descriptions of both species.

Research on Indian Oniscidea remains geographically fragmented, with northern India receiving comparatively little attention. The present records extend the known distribution of *P. pruinosus* and provide the first record of *C. murina* from northern India. These findings highlight the North-Western Himalaya as an underexplored region and emphasize the need for further surveys of terrestrial isopods.

Phylogenetic analysis: The phylogenetic relationships inferred from the mitochondrial COI sequences recovered the two newly generated sequences of *Porcellionides pruinosus* from the present study (PV608440 and PV608441) within a well-supported *P. pruinosus* clade (Fig. 6).

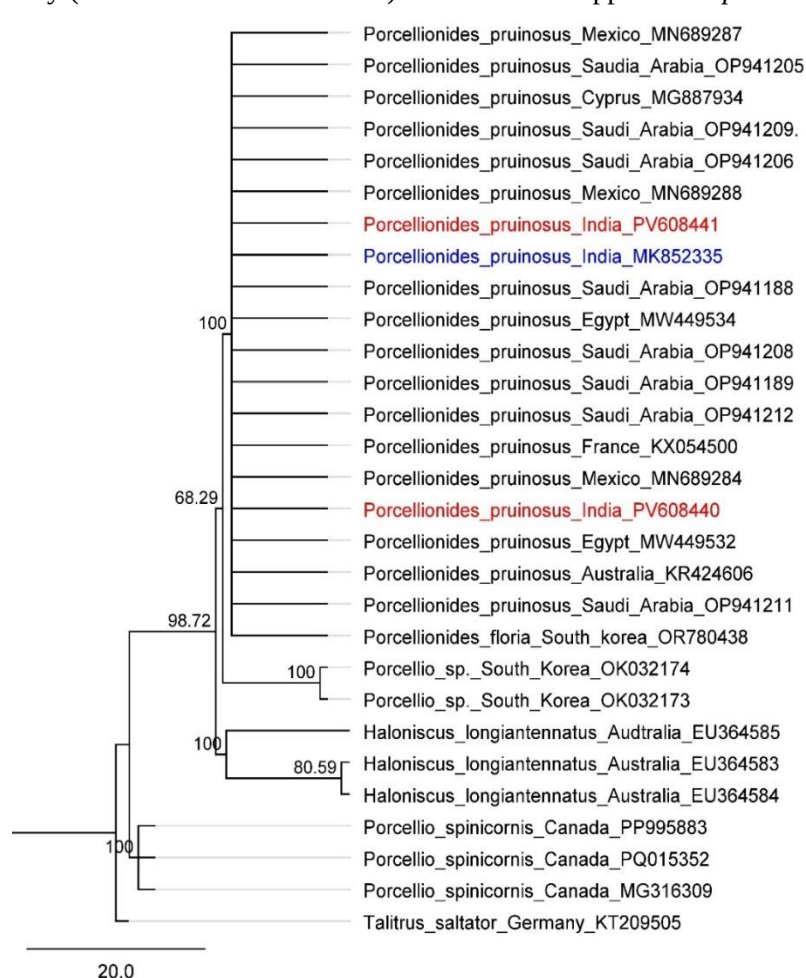


Fig. 6: Phylogenetic analysis, BI tree of *Porcellionides pruinosus* based on COI gene

and *Porcellio spinicornis*. The phylogenetic analysis thus corroborates the morphological identification of the specimen examined in present study as *P. pruinosus* and confirms their close

Sequence PV608441 clustered closely with the previously reported sequence of *P. pruinosus* (MK852335) from Tamil Nadu (India), indicating high genetic similarity between the newly generated and previously available Indian isolate. Sequence PV608440 was also nested within the *P. pruinosus* clade and grouped with conspecific sequences from Saudi Arabia, Egypt, Australia, France, Mexico, and Cyprus, demonstrating low intraspecific divergence across geographically distant populations. The *P. pruinosus* lineage was recovered with strong posterior probabilities (PP) support (68.29-100%), confirming the monophyly of the species. Furthermore, the *P. pruinosus* clade was clearly separated from closely related taxa, including *Porcellionides floria*, *Porcellio* sp., *Haloniscus longiantennatus*,

genetic affinity with previously reported global populations. The failure to amplify the COI gene in *C. murina* reflected primer-template mismatches or poor DNA amplification efficiency, highlighting the need for species-specific primer development or alternative molecular markers in future studies.

The present study reports *P. pruinus* and *C. murina* as new records from the North-Western Himalaya and provides detailed morphological descriptions with illustrated diagnostic characters for their reliable identification. Molecular characterization based on mitochondrial COI gene and phylogenetic analysis further confirmed the identity of *P. pruinus*, supporting its close genetic affinity with previously reported global populations. Together, these findings significantly expand the known distribution of terrestrial isopods in northern India and contribute to the taxonomic inventory of the region. The study also provides a valuable foundation for future taxonomic, molecular, and biogeographic investigations of Himalayan Oniscidea.

Acknowledgement: The first author, Shahnaz Tabassum is grateful to NFST for providing financial support and DBT BUILDER, University of Jammu Interdisciplinary Life Science Program funded by Department of Biotechnology, Ministry of Science & Technology, Govt. of India, New Delhi (Grant No. BT/INF/22/SP47656/2022; Dated: Nov. 30, 2022) which made this research possible.

Data availability: All the data is available either in the manuscript.

Conflict of interest: Authors declare that there are no conflicts of interest.

Ethical approval: Not required.

REFERENCES

- Arcangeli, A. 1934. Isopodi terrestri raccolti nel Caracoram dalla Spedizione di SAR il Duca di Spoleto. *Bollettino di zoologia agraria e bachicoltura*, **4**(2): 43-63.
- Brandt, I. 1833. Conspectus monographiae crustaceorum oniscodorum Latreillii. *Byulleten moskovskogo Obshchestva Ispytatelei Prirody*, **6**: 171-193.
- Cifuentes, J. and Da Silva, L.P. 2024. Revision of the genus *Porcellionides* Miers, 1877 (Isopoda: Porcellionidae) in the Ibero-Balearic region. *European Journal of Taxonomy*, **939**: 1-51.
- Collinge, W.E. 1914. XXXVII. Terrestrial Isopoda. In: Zoological Results of the Abor Expedition, 1911–1912. *Records of the Indian Museum*, **8**(4): 465-469.
- Folmer O, Black M, Hoeh W, Lutz R and Vrijenhoek R. 1994. DNA primers for amplification of mitochondrial cytochrome C oxidase subunit I from diverse metazoan invertebrates. *Molecular Marine Biology and Biotechnology*, **3**: 294-299.
- Gongalsky, K.B., De Smedt, P., Kuznetsova, D.M., Segers, S., Gardini, P., Hornung, E., *et al.*, 2025. Oniscid Base: A call for contributions to a global database to advance terrestrial isopod research. *Soil organisms*, **97**(3): 247-269.
- Hall, T.A. 1999. BioEdit: A user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucleic Acids Symposium Series*, **41**: 95-98.
- Hassan, M.M., Albogami, B., Mwabvu, T., Hassan, M.M., Awad, M.F., Sabry, A., *et al.*, 2024. Morphological, molecular identification and genetic diversity assessment of three terrestrial Isopods from the High-Altitude region. *Journal of Biobased Materials and Bioenergy*, **18**(4): 656-666.
- Jackson, H.G. 1935. Isopoda Terrestria. pp. 162-167. In: *Wissenschaftliche Ergebnisse der Niederländischen Expeditionen in den Karakorum und die Angrenzenden Gebiete in den Jahren 1922, 1925 und 1929/30* (eds. P.C. Visser, and J. Visser-Hooft) **1**: 162-167.
- Karasawa, S. 2012. *Cubaris iriomotensis*, a junior synonym of the pantropical species *Cubaris murina* (Crustacea: Isopoda: Oniscidea). *Edaphologia*, **91**: 21-30.

- Kearse, M., Moir, R., Wilson, A., Stones-Havas, S., Cheung, M., Sturrock, S., *et al.*, 2012. Geneious Basic: an integrated and extendable desktop software platform for the organization and analysis of sequence data. *Bioinformatics*, **28**(12): 1647-1649.
- Lillemets, B. and Wilson, G.D. 2002. Armadillidae (Crustacea: Isopoda) from Lord Howe Island: New taxa and biogeography. *Records-Australian Museum*, **54**(1): 71-98.
- Ramakrishna, G. 1965. Studies on the Indian isopods. Part II. Notes on the Oniscid collection from the Kameng Division of NEFA. *Records of the Zoological Survey of India*, **63**: 181-184.
- Ramakrishna, G. 1995. The fauna of India and the adjacent countries: Crustacea: Oniscidae. *Records of the Zoological Survey of India*. pp. 103-107.
- Schmalfuss, H. 2003. *World Catalog of Terrestrial Isopods (Isopoda: Oniscidea)*. Issue 654 of *Stuttgarter Beiträge zur Naturkunde/ A: Biologie*, Staatliches für Naturkunde, **654**: 1-341.
- Segura-Zarzosa, I.E., Rodríguez-Almaraz, G.A., Obregón-Barboza, H., Murugan, G., Treviño-Flores, J.A. and Maeda-Martínez, A.M. 2020. New records of exotic species of Oniscidea (Crustacea: Isopoda) from northern Mexico. *Revista Mexicana de Biodiversidad*, **91**: e913098. [DOI: <https://doi.org/10.22201/ib.20078706e.2020.91.3098>].
- Tabassum, S., Mitra, S. and Langer, S. 2020. An annotated checklist of terrestrial isopod fauna (Crustacea: Isopoda) of India. *Ecology, Environment & Conservation*, **26**(4): 1826-1833.