



Ecologica Montenegro
ISSN 2396-9744 (online) | ISSN 2337-0173 (print)

Ecologica Montenegro 74: 1-8 (2024)
This journal is available online at: www.biotaxa.org/em
<https://dx.doi.org/10.37828/em.2024.74.1>


Article

<https://zoobank.org/urn:lsid:zoobank.org/pub:DA052CE7-6D0F-4555-885A-36760F124325>

Two new *Kongsbergia* species from the Western Himalaya with a key to the species of the genus from India (Acari: Hydrachnidia, Aturidae)

VLADIMIR PEŠIĆ¹, HARRY SMIT^{2,3}, NEHA SHARMA⁴,
KUMBHLESH KAMAL RANA⁴, PANKAJ BAHUGUNA⁵ & RAJESH RAYAL⁴

¹ Department of Biology, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro.

 <https://orcid.org/0000-0002-9724-345X>

² Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands.

E-mail: harry.smit@naturalis.nl;  <https://orcid.org/0000-0002-0376-6808>

³ Museums Victoria Research Institute, Museums Victoria, GPO Box 666, Melbourne, VIC 3001, Australia.

⁴ Department of Zoology, School of Basic and Applied Sciences, Sri Guru Ram Rai University, Patel Nagar, Dehradun, Pin no-248001, Uttarakhand, India.

E-mails: nehasurira@gmail.com, kumbhleshkamalrana@gmail.com, drrajeshrayal@gmail.com

⁵ Department of Zoology, Government Degree College Dehradun Sehar, Pin No - 248007, Dehradun, Uttarakhand, India. E-mail: pankajpaurii@gmail.com

* Corresponding author. E-mail: vladopesic@gmail.com

Received 1 June 2024 | Accepted by A. Zawal: 10 June 2024 | Published online 12 June 2024.

Abstract

In this paper, two species of the water mite genus *Kongsbergia* Thor, 1899 (Aturidae), i.e., *K. uttarakhandensis* Pešić & Smit **n. sp.** and *K. tuzovskiji* Pešić & Smit **n. sp.** are described from streams in Uttarakhand State of India. The latter species was named after late Dr Petr Tuzovskij for his outstanding contribution to the research of water mites.

Key words Acari, water mites, taxonomy, Himalayas, new species, streams.

Introduction

Water mites of the genus *Kongsbergia* are widely distributed in all biogeographical realms, except Australia and Antarctica. Following Smit (2020) the genus includes five subgenera, *Kongsbergia* s. s. (worldwide, except the Australasian region), *Crocokongsbergia* Orghidan & Gruia, 1980 (two species known from Cuba), *Kongsbergiella* Cook, 1966 (one species known from Liberia), *Parakongsbergia* K. Viets, 1949 (one species known from North Macedonia) and *Pseudokongsbergia* Walter, 1935 (five species from East and West Africa). To date, five species of the genus *Kongsbergia*, i.e., *K. parvatiya* Cook, 1967, *K. variabilis* Cook, 1967, *K. rucira* Cook, 1967, *K. indica* Pešić & Smit, 2019 and *K.*

himalayaensis Pešić & Smit, 2020 have previously been described from India (Cook 1967; Pešić *et al.* 2019, 2020).

Here we described two *Kongsbergia* species new for science from Uttarakhand State, located in the western part of the Indian Himalayan range.

Material and Methods

All material was collected from spring-fed streams in Uttarakhand State in India by the third (N.S.) and fourth (K.KR) authors and was fixed in ethanol 70 %. Later on, water mites were transferred to Koenike-fluid and dissected as described elsewhere (Gerecke *et al.* 2016). Morphological nomenclature follows Gerecke *et al.* (2016). Holotype and paratypes of the new species will be deposited in Naturalis Biodiversity Center, Leiden (RMNH). In the section 'Material examined', collecting site abbreviations derive from the geographical database of Neha Sharma and Kumbhlesh Kamal Rana.

All measurements are given in μm . The following abbreviations are used: Cx-I = first coxae; Dgl-4 = dorsoglandularia 4; dL = dorsal length; H = height; I-L-4-6 = fourth-sixth segments of first leg; L = length; P-1-P-5 = palp segment 1-5; vL = ventral length; W = width.

Systematic part

Family Aturidae Thor, 1900

Genus *Kongsbergia* Thor, 1899

Diagnosis — Smit 2020, p. 364.

Kongsbergia (Kongsbergia) tuzovskiji Pešić & Smit n. sp.

<https://zoobank.org/urn:lsid:zoobank.org:act:3A2529E8-A1DE-498F-9FB3-4DB2ADA9C4A9>

(Fig. 1)

Type material — Holotype male, dissected and slide mounted (RMNH), India, Uttarakhand State, SPR-MD-02-FE spring-fed Maldevta stream (Fig. 2), 30°19'50.7684" N, 78°08'23.4024" E, 2 February 2021 leg. N. Sharma. Paratypes: 1/0/0, same data as the holotype; 2/0/0, SPR-MD-01-JN, spring-fed Maldevta stream, 30°19'50.4444" N, 78°08'23.6256" E, 7 April 2020 leg. N. Sharma, dissected and slide mounted (RMNH).

Other material — 1/0/0 (one IV-L dissected and slide mounted), SPR-MD-02-JA spring-fed Maldevta stream, 30°19'55.2432" N, 78°08'20.6412" E, 30 January 2021 leg. N. Sharma; 1/0/0, SPR-MD-01-OC spring fed Maldevta stream, 30°19'51.4848" N, 78°08'22.7112" E, 4 October 2020 leg. N. Sharma; 1/0/0, SNO-DEV-RTH-01 Devprayag, 30°08'39.30" N, 78°35'51.30" E, 2 March 2020, leg. K. Kamal Rana; 1/0/0, SNO-DEV-RTH-03, Devprayag, 30°08'25.77" N, 78°35'47.10" E, 13 June 2020, leg. K. Kamal Rana; 2/0/0, SNO-DEV-RTH-06 Devprayag, 30°08'13.60" N, 78°35'48.10" E, 23 January 2021, leg. K. Kamal Rana; 1/0/0 (one IV-L dissected and slide mounted), SNO-BAS-RTH-04, Byasi, 30°03'52.32" N, 78°28'03.74" E, 20 December 2020 leg. K. Kamal Rana.

Diagnosis. Male (Female unknown) — Dorsal shield with simple setae, without colour pattern, IV-L-4 distoventrally not projecting; IV-L-5 ventral margin in centre convexly protruding bearing a strong and curved medioventral seta and a distoventral stout and strongly pectinate seta.

Description. *Male* — Colour yellowish brown, idiosoma elongated, egg-shaped, lateral margins weakly convex, posterior margins of dorsal shield rounded, lateral eyes with black pigment dot, frontal margin between Dgl-1 medially indented. Dorsal and ventral shields present; dorsal shield with simple setae and with numerous wrinkles in lateral area, without any obvious colour pattern. Gnathosomal bay deep, suture Cx-I/II distinct, not reaching the medial line. Genital field with 40-50 pairs of acetabula, in one to three rows near posterior and lateral margins of the venter, gonopore small in terminal position on ventral surface (Fig. 1E), excretory pore on dorsal side of ventral shield anterior to the gonopore. Palp stout, P-2 dorsal margin convex, ventral margin proximally with a projection, distally with a blunt

medial hump, P-4 stout, maximum H at the base, proximoventral seta longer and stouter than distoventral seta (Figs. 1C-D). IV-L: IV-L-2 distoventrally projecting, IV-L-4 not projecting distally, with some pectinate setae at distal margin; IV-L-5 ventral margin with a basal kink, in centre weakly

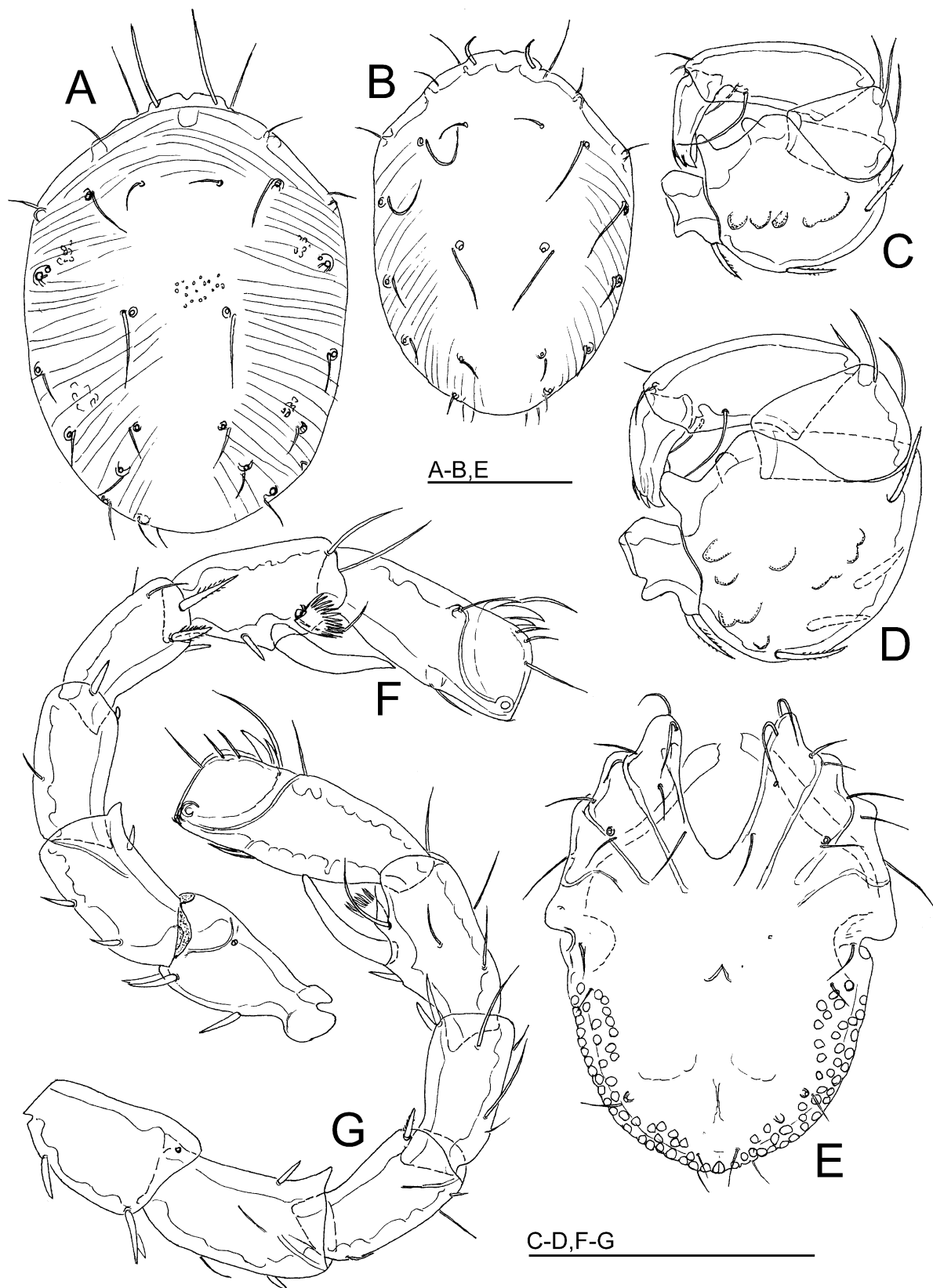


Figure 1. *Kongsbergia tuzovskiji* Pešić & Smit n. sp., male (A, D, E – holotype; B-C, F-G – paratypes), Uttarakhand, Maldevta stream: A-B – dorsal shield; C-D – palp; E – ventral shield; F – IV-L; F – IV-L-2-6. Scale bars = 100 μ m.

convexly protruding bearing a small peg-like proximoventral seta, a stout, curved, bluntly pointed medioventral seta and a stout and strongly pectinate distoventral seta (Fig. 1F).

Measurements (holotype, in parentheses paratypes from SPR-MD-01-JN, n=2) — Dorsal shield L 309 (258-281), W 266 (188-203); ventral shield L 322 (267-298), W 247 (188-203); gnathosomal bay L 105 (78), Cx-III W 231. Palp: palp total 257 (216-231); dL/H, dL/H ratio: P-1, 22/28, 0.77 (16-17/22, 0.73-0.74); P-2, 96/77, 1.24 (77-67/56-61, 1.19-1.26); P-3, 41/53, 0.76 (33-34/38-39, 0.86-0.87); P-4, 77/37, 2.06 (66-68/25-28, 2.42-2.66); P-5, 41/20, 2.03 (34-36/14-15, 2.48-2.49); L ratio P-2/P-4, 1.25 (1.02-1.13). Gnathosoma vL 131. Legs: dL of I-L: 41 (36), 48 (47), 47 (45), 55 (48), 66 (60), 86 (78); I-L-6 H 30 (25), L/H I-L-6 ratio 2.9 (3.1); dL of IV-L: 68 (51-56), 75 (61-71), 66 (54-58), 72 (56-58), 73 (60-61), 105 (86-92); IV-L-6 H 39 (33-36), L/H IV-L-6 ratio 2.68 (2.57-2.62).

Female — Unknown.

Etymology — The species is named after the late Dr Petr Tuzovskij (Papanin Institute for Biology of Inland Waters, Borok, Russia), on the occasion of his passing away in December 2023, for his outstanding contribution in the research of water mites as well as his friendly relationship with the first (V.P.) and second author (H.S.) of this paper over more than twenty years.

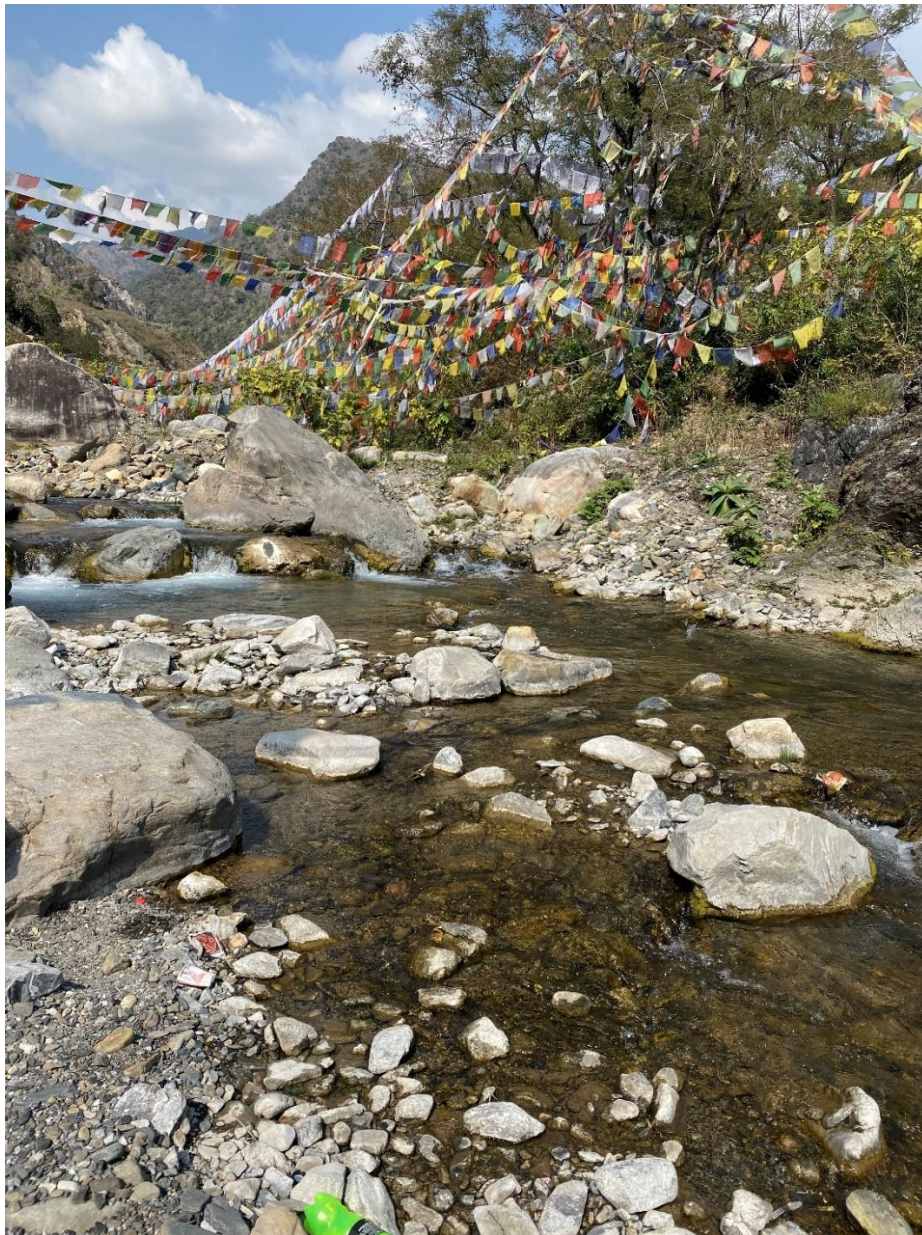


Figure 2. Photograph of Maldevta stream (*locus typicus* of *K. tuzovskiji* Pešić & Smit n. sp.). Photo by P. Bahuguna.

Discussion — In the shape of the IV-L and palp, the new species is most similar to *Kongsbergia variabilis* Cook, 1967, and *K. indica* Pešić & Smit, 2019. The latter species, recently described from Uttarakhand (Pešić *et al.* 2019), can be separated by the dorsal shield with four pairs of strong setae associated with accompanying glandularia. Moreover, the stout seta of IV-L-5 of *K. indica* is much larger and not curved. *Kongsbergia variabilis*, known from Maharashtra State of India (Cook 1967) differs from the new species in the colour pattern consisting of a small anterior patch, and in the shape of IV-L with IV-L-4 distoventrally projecting but exhibiting various degrees of extension (for variation in IV-L-4 see Cook 1967, fig. 738), and IV-L-5 comparatively more slender with the distoventral seta comparatively more slender and curved, smooth, not strongly pectinate as in new species (see Cook 1967, fig. 736).

Variability — The male of new species shows variation in the size, and especially in the proportions of the palp (compare Figs. 1C and 1D). The same pattern was observed by Cook (1967) for *Kongsbergia rucira* Cook, 1967 and *K. variabilis*, and by Pešić *et al.* (2019) for *Kongsbergia indica*.

Distribution — India; known only from Uttarakhand State.

***Kongsbergia (Kongsbergia) uttarakhandensis* Pešić & Smit n. sp.**

<https://zoobank.org/urn:lsid:zoobank.org:act:34DEAB78-E53F-4EF6-847B-27391C03D010>

(Fig. 3)

Type material — Holotype male, dissected and slide mounted (RMNH), India, Uttarakhand State, SNO-DEV-RTH-01 Devprayag, 30°08'39.30" N, 78°35'51.30" E, 2 March 2020, leg. K. Kamal Rana. Paratypes: 1/0/0, same data as the holotype, conserved in Koenike fluid (RMNH).

Diagnosis. Male (Female unknown) — Dorsal shield with simple setae, without colour pattern; excretory pores located on the dorsal surface, behind the medially slightly indented posterior margin of the dorsal shield; gonopore located on a small projection. IV-L-5 distoventrally projecting, anterodorsal extension truncate, triangular ventral projection in segment centre bearing the medioventral stout, sword-shaped seta, not contracted distally, and longer distoventral seta, distally ending in a fine flagellum-like tip, proximoventral seta stout and peg-like located in the proximal half of the segment.

Description. *Male* — Colour yellowish brown, idiosoma egg-shaped, lateral margins weakly convex; lateral eyes with black pigment dots. Dorsal and ventral shield present; dorsal shield with simple setae and with wrinkles in lateral area, without any obvious colour pattern. Excretory pore located on dorsal surface, behind the medially slightly indented posterior margin of the dorsal shield (Fig. 3A). Gnathosomal bay moderately deep, suture Cx-I/II distinct, not reaching the medial line. Genital field with 25-30 pairs of acetabula, in one or two rows near posterior and lateral margins of the venter. Gonopore located on a small subrectangular projection (Figs. 3B). Palp stout, P-2 dorsal margin convex, ventral margin with a large, posteriorly located tubercle, and one much smaller, more anteriorly located knob-shaped tubercle, P-4 stout, maximum H at the base of the segment (Fig. 3E). IV-L: IV-L-2 distoventrally projecting, IV-L-4 distoventrally not projecting, with some pectinate setae at distal margin; IV-L-5 distoventrally projecting, with a triangular ventral projection in segment centre bearing a medioventral stout, sword-shaped seta with a rounded tip and with a small proximally located tubercle on the outer margin of seta and a distoventral seta which is longer, and distally ending in a fine flagellum-like tip, located nearly at the same level and partly embracing each other, proximoventral seta short and stout, located in the proximal half of the segment; IV-L-6 stout, at its base covered by a distoventral process of the preceding segment (Figs. 3C-D).

Measurements (holotype, in parentheses selected measurements of paratype fixed in fluid) — Dorsal shield L 275 (277), W 207 (206); ventral shield L 294 (313), W 209 (213), gnathosomal bay L 59 (77), Cx-III W 217. Palp: palp total L 242; dL/H, dL/H ratio: P-1, 16/23, 0.68; P-2, 77/64, 1.21; P-3, 36/42, 0.85; P-4, 63/29, 2.13; P-5, 50/16, 3.2; L ratio P-2/P-4, 1.24. Chelicera total L 116, basal segment L 84, claw L 36. Legs: dL of I-L-2-6: 35, 43, 45, 61, 77; I-L-6 H 28, L/H I-L-6 ratio 2.77; dL of IV-L: 61, 64, 53, 53, 80 (110 till the end of distal projection), 91.

Female — Unknown.

Etymology — The species is named for its occurrence in the Uttarakhand State of India.

Discussion — The species from Uttarakhand most closely resembles *Kongsbergia thienemanni* K. Viets, 1935, a species originally described on the basis of specimens collected from a waterfall near

Rana Bedala in East Java (K. Viets 1935). Both species share unique morphological traits in the male, i.e., the excretory pores located on the dorsal surface, behind the medially slightly indented posterior margin of the dorsal shield, the gonopore located on a small projection, and the similar shape of IV-L-5 (distally projecting, with a triangular ventral projection in the center of the segment bearing a medioventral and distoventral seta).

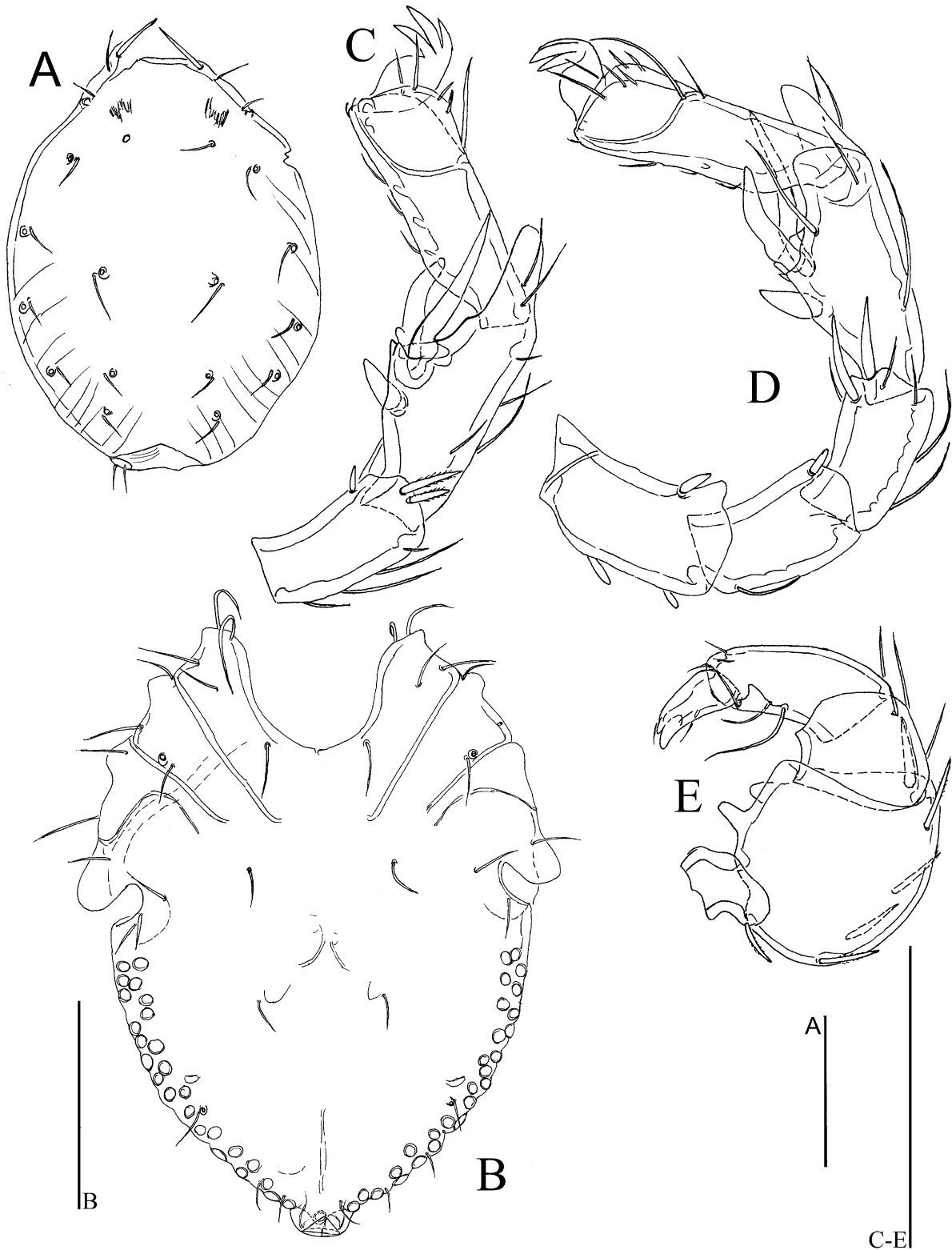


Figure 3. *Kongsbergia uttarakhandensis* Pešić & Smit n. sp., male holotype, Uttarakhand, Devprayag: A – dorsal shield; B – ventral shield; C – IV-L-4-6; D – IV-L-2-6; E – palp. Scale bars = 100 μ m.

From the new species, *K. thienemanni* is distinguished by the following morphological traits of IV-L-5: (i) the shortest (medioventral) of the two setae located in triangular ventral projection is very slender and contracted distally in *thienemanni*, but stout and not contracted in the new species, (ii) the short proximoventral seta which is stout in the new species is much more slender in *thienemanni*, and (iii) the anterodorsal extension is pointed in *thienemanni* and truncated in the new species.

Distribution — Known only from the *locus typicus* in Uttarakhand State.

Key to species of the genus *Kongsbergia* from India (modified from Pešić *et al.* 2020)

- | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1 | IV-L-5 modified with characteristic modified setae: males | 2 |
| - | IV-L-5 without modified setae: females (unknown for <i>K. parvatiya</i> , <i>K. himalayaensis</i> , <i>K. tuzovskiji</i> n. sp. and <i>K. uttarakhandensis</i> n. sp.) | 8 |
| 2 | IV-L-5 distally projecting | 5 |
| - | IV-L-5 not projecting distally | 3 |
| 3 | Dorsal shield with four pairs of strong setae associated with accompanying glandularia; without dorsal colour pattern | <i>K. indica</i> Pešić & Smit, 2019 (Uttarakhand) |
| - | Dorsal shield with simple setae; dorsal shield colour pattern various | 4 |
| 4 | Colour pattern consisting of a small anterior patch; IV-L-4 distoventrally projecting (exhibiting a strong variability, see Cook 1967), distoventral seta on IV-L-5 curved and smooth | <i>K. variabilis</i> Cook, 1967 (Maharashtra) |
| - | Dorsal shield without colour pattern; IV-L-4 not projecting distoventrally, distoventral seta on IV-L-5 strongly pectinate | <i>K. tuzovskiji</i> Pešić & Smit n. sp. (Uttarakhand) |
| 5 | Gonopore located on a projection; IV-L-5 ventral margin with a triangular projection located in segment centre | <i>K. uttarakhandensis</i> Pešić & Smit n. sp. (Uttarakhand) |
| - | Gonopore not located on a projection; IV-L-5 ventral margin with a projection at proximal end of the segment | 6 |
| 6 | Proximoventral projection on IV-L-5 bearing a relatively large sword-like seta; P-4 relatively long and narrow, colour pattern with pigmented area confined to the posterior half of the dorsal shield. | <i>K. parvatiya</i> Cook, 1967 (Kerala) |
| - | Proximoventral projection on IV-L-5 much smaller; P-4 proportionally much shorter and stouter; dorsal colour pattern different | 7 |
| 7 | Dorsal shield without colour pattern; distoventral seta on IV-L-5 less curved, almost straight, IV-L-6 proportionally stouter (L/H ratio 2.3) | <i>K. himalayaensis</i> Pešić & Smit, 2020 (Uttarakhand) |
| - | Dorsal colour pattern consists of anterior and posterior patches; distoventral seta on IV-L-5 curved, IV-L-6 proportionally slender (L/H ratio > 2.5) | <i>K. rucira</i> Cook, 1967 (Maharashtra) |
| 8(1) | P-4 slender (L/H ratio 4.0), relatively longer, nearly as long as P-2+3 | <i>K. variabilis</i> Cook, 1967 |
| - | P-4 stouter (L/H ratio 3.0), shorter than P-2+3 | 9 |
| 9 | Dorsal shield without dorsal colour pattern, dorsal shield with four pairs of strong setae associated with accompanying glandularia | <i>K. indica</i> Pešić & Smit, 2019 |
| - | Dorsal shield with colour pattern as described for male, all dorsal setae simple | <i>K. rucira</i> Cook, 1967 |

Acknowledgements

PB gratefully acknowledges the financial assistance rendered by the Science and Engineering Research Board (SERB) as a major Project F. No.–ECR/2016/001291. NS and KKR also grateful to SERB(DST) for the instrument and lab facility. We thank Andrzej Zawal (Szczecin) whose constructive comments greatly improved this work.

References

- Cook, D.R. (1967) Water mites from India. *Memoirs of the American Entomological Institute*, 9, 1–411.
- Gerecke, R., Gledhill, T., Pešić, V. & Smit, H. (2016) Chelicerata: Acari III. In: Gerecke, R. (Ed.), *Süßwasserfauna von Mitteleuropa, Bd. 7/2-3*, Springer-Verlag Berlin, Heidelberg, pp. 1–429. <http://dx.doi.org/10.1007/978-3-8274-2689-5>
- Pešić, V., Smit, H. & Bahuguna, P. (2019) New records of water mites (Acari: Hydrachnidia) from the Western Himalaya with the description of four new species. *Systematic and Applied Acarology*, 24(1), 59–80 <http://doi.org/10.11158/saa.24.1.5>
- Pešić, V., Smit, H. & Bahuguna, P. (2020) A new species of *Kongsbergia* from the Western Himalaya with a key to the species of the genus of India (Acari: Hydrachnidia). *Ecologica Montenegrina*, 27, 35–38. <https://doi.org/10.37828/em.2020.27.4>
- Smit, H. (2020) Water mites of the world with keys to the families, subfamilies, genera and subgenera (Acari: Hydrachnidia). *Monografieën van de Nederlandse Entomologische Vereniging*, 12, 1–774.
- Viets, K. (1935) Die Wassermilben von Sumatra, Java und Bali nach den Ergebnissen der Deutschen Limnologischen Sunda-Expedition. *Archiv für Hydrobiologie, Supplement*, 13, 595–738, *Tropische Binnengewässer*, 14, 1–113.