

OPEN ACCESS



All articles published in the Journal of Threatened Taxa are registered under Creative Commons Attribution 4.0 International License unless otherwise mentioned. JoTT allows unrestricted use of articles in any medium, reproduction and distribution by providing adequate credit to the authors and the source of publication.



Journal of Threatened Taxa

The international journal of conservation and taxonomy

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

NOTE

NEW PHYTOGEOGRAPHICALLY NOTEWORTHY PLANT RECORDS FROM UTTARAKHAND, WESTERN HIMALAYA, INDIA

Amit Kumar, Bhupendra Singh Adhikari & Gopal Singh Rawat

26 June 2016 | Vol. 8 | No. 6 | Pp. 8943–8947
10.11609/jott.2416.8.6.8943-8947



For Focus, Scope, Aims, Policies and Guidelines visit http://threatenedtaxa.org/About_JoTT.asp

For Article Submission Guidelines visit http://threatenedtaxa.org/Submission_Guidelines.asp

For Policies against Scientific Misconduct visit http://threatenedtaxa.org/JoTT_Policy_against_Scientific_Misconduct.asp

For reprints contact <info@threatenedtaxa.org>

Partner



Publisher/Host



NEW PHYTOGEOGRAPHICALLY NOTEWORTHY PLANT RECORDS FROM UTTARAKHAND, WESTERN HIMALAYA, INDIA

Amit Kumar¹, Bhupendra Singh Adhikari² & Gopal Singh Rawat³

^{1,2,3}Wildlife Institute of India, P.O. Box # 18, Chandrabani, Dehradun, Uttarakhand 248001, India

¹amit_ndbr@wii.gov.in (corresponding author),

²adhikaribs@wii.gov.in, ³rawatg@wii.gov.in

The Indian Himalayan Region (IHR), covering wide physiographic zones from the Shivalik ranges along the foothills in the south to the Tibetan Plateau in the north, is known for its biological, geo-hydrological, aesthetic and cultural values. It comprises two biotic zones and six biogeographic provinces viz., Ladakh Mountains (1A), Tibetan Plateau (1B), northwestern Himalaya (2A), western Himalaya (2B), central Himalaya (2C) and eastern Himalaya (2D) (Rodgers et al. 2000). The western Himalaya (WH) between Satluj and Sharada rivers in the states of Himachal Pradesh and Uttarakhand (2B) represents a highly complex and diverse system both in terms of biological and physical attributes. A few authors describe this region in northwestern Himalaya as well (Deva & Naithani 1986; Gaur 1999).

Compared to other Himalayan states of India, Uttarakhand has been most extensively explored. Plant collections in the region started in 1796 when Thomas Hardwicke collected plants from the Alaknanda Valley of Garhwal Himalaya. Since then, various plant collectors such as Osmaston (1927), Gupta (1928, 1968), Babu (1977), Raizada & Saxena (1977), Naithani (1984),

Gaur (1999), Rawat (2005, 2007) have worked in the state and have deposited their collections in the three national herbaria located in Dehradun, viz.: Botanical Survey of India (BSD), Forest Research Institute (DD) and Wildlife Institute of India (WII). The most comprehensive collections in terms of flora were made by R. Strachey and J.E. Winterbottom between the years 1846–1849. Their collections, comprising of ca. 2000 species were submitted mainly to the Kew Herbarium (K; in the years 1852–1853), the British Museum Natural History (BM) and the Linnaean Society (LNS). Additionally, discovery of new plant species is still going on from the state (Rai & Adhikari 2012; Rawat 2014; Tiwari et al. 2014; Rai et al. 2015). Recently, Uniyal et al. (2007) have brought out a comprehensive list of flowering plants from Uttarakhand which reveals that the state harbours ca. 4,700 species under 1,503 genera and 213 families, thus accounting for about 27% of India's total angiospermic flora.

Although the entire state has been extensively explored by botanists, the patterns of biodiversity are under explored or unexplored even from well demarcated remote areas such as the trans-Himalaya. These areas with an average elevation ranging from 3,500–5,000 m are situated in the rain-shadow zone of Himalaya. These areas under cold deserts constitute a unique ecosystem, which are characterized by extreme climatic conditions, such as diurnal fluctuations in temperatures, scanty and erratic rainfall, heavy winds and snowfall. Most of the area (>70%) in these regions fall under the alpine dry scrub (scrub steppe) and alpine



ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

OPEN ACCESS



DOI: <http://dx.doi.org/10.11609/jott.2416.8.6.8943-8947>

Editor: Pankaj Kumar, Kadoorie Farm and Botanic Garden (KFBG) Corporation, Tai Po, Hong Kong.

Date of publication: 26 June 2016 (online & print)

Manuscript details: Ms # 2416 | Received 18 November 2015 | Final received 23 March 2016 | Finally accepted 26 May 2016

Citation: Kumar, A., B.S. Adhikari & G.S. Rawat (2016). New phytogeographically noteworthy plant records from Uttarakhand, western Himalaya, India. *Journal of Threatened Taxa* 8(6): 8943–8947; <http://dx.doi.org/10.11609/jott.2416.8.6.8943-8947>

Copyright: © Kumar et al. 2016. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use of this article in any medium, reproduction and distribution by providing adequate credit to the authors and the source of publication.

Funding: University Grant Commission (UGC), New Delhi; World Wide Fund for Nature-India.

Conflict of Interest: The authors declare no competing interests.

Acknowledgements: The authors are grateful to Director, Wildlife Institute of India, Dehradun for institutional support. The first author wishes to acknowledge University Grant Commission (UGC), New Delhi for Rajiv Gandhi National Fellowship; WWF-India's small grants programme and Dr. I.D. Rai and Ms. Upma Manral for their valuable suggestions.



भारतीय वन्यजीव संस्थान
Wildlife Institute of India



ज्ञान-विज्ञान विमुक्तये

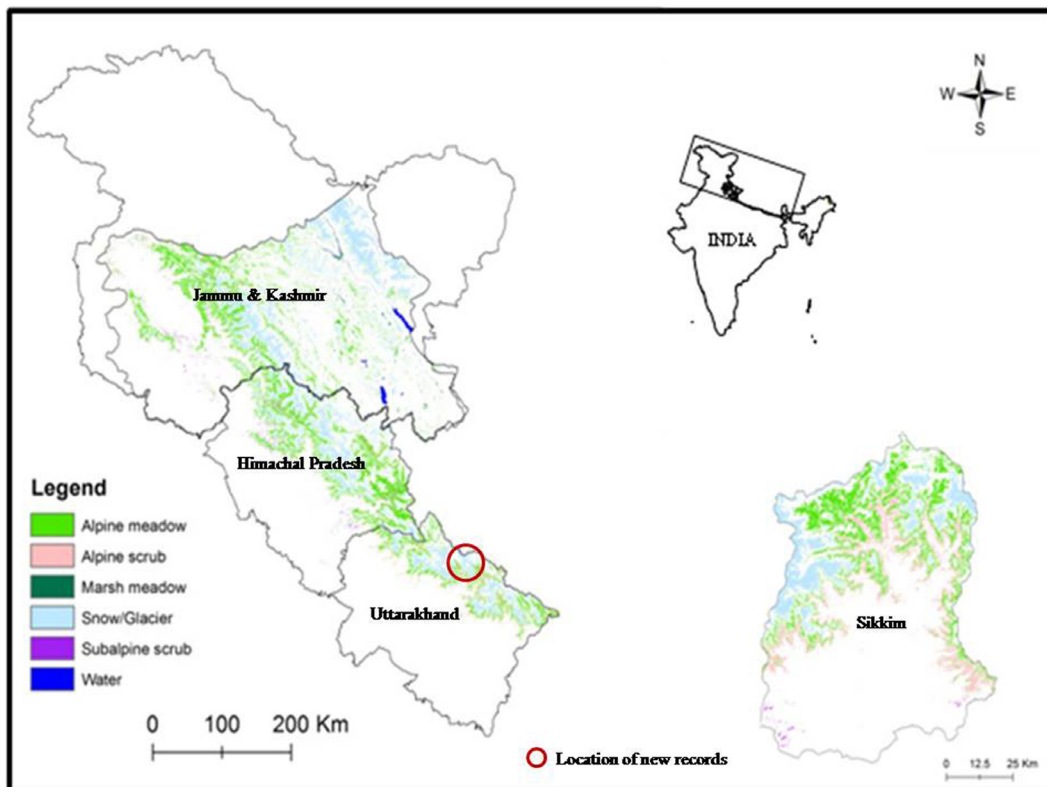


Figure 1. Map showing the location of new plant records in the cold-arid region of Uttarakhand, western Himalaya.

dry pastures (desert steppe) type.

During recent floristic surveys in the Upper Dhaulti Valley (also known as the Niti Valley), a trans-Himalayan region of Nanda Devi Biosphere Reserve (ca. 6,407km²; 30°08'–31°02'N & 79°12'–80°19'E; Fig. 1) in Uttarakhand, a few interesting plant species were collected. A detailed scrutiny of the characters observed in the field, the literature and the authentic herbarium specimens (BSD, DD & WII) revealed that the species were new records to the state of Uttarakhand, western Himalaya. The plant specimens were processed and prepared following standard herbarium methods and deposited at WII. The botanical names were updated following www.theplantlist.org and other recent published literature. The description, phenology, distribution and habitat of these species are provided along with photographs of live or herbarium specimens.

Taxonomic treatment and description

1. *Dontostemon glandulosus* (Kar. & Kir.) O.E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem. 10: 554. 1930.

Arabis glandulosa Kar. & Kir., Bull. Soc. Imp. Naturalistes Moscou. 15: 146. 1842.

Alaïda glandulosa (Kar. & Kir.) Dvorak, Feddes Repert. 82(6): 431. 1971.

Dimorphostemon glandulosus (Kar. & Kir.) Golubk., Bot. Zhurn. (Moscow & Leningrad) 59(10): 1454. 1974.

D. sergievskianus (Polozhij) S.V. Ovchinnikova, Fl. Sibir. (Berberidac.-Grossulariac.) 7: 100. 1994.

Erysimum karelinianum Kuntze, Revis. Gen. Pl. 2: 933. 1891.

Neotorularia sergievskiana (Polozhij) Czerep., Vasc. Pl. Russia & Adj. States (former USSR) 145. 1995.

Sisymbrium glandulosum (Kar. & Kir.) Maxim., Fl. Tangut. 61. 1889.

Stenophragma glandulosum (Kar. & Kir.) B. Fedtsch., Rastit. Turkest. 457. 1915.

Torularia glandulosa (Kar. & Kir.) Vassilcz. Fl. URSS. 8: 69. 1939.

T. sergievskiana Polozhij., Novosti Sist. Vyssh. Rast. 11: 210. 1974.

Annual or biennial herbs, 4–20 cm long, glandular, stems erect to spreading or suberect, sparsely hairy with simple and glandular hairs. Basal and lower cauline leaves pubescent, rosulate, narrowly spatulate or linear, glandular, 8–28 x 3–5 mm, petiole 3–12 mm, entire or sinuate-toothed, leaf blade lanceolate or oblong, apex acute. Racemes 10–25-flowered, up to 6cm long in fruit. Flowers 3–5 mm across, white or pinkish; pedicels up to 8mm long in fruit, ascending, glandular. Sepals



Image 1. *Dontostemon glandulosus* (Kar. & Kir.) O.E. Schulz

oblong, 2–3 mm long, sparsely pubescent apically or glabrous. Petals white with pale lavender or pink tinge, spatulate, 3–5 x 1.5–2 mm, sub-marginate or obtuse at apex, subrounded. Stamens ca. 2–3 mm long; anthers ca. 0.5 mm long, broadly ovate. Style minute with short depressed stigma; seeds brown, 10–15 in each locule, ovate or oblong, oblong-ellipsoid, cotyledons obliquely accumbent or obliquely incumbent, Ovules 14–70 per ovary.

Specimen examined: WII0202 (WII), 22.vi.2015, Amrit Ganga watershed, Upper Dhaulti Valley, Nanda Devi Biosphere Reserve, Uttarakhand, India, 3,800m, 30°47'1.69"N & 79°46'59.1E, coll. Amit Kumar (Images 1 & 2).

Flowering and Fruiting: June–August.

Habitat: Grows on open habitats especially on stabilized sandy river bed at 3,800m altitude, sparsely distributed in association with *Thymus linearis* Benth., *Sibbaldia parviflora* Willd., *Potentilla cuneifolia* Bertol., *P. argrophylla* Wall., *Kobresia* sp., *Carex* sp., and *Bistorta affinis* Greene.

Phytogeographic notes: In India, *Dontostemon glandulosus* was reported only from Jammu & Kashmir and Sikkim (www.efloras.org). Other reports of the species are from China (Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xinjiang, Xizang and Yunnan), Tibet (now Zizang province of China), Kazakhstan, Nepal, Russia and Tajikistan.

2. *Potentilla pamirica* Th. Wolf, Trudy Imp. Bot. Sada Petra Velikago 31(3): 489. 1915.

Potentilla thomsonii Hand.–Mazz., Acta Horti. Gothob. 13: 307. 1939.

Potentilla thomsonii var. *trijuga* Sojak, Bot. Jahrb. Syst. 106(2): 208. 1986.

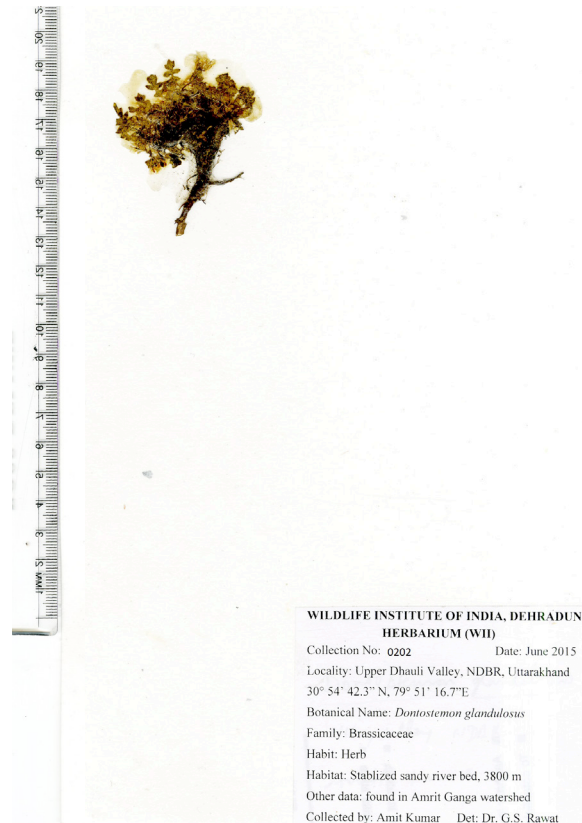


Image 2. Herbarium image of *Dontostemon glandulosus*

Perennial, caespitose herb with much divided root stock. Flowering stems many, tufted together, 5–18 cm long, slender with thin silky hairs. Basal leaves mostly adpressed together at the base, 3–4 pinnate, petiole 8–12 mm. long, adpressed pilose. Indumentum on the petioles <2mm long. Leaflets 5–15 x 3–6 mm, upper surface sparsely to densely silky hairy, lower surface of leaflets with greyish tomentose hairs, lobes 4–8, approximate, 2–3 mm. broad, obovate obtuse. Basal stipules membranous, dark-brown, auricles ovate-lanceolate, stem stipules are leafy, entire or 2–3 divided. Bright yellow flowers 1–1.5 cm across, Sepals are densely hairy. Petals 5–7 mm long. Stamens 20–25. Carpels numerous, styles uniformly thickened about 1–1.5 mm long, sub-terminal.

Specimen examined: WII20661, WII20890, 12.vii.2012, India, Uttarakhand, Nanda Devi Biosphere Reserve, Upper Dhaulti Valley, Amrit Ganga watershed, 3828m, 30°46.273'N & 79°47.554'E, coll. Amit Kumar (Images 3 & 4).

Flowering and Fruiting: June–September.

Habitat: The species inhabits the slopes left bare by melting snow, sandy and stony grounds, lateral moraine and sandy plains at elevations ranging from 4000–5000



Image 3. *Potentilla pamirica* Th. Wolf



Image 4. Herbarium image of *Potentilla pamirica*

m (www.efloras.org). In Amrit Ganga watershed, NDBR, it was reported at old camping or animal resting sites. It grows in association with *Rumex nepalensis* Spreng., *Polygonum plebeium* R. Br., *Geranium wallichianum* D. Don ex Sweet, *Potentilla bifurca* L., *P. atrosanguinea* G. Lodd., *P. argrophylla* Wall. ex Lehm. and *Fragaria nubicola* (Lindl. ex Hook. f.) Lacaita.

Phytogeographic notes: In India, *Potentilla pamirica* is reported from B-9 Kashmir, Depsang Plains, F. Ludlow 457 (BM); Mashoo Nullah, Leh (Ladakh) F.

Ludlow & G. Sherrif 8447 (E); Khyung Tso, Rupshu, W. Koelz 2255 (K,W), (www.efloras.org). Other reports of this species are A-8 Gilgit, Khunjab Top ca. 5,000m, Shah & Jamshed 189 B (ABD); Gharesa Glacier 4,816m, O. Polunin 6184 (BM); China (Zizang & Shan); Tajikistan (Pamir Alai); southwestern Mongolia; Afghanistan; Iran and Pakistan.

3. *Carex sagaensis* Y.C. Yang, Fl. Xizang. 5: 439. 1987.

Perennial rhizomatous herbs, densely tufted culms, 4–8 cm tall, trigonous, smooth. Leaves longer or shorter than culm, blades needle-like, less than 1mm wide, hairy. Involucral bracts glumelike, broadly obovate, sheathless, awned at apex. Inflorescence capitate, broadly elliptic or ovate, 6–8 mm; spikes 2 or 3, androgynous, elliptic, 5–6 mm. Stigmas 2. Female glumes pale brown, lanceolate, 4.5 mm, membranous, 1-veined. Utricles subequalling glume, lanceolate, membranous, base cuneate, apex gradually attenuate into a slightly scabrous beak, orifice 2-toothed. Nutlets broadly oblong, compressed trigonous, 2 mm, base shortly stipitate.

Specimen examined: WII20818, 24.vii.2014, Geldung Lake, Ganesh Ganga watershed, Upper Dhaulil Valley, Nanda Devi Biosphere Reserve, Uttarakhand, India, 5,030m, coll. Amit Kumar (Images 5 & 6).

Flowering and Fruiting: July–August.

Habitat: The species inhabits moist habitats along glacial streams and lateral moraines above 4,500m. In Ganesh Ganga, NDBR, *Carex sagaensis* grows along the small glacial streams near Geldung Lake at ca. 5,000m elevation.



Image 5. *Carex sagaensis* Y.C. Yang

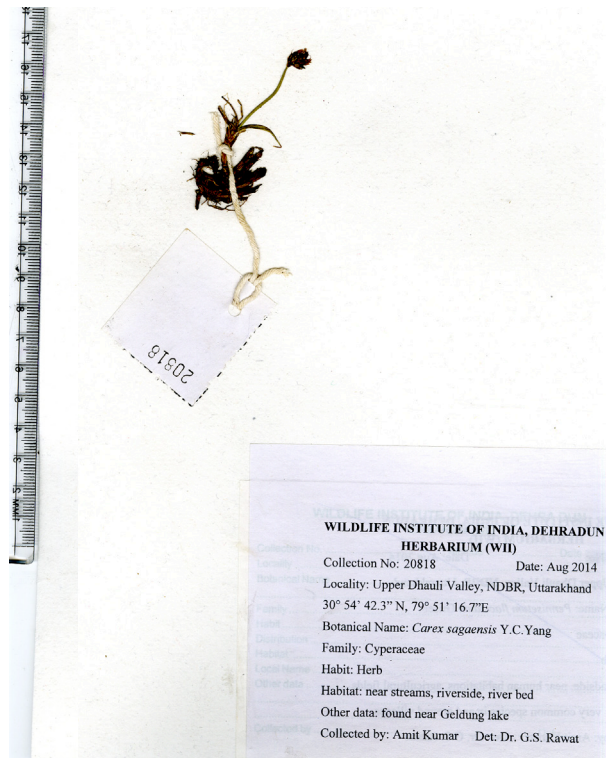


Image 6. Herbarium image of *Carex sagaensis*

Phytogeographic notes: The Xizang (Saga) in China was the type locality of this species (www.efloras.org). In India, this species was reported recently from Eastern Ladakh at about 5,000m in northwestern Himalaya (Dvorsky 2014).

Discussion

In the Indian Himalayan region, the three species discussed above are previously known to occur in the Trans-Himalaya—the Ladakh Mountains (1A) and the Tibetan Plateau (1B). However, the current reports from the Trans-Himalayan region of NDBR in western Himalaya make them bio-geographically noteworthy by means of their distribution in similar phytogeographic regions. The new species record of *Potentilla pamirica* and *Carex sagaensis* in 1A, 1B and 2A and *Dontostemon glandulosus* (1B) could be attributed to its extended distributional range and restrained botanical explorations in the state of Uttarakhand in western Himalaya. There

are no records on the distribution of these species hence are additions to the state flora of Uttarakhand. During the present floristic exploration we found only a few individuals of *Dontostemon glandulosus* (two), *Potentilla pamirica* (five) in the UDV, NDBR indicating their rarity in the region.

References

- Babu, C.R. (1977). *Herbaceous Flora of Dehradun*. Publications and Information Directorate, Council of Scientific and Industrial Research, New Delhi, 721pp.
- Deva, S. & H.B. Naithani (1986). *The Orchid Flora of North-West Himalaya*. Print and Media Associates, New Delhi, 459pp.
- Dvorsky, M. (2014). Ecology of alpine plants in North–West Himalaya. PhD Thesis. Series, No. 2. University of South Bohemia, Faculty of Science, School of Doctoral Studies in Biological Sciences, Ceske Budejovice, Czech Republic, 196pp.
- Gaur, R.D. (1999). *Flora of the District Garhwal, North–West Himalaya (with ethnobotanical notes)*. Srinagar, Garhwal, Trans Media, 811pp.
- Gupta, B.L. (1928). *Forest flora of the Chakrata, Dehradun and Saharanpur Forest Divisions, Uttar Pradesh*. Managers of publications, New Delhi, 593pp.
- Gupta, R.K. (1968). *Flora Nainitalensis. A Hand Book of the Flowering Plants of Nainital*. Navayug Traders, 529pp.
- Naithani, B.D. (1984). *Flora of Chamoli - Vol. 1 and 2*. Botanical survey of India. Dehradun, 789pp.
- Osmaston, A.E. (1927). *A Forest Flora for Kumaon*. Allahabad: Government press, United Provinces, 605pp.
- Rai, I.D. & B.S. Adhikari (2012). *Rhododendron rawatii* (Ericaceae), a new species from the western Himalaya, India. *Phytotaxa* 71: 10–16; <http://dx.doi.org/10.11646/phytotaxa.71.1.3>
- Rai, I.D., G. Singh & G.S. Rawat (2015). Rediscovery, distribution and conservation status of *Leptodermis riparia* R. Parker (Rubiaceae) in Western Himalaya, India. *Telopea* 18: 79–83; <http://dx.doi.org/10.7751/telopea8470>
- Raizada, M.B. & H.O. Saxena (1977). *Flora of Mussoorie - Vol. 1*. Bisen Singh Mahendra Pal Singh, Dehradun, 645pp.
- Rawat, D.S. (2014). New additions to the flora of Uttarakhand, India. *Journal of Threatened Taxa* 6(8): 6101–6107; <http://dx.doi.org/10.11609/JoTT.03510.6101-7>
- Rawat, G.S. (2005). *Alpine Meadows of Uttaranchal: Ecology, landuse and Status of Medicinal and Aromatic Plants*. Bishen Singh Mahendra Pal Singh, Dehradun, 219pp.
- Rawat, G.S. (2007). Alpine vegetation of the western Himalaya: species diversity, community structure, dynamics and aspects of conservation. D.Sc Thesis, Kumaun University, Nainital, 239pp.
- Rodgers, W.A., H.S. Panwar & V.B. Mathur (2000). *Wildlife Protected Area Network in India: A Review (Executive Summary)*. Wildlife Institute of India, Dehradun, 44pp.
- Tiwari, U., G.S. Rawat & B.S. Adhikari (2014). *Berberis karnaliensis* Bh. Adhikari (Berberidaceae): a new addition to the flora of India. *Biodiversity Research and Conservation* 34: 7–10; <http://dx.doi.org/10.2478/biocr-2014-0003>
- Uniyal, B.P., J.R. Sharma, U. Chaudhery & D.K. Singh (2007). *Flowering Plants of Uttarakhand (A Checklist)*. Bishen Singh Mahendra Pal Singh, Dehradun, 404pp.



OPEN ACCESS



All articles published in the Journal of Threatened Taxa are registered under Creative Commons Attribution 4.0 International License unless otherwise mentioned. JoTT allows unrestricted use of articles in any medium, reproduction and distribution by providing adequate credit to the authors and the source of publication.

ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

June 2016 | Vol. 8 | No. 6 | Pages: 8849–8952

Date of Publication: 26 June 2016 (Online & Print)

DOI: 10.11609/jott.2016.8.6.8849-8952

www.threatenedtaxa.org

Articles

Low genetic diversity in *Clarias macrocephalus* Günther, 1864 (Siluriformes: Clariidae) populations in the Philippines and its implications for conservation and management

-- Marc Timothy C. Tan, Joycelyn C. Jumawan & Jonas P. Quilang, Pp. 8849–8859

On the reproductive ecology of *Suaeda maritima*, *S. monoica* and *S. nudiflora* (Chenopodiaceae)

-- A.J. Solomon Raju & Rajendra Kumar, Pp. 8860–8876

Communications

The Nilgiri Tahr (Mammalia: Cetartiodactyla: Bovidae: *Nilgiritragus hylocrius* Ogilby, 1838) in the Agastyamalai range, Western Ghats, India: population status and threats

-- Ponniah Hopeland, Jean-Philippe Puyravaud & Priya Davidar, Pp. 8877–8882

All that glitters is not gold: A projected distribution of the endemic Indian Golden Gecko *Calodactylodes aureus* (Reptilia: Squamata: Gekkonidae) indicates a major range shrinkage due to future climate change

-- Aditya Srinivasulu & Chelmala Srinivasulu, Pp. 8883–8892

Description of a new species of *Umairia* Hayat (Hymenoptera: Aphelinidae) with additional distribution records of aphelinids from India

-- Sagadai Manickavasagam, Chakaravarthy Menakadevi & Mani Ayyamperumal, Pp. 8893–8897

Egg parasitoids from the subfamily Scelioninae (Hymenoptera: Platygasteridae) in irrigated rice ecosystems across varied elevational ranges in southern India

-- M. Shweta & K. Rajmohana, Pp. 8898–8904

Short Communications

Perch height and the hunting success of the Indian Eagle Owl *Bubo bengalensis* (Franklin) (Aves: Strigiformes: Strigidae) targeting anuran prey

-- Eric Ramanujam, Pp. 8905–8908

A checklist of avifauna from Malgaon-Bagayat and Malvan towns of Sindhudurg District, Maharashtra, India

-- Mayura Khot, Pp. 8909–8918

Rediscovery of *Penicillium paradoxum* (Ascomycete: Aspergillaceae) from Maharashtra, India

-- Kunhiraman C. Rajeshkumar, Sayali D. Marathe, Sneha S. Lad, Deepak K. Maurya, Sanjay K. Singh & Santosh V. Swami, Pp. 8919–8922

Notes

A first record of the Lined Wrasse *Anampses lineatus* Randall, 1972 (Perciformes: Labridae) in the Gulf of Mannar, Tamil Nadu, India

-- S. Prakash & T.T. Ajith Kumar, Pp. 8923–8926

A report of False Tibetan Cupid *Tongeia pseudozuthus* Huang, 2001 (Lepidoptera: Lycaenidae) from the Upper Dibang Valley, Arunachal Pradesh - An addition to the Indian butterfly fauna

-- Seena N. Karimbunkara, Rajkamal Goswami & Purnendu Roy, Pp. 8927–8929

Recent sightings of Kaiser-I-Hind *Teinopalpus imperialis* Hope, 1843 (Lepidoptera: Teinopalpani) from Manipur, India

-- Baleshwar Soibam, Pp. 8930–8933

On the occurrence of *Theobaldius(?) tristis* (Blanford, 1869) (Caenogastropoda: Cyclophoridae) in the northern Western Ghats, Maharashtra, India

-- Amrut R. Bhosale, Tejas S. Patil, Rupesh B. Yadav & Dipak V. Muley, Pp. 8934–8937

Are exotics *Amyntas alexandri* (Beddard, 1900) and *Metaphire peguana* (Rosa, 1890) (Clitellata: Oligochaeta: Megascolecidae) a threat to native earthworms in Kerala, India?

-- S. Prasanth Narayanan, S. Sathrumithra, Dinu Kuriakose, G. Christopher, A.P. Thomas & J.M. Julka, Pp. 8938–8942

New phytogeographically noteworthy plant records from Uttarakhand, western Himalaya, India

-- Amit Kumar, Bhupendra Singh Adhikari & Gopal Singh Rawat, Pp. 8943–8947

***Aira* (Poaceae): a new generic record for Nicobar Islands, India**

-- Kumar Vinod Chhotupuri Gosavi, Arun Nivrutti Chandore & Mayur Yashwant Kamble, Pp. 8948–8949

Notes on three new records of foliicolous lichens from Karnataka Western Ghats, India

-- S. Shravan Kumar & Y.L. Krishnamurthy, Pp. 8950–8952