

OPEN ACCESS

The Journal of Threatened Taxa is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) 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

Building evidence for conservation globally

www.threatenedtaxa.org

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

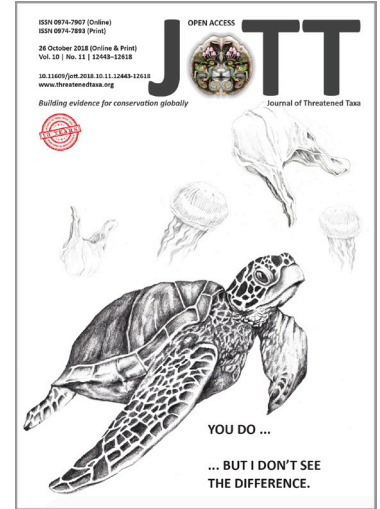
NOTE

AMORPHOPHALLUS LONGICONNECTIVUS AND A. MARGARITIFER: ADDITIONAL AROIDS FROM MAHARASHTRA WITH NOTES ON THE FLORAL VARIATIONS

Avinash R. Gholave, Ravikiran S. Govekar, Vasanta I. Kahalkar, Milind M. Sardesai & Shirang R. Yadav

26 October 2018 | Vol. 10 | No. 11 | Pages: 12610-12613

10.11609/jott.2446.10.11.12610-12613



For Focus, Scope, Aims, Policies and Guidelines visit <http://threatenedtaxa.org/index.php/JoTT/about/editorialPolicies#custom-0>

For Article Submission Guidelines visit <http://threatenedtaxa.org/index.php/JoTT/about/submissions#onlineSubmissions>

For Policies against Scientific Misconduct visit <http://threatenedtaxa.org/index.php/JoTT/about/editorialPolicies#custom-2>

For reprints contact info@threatenedtaxa.org

Partners



صندوق محمد بن زايد
للمحافظة على
الكائنات الحية
The Mohamed bin Zayed
SPECIES CONSERVATION FUND



zooh!
ZÜRICH

Member



Publisher & Host





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

OPEN ACCESS



Genus *Amorphophallus* Blume ex Decne. comprises 203 species worldwide (The Plant List 2013). It is distributed in tropical Africa, Madagascar, tropical and subtropical Asia, Archipelago, Melanesia and Australia (Mayo et al. 1997). In India the genus is represented by 19 species and five varieties belonging to three sections, viz., *Amorphophallus*, *Conophallus* (Schott) Engl. and *Rhaphiophallus* (Schott) Engl., of which 13 species and three varieties are endemic to India (Jaleel et al. 2011, 2012, 2014).

As a part of taxonomic revision during our explorations in northeastern Maharashtra, we collected *Amorphophallus longiconnectivus* and *A. margaritifera* and reported the floral variations (Image 1). *A. longiconnectivus* and *A. margaritifera* show a range of variation which needs to be considered by future taxonomists before describing a new species. The specimens (A.R. Gholave & Kahalkar ARG-52, A.R. Gholave & Kahalkar ARG-59) have been deposited in Shivaji University Kolhapur (SUK).

Amorphophallus longiconnectivus

Bogner, Kew Bull. 50(2): 397.1995; Sivad. & Jaleel, Rheedea 8(2): 243.1998; Jaleel et al., Bangladesh J Plant Taxon. 18: 1–26. 2011.

Tuberous herbs. Tubers smooth, subglobose, 5–9 cm in diam. Leaf solitary; petiole smooth, 32–75 cm long, 1.2–2.3 cm in diam.; lamina 35–45 cm across., leaflets linear - lanceolate, 7–15 x 2–4 cm, acuminate at apex,

AMORPHOPHALLUS LONGICONNECTIVUS AND A. MARGARITIFER: ADDITIONAL AROIDS FROM MAHARASHTRA WITH NOTES ON THE FLORAL VARIATIONS

Avinash R. Gholave¹ , Ravikiran S. Govekar² ,
Vasanta I. Kahalkar³ , Milind M. Sardesai⁴ &
Shrirang R. Yadav⁵

¹ Department of Botany, Walchand College of Arts and Science, Walchand Hirachand Marg, Ashok Chowk, Solapur, Maharashtra 413006, India

² Office of the Field Director, Pench Tiger Reserve, Maharashtra Forest Department, BSNL Building, Kasturchand Park, Nagpur, Maharashtra 440001, India

³ Department of Botany, Mahatma Gandhi Arts & Science and Late N.P. Commerce College, Armori, Gadchiroli District, Maharashtra 441208, India

⁴ Department of Botany, Savitribai Phule Pune University, Ganeshkhind Road, Aundh, Pune, Maharashtra 411007, India

⁵ Department of Botany, Shivaji University, Vidyanagar, Kolhapur, Maharashtra 416004, India

¹ agholave@gmail.com (corresponding author), ² ntcana@gmail.com,

³ vasantak30@rediffmail.com, ⁴ sardesaiimm@gmail.com, ⁵ sryadavdu@rediffmail.com

base unequal and decurrent on rachis. Inflorescence solitary, long pedunculate; peduncle similar to leaf petiole, 52–108 cm long, 1.5–3 cm in diam.; cataphylls 2–3, 17–31 x 2–6 cm, pale pinkish. Spathe broadly ovate to broadly triangular, usually broader than long, 10.5–17.5 cm long, 1.5–4 cm in diam., tip acute, completely convolute, not differentiated in to basal tube and upper limb, pale green outside, pale purplish within, dark purplish verrucose inside at base. Spadix as long as spathe or slightly shorter than spathe; 10.5–17.5 cm

DOI: <https://doi.org/10.11609/jott.2446.10.11.12610-12613>

Editor: Aparna Watve, Pune, Maharashtra, India.

Date of publication: 26 October 2018 (online & print)

Manuscript details: Ms # 2446 | Received 06 December 2016 | Final received 29 August 2017 | Finally accepted 10 October 2018

Citation: Gholave, A.R., R.S. Govekar, V.I. Kahalkar, M.M. Sardesai & S.R. Yadav (2018). *Amorphophallus longiconnectivus* and *A. margaritifera*: additional aroids from Maharashtra with notes on the floral variations. *Journal of Threatened Taxa* 10(11): 12610–12613; <https://doi.org/10.11609/jott.2446.10.11.12610-12613>

Copyright: © Gholave et al. 2018. 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: SERB-National Post Doctoral Fellowship (N-PDF) and DBT-IPLS.

Competing interests: The authors declare no competing interests.

Acknowledgements: We are grateful to the Principal Walchand College of Arts and Science, Solapur; Mahatma Gandhi Arts & Science and Late N.P. Commerce College, Armori for providing research facilities. The first author thanks the Science and Engineering Research Board (SERB), Department of Science and Technology, New Delhi (SERB/PDF/2016/001910) and DBT-IPLS: No. BT/PR4572/INF/22/147/2012 for financial assistance.



long and 1–1.5 cm diam., stipitate, stipe 0.4–0.6 cm long; female zone 2.5–3 cm long; staminodial zone between male and female zone 1.5–2 cm long; neuters elongated, 3–6 mm long, 1–3 mm in diam., brown at curved tip. Male zone 5–8.5 cm long; appendix 1.5–3.4 cm long, clothed with sterile flowers and rarely with a scattered fertile stamens. Ovaries sub-globose, 1.5–2 mm in length, 2–3 mm in diam., pale green, 2–3 locular with one basal ovule per locule; style very short, 1–1.5 mm long; stigma 2–3 lobed, 1–2 mm in diam. Male flowers with 4–8 stamens; stamen 2–2.5 mm long, 1–1.5 mm in diam., yellowish-pink; filament short, thecae lateral, ellipsoid, 1.5–2.5 mm long; connective elongated, 1–1.5 mm long. Fruit berry, ellipsoid, 6–9 mm long, 5–6 mm in diam., green when young, red at maturity, 2–3 seeded; seed ovoid, 6–7 mm long and 4–5 mm in diam.

Flowering & fruiting: June–September.

Chromosome number: $2n = 3x = 39$ (Lekhak & Yadav 2011).

Distribution: India: Madhya Pradesh (Piparia, Khandwa) and Maharashtra (Tumsar, Bhandara District) (Fig. 1a).

Specimens examined: India, Madhya Pradesh; Khandwa District, Singar, 9.vii.2012, A.R. Gholave ARG - 3, 3.vii.2009, Lekhak & Shimpale 3862, SUK. Maharashtra; Bhandara District, Tumsar, Bamhani, 21.042°N & 79.551°E; 272m, 26.vi.2015, A.R. Gholave & Kahalkar ARG- 59, SUK.

Discussion: The genus *Amorphophallus* is highly variable in its spadix and floral morphology. These two species belong to *Amorphophallus* sect. *Rhaphiophallus*. There are nine species in this section and all are endemic to India except *A. sylvaticus* which is also reported from Sri Lanka (Jaleel et al. 2011).

Amorphophallus longiconnectivus was described by Bogner (1995) based on Haines's collection (1910) from Madhya Pradesh, Piparia District. Sivadasan & Jaleel (1998) studied the variations in the species. The spadix shows considerable variations with reference to size, shape, colour of neuters and appendix. Some morphological variations were observed in the population of the species at Bamhani Village, Bhandara District. Specimens from the above mentioned localities exactly matched with the description and illustration given in the protologues. On the basis of elongated neuters this species is easily distinguishable from other species in the genus. Variations are also reported from within a species. Green coloured hooked neuters, appendix covered with clothed sterile flowers (Image 1b), lemon coloured hooked neuters with sterile flowers (Image 1c). Elongated, green coloured, hooked neuters with brown coloured forked tip and very short appendix with a few sterile flowers (Image 1d), were variations noted in the same locality, i.e., Maharashtra; Bhandara District, Tumsar, Bamhani. Variations were seen in neuter structure e.g., very short blunt, golden neuters, (Image 1e & f) straight, faint golden coloured neuters with tip brown (Image 1g). In Gadchiroli, Maharashtra, individuals with blunt quadrangular neuters, half basal part moss green coloured, half upper part brown coloured neuters, male flowers arranged in groups, each group with 4–5 flowers were observed in the species' populations (Image 1h).

Amorphophallus margaritifera (Roxb.)

Kunth, Enum. Pl. 3: 34.1841; Hett. & De Sarker, Aroideana 19: 131.1996; Jaleel et al., Bangladesh J Plant Taxon. 18: 1–26. 2011. *Arum margaritifera* Roxb., Fl.

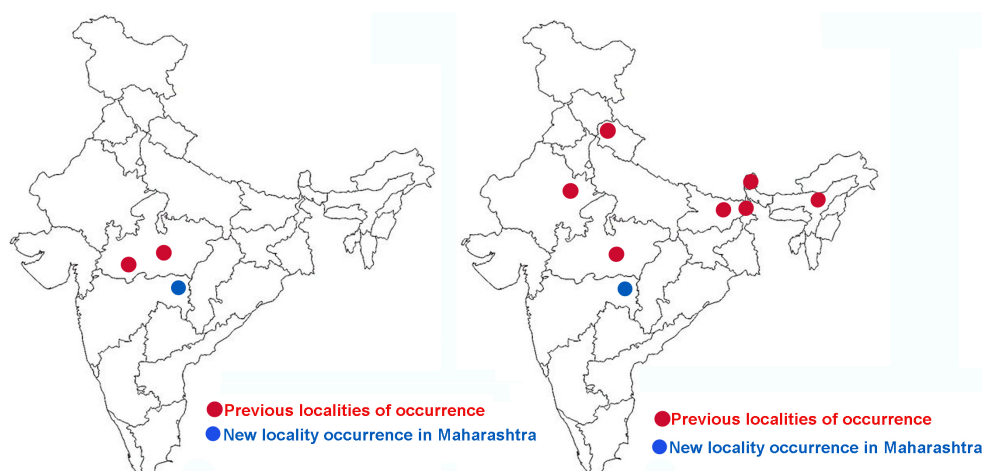


Figure 1. Map showing geographical distribution of (a) *A. longiconnectivus*, (b) *A. margaritifera*.

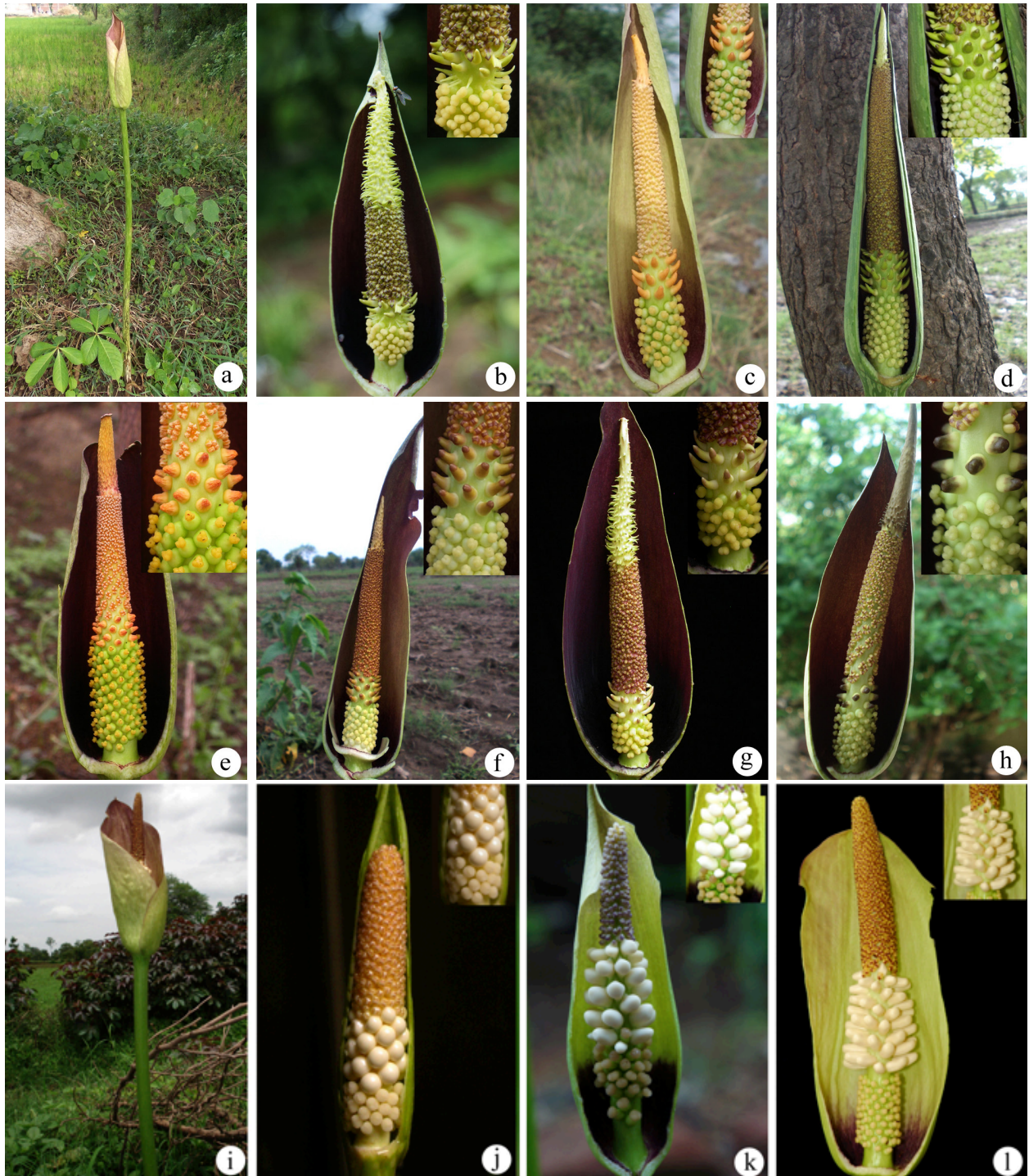


Image 1. a–h - *Amorphophallus longiconnectivus*: a - Habit, b–h - Spathe cut open to show variations in spadix and its parts; i–l. *Amorphophallus margaritifera*: i - Habit, j–l - Spathe cut open to show variations in spadix and its parts.
 Photo credit: a,b,c,d,f,l,j & k - © A.R. Gholave; e,g & i - © S.R. Yadav; h - © M.M. Sardesai.

Ind. (Ed., Carey) 3: 512. 1832; Wight, Ic. 3(1): 6, t. 795. 1844; *Plesmonium margaritifera* (Roxb.) Schott, Syn. Aroid.: 34.1856; Hook. f., Fl. Brit. India 6: 518.1893; Engl., Pflanzenr. IV 23C (48): 49.1911; C.E.C. Fisch. in Gamble, Fl. Pres. Madras: 1588. 1931.

Tuberous herbs. Tubers smooth, more or less sub-globose, 7.5–8.5 cm in diam., 5–6.5 cm in height. Leaf solitary, petiolate; petiole smooth, up to 24–85 cm long, 1–3.5 cm in diam., green to greenish-brown with regular elongated stripes; lamina

30–75 cm across, rachis smooth; 4–10 cm long, 3–13 mm in diam., leaflets linear-lanceolate, 8–27 x 1–4 cm, sub-marginal vein present, margins entire. Inflorescence long peduncled; peduncle 58–64 cm long, 1–1.2 cm in diam.; cataphylls-2, 11–17 x 1–2 cm. Spathe broader than long, triangular, tip acute, 12–14.5 cm long, 4–5 cm in diam., outside pale greenish, inside pale purplish, prominently verrucate at base within. Spadix 11.5–13.7 cm long as long as or slightly longer than spathe, stipitate; stipe green, 0.3–0.5 cm long, 0.5–0.8 cm diam.; female zone 2–3 cm long; staminodal zone between male and female zone, 3.5–4 cm long; staminodes congested, in 5–6 rows; male zone longer than female zone, 6–7 cm long, 0.5–1.5 cm in diam.; appendix absent. Ovaries pale-green, 1.5–2 mm in diam., 1–1.5 mm long, 3-locular, one basal ovule per locule; style very short, 0.5–1.0 mm long; stigma yellowish, capitate, 1–1.2 mm high, ca. 2mm in diam., 2–4 lobed. Stamens many, compactly arranged in male zone, 1.5–2 mm long, pale brownish; staminodes loosely arranged, large, elongate- obovoid, 0.8–1 cm long, 0.5–0.7 cm in diam., yellowish-white. Berries red at maturity, globose, 1–3 seeded.

Flowering & fruiting: May–August.

Chromosome number: $2n = 3x = 39$ (Lekhak & Yadav 2011).

Distribution: India: Maharashtra, Madhya Pradesh, Uttar Pradesh, Rajasthan, Bihar, West Bengal, Sikkim and Assam (Fig. 1b).

Specimens examined: India: Jharkhand; Giridih District, Parasnath Hill, 630m, 23.vii.2012 A.R. Gholave ARG-7, 23.vii.2012, A.R. Gholave ARG – 8, SUK; West Bengal; 9.vi.1897, Prain, CAL Acc. No. 4968 & 4969; Maharashtra; 2.vii.2008 Kahalkar 3108, SUK; Bhandara District, Tumsar, Bamhani 21.042°N & 79.551°E; 272m, 26.vi.2015, A.R. Gholave & Kahalkar ARG-52, SUK.

Discussion

Amorphophallus margaritifera is unique as it lacks a spadix appendix. Jaleel et al. (2011) in his revision mentioned that Haines collected *A. margaritifera* from Chorbush, Nagpur; however, this place is not in Maharashtra and it is evident from the literature (Staffleu & Cowan 1976–1978). Haines worked in Chhota Nagpur area (today's Jharkhand & Chhattisgarh) and hence it is likely to be that he must have collected this species from Jharkhand rather than from Maharashtra. Specimens

collected from Bhandara District, Maharashtra showed compact and rounded shaped neuters especially in premature condition (Image 1j), loosely arranged and elongated diamond shaped neuters were observed on mature inflorescences (Image 1k & 1l).

Conclusion

The genus *Amorphophallus* is highly variable in its spadix morphology. Variation is mainly observed in appendage colour and shape, neuter shape, size and colour, colour and interior of the spathe. The section is mainly characterised by staminodal zone /neuters between the male and female zone of the spadix. Many insects visit the inflorescence for feeding on neuters and at that time many flowers are pollinated. For attraction of insects inflorescence may be displaying these variations but these variations are not constant. These variations should be considered in future while delimiting the species.

References

- Bogner, J. (1995). A remarkable new *Amorphophallus* (Araceae) from India. *Kew Bulletin* 50: 397–400.
- Hettterscheid, W.L.A. & D.D. Sarker (1996). Notes on the Genus *Amorphophallus* (Araceae) - 7. *Amorphophallus (Plesmonium) margaritifera* (Roxb.) Kunth in Profile. *Aroideana* 19: 132–138.
- Jaleel, V.A., M. Sivadasan, A.H. Ahmed, J. Thomas & A.A. Alatar (2011). Revision of *Amorphophallus* Blume ex Decne. sect. *Raphiophallus* (Schott) Engl. (Araceae) in India. *Bangladesh Journal of Plant Taxonomy* 18: 1–26.
- Jaleel, V.A., M. Sivadasan, A.H. Ahmed & J. Thomas (2012). A Taxonomic Revision of *Amorphophallus* Blume ex Decne. Sect. *Conophallus* (Scott) Engl. (Araceae) in India. *Bangladesh Journal of Plant Taxonomy* 19(2): 135–153.
- Jaleel, V.A., M. Sivadasan, A.H. Ahmed, J. Thomas & A.A. Alatar (2014). A taxonomic revision of *Amorphophallus* Blume ex Decne. Sect. *Amorphophallus* (Araceae) in India. *Bangladesh Journal of Plant Taxonomy* 21(2): 105–120.
- Lekhak, M.M. & S.R. Yadav (2011). Cytotaxonomy of some species of *Amorphophallus* sect. *Raphiophallus* (Schott) Engl. (Araceae) of the Indian Subcontinent. *Nucleus* 54(3): 169–176.
- Mayo, S.J., J. Bogner & P.C. Boyce (1997). *Amorphophallus*, pp. 235–239. In: *The Genera of Araceae*. Royal Botanic Gardens, Kew.
- Sigismund, K. (1841). *Amorphophallus margaritifera* (Roxb.) Kunth, Enumeratio Plantarum Omnium Hucusque Cognitarum 3: 34.
- Sivadasan, M. & V.A. Jaleel (1998). Rediscovery of *Amorphophallus longiconnectivus* Bogner, a little known rare endemic species of Araceae. *Rheedea* 8(2): 243–247.
- Staffleu, F.A. & R.S. Cowan (1976–1978). Taxonomic Literature: A selective Guide to Botanical publications and Collection with dates, Commentaries and types 2, Vol. I–7. Regnum Vegetalis, Utrecht.
- The Plant List (2013). Version 1.1. Published on the Internet; <http://www.theplantlist.org/> (accessed 28 November 2016).





OPEN ACCESS



The Journal of Threatened Taxa is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) 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)

October 2018 | Vol. 10 | No. 11 | Pages: 12443–12618

Date of Publication: 26 October 2018 (Online & Print)

DOI: 10.11609/jott.2018.10.11.12443-12618

www.threatenedtaxa.org

Article

The terrestrial life of sea kraits: insights from a long-term study on two *Laticauda* species (Reptilia: Squamata: Elapidae) in the Andaman Islands, India
-- Zoya Tyabji, Nitya Prakash Mohanty, Erina Young & Tasneem Khan, Pp. 12443–12450

Communications

Fishing Cat *Prionailurus viverrinus* Bennett, 1833 (Carnivora: Felidae) distribution and habitat characteristics in Chitwan National Park, Nepal
-- Rama Mishra, Khadga Basnet, Rajan Amin & Babu Ram Lamichhane, Pp. 12451–12458

Status distribution and feeding habit of Wild Boar *Sus scrofa* (Mammalia: Artiodactyla: Suidae) in Pench Tiger Reserve, Madhya Pradesh, India
-- Shaheer Khan & Orus Ilyas, Pp. 12459–12463

The composition and status of waterbirds of Perur Lake in Tamil Nadu, India
-- G. Parameswaran & R. Sivashankar, Pp. 12464–12488

The herpetofauna of Jigme Singye Wangchuck National Park in central Bhutan: status, distribution and new records
-- Sangay Tshewang & Letro Letro, Pp. 12489–12498

The Odonata (Insecta) of Dhofar, southern Oman
-- Elaine M. Cowan & Peter J. Cowan, Pp. 12499–12514

New kissing bug (Hemiptera: Reduviidae: Triatominae) records from Napo and Morona-Santiago provinces with distribution updates in Ecuador
-- Ana Soto-Vivas, Sandra Enríquez, Ernesto Villacrés, Jazmin Arrivillaga, Martín Hinojosa & Jonathan Liria, Pp. 12515–12522

Orchid diversity in two community forests of Makawanpur District, central Nepal
-- Bijaya Pant, Mukti Ram Paudel, Mukesh Babu Chand, Shreeti Pradhan, Bijaya Bahadur Malla & Bhakta Bahadur Raskoti, Pp. 12523–12530

Habitat distribution modeling for reintroduction and conservation of *Aristolochia indica* L. - a threatened medicinal plant in Assam, India
-- Bhaskar Sarma, Prantik Sharma Baruah & Bhaben Tanti, Pp. 12531–12537

Pollination ecology of *Synedrella nodiflora* (L.) Gaertn. (Asteraceae)
-- B. Usharani & A.J. Solomon Raju, Pp. 12538–12551

Review

Status of studies on zooplankton fauna of Arunachal Pradesh, India
-- Bikramjit Sinha, Pp. 12552–12560

Short Communications

First record of the endangered Arabian Tahr *Arabitragus jayakari* (Thomas, 1894) in the Hatta Mountain Conservation Area, Dubai, United Arab Emirates
-- Jeruel Cabadonga Aguhob, Junid N. Shah, Esmat Elfaki Mohammed Elhassan, Aisha Almurr Al Muhery, Mohamed Mustafa Eltayeb Mohamed, Juma Abdulla Saeed Mohammad Al Omairi, Hamad Hashim Mohammed Khalaf Albedwawi, Obaid Mohammed Salem Mohammed Al Bedwawi, Hassan Zain Alsharif & Afra Mahmood Mohammad Ali Haji, Pp. 12561–12565

Partners



A winter roost count of the Short-eared Owl *Asio flammeus* (Aves: Strigiformes: Strigidae) at Porbandar, Gujarat, India
-- Dhavalkumar Varagiya & Anita Chakraborty, Pp. 12566–12570

Crocodiles of river Krishna: impact on agriculture, economy, and the sociology of human population in Sangli, Maharashtra, India
-- Rajaram Hindurao Atigre, Pp. 12571–12576

A new report on the clasper movements of a captive Sand Tiger Shark *Carcharias taurus* (Lamniformes: Odontaspidae) and a possible reason for the behaviour
-- Helen Colbachini, Rafael Caprioli Gutierrez, Cristiane Schilbach Pizzutto & Otto Bismarck Fazzano Gadig, Pp. 12577–12581

New species of termite *Pericapritermes travancorensis* sp. nov. (Isoptera: Termitidae: Termitinae) from India
-- Jobin Mathew & Chinnu Ipe, Pp. 12582–12588

A checklist of vascular epiphytes of El Cometa Lagoon, Pantanos de Centla Biosphere Reserve, Mexico
-- Derio Antonio Jiménez-López, Candelario Peralta-Carreta, Jonathan V. Solórzano, Gerardo Luis Cervantes-Jiménez & Marco Antonio Domínguez-Vázquez, Pp. 12589–12597

Notes

Two moth species of Lasiocampidae (Lepidoptera: Lasiocampoidea) recorded for the first time in Bhutan
Jatishwor Singh Irungbam & Meenakshi Jatishwor Irungbam, Pp. 12598–12601

New nymphalid butterfly records from Jammu & Kashmir, India
-- Shakha Sharma & Neeraj Sharma, Pp. 12602–12606

***Argostemma khasianum* C.B. Clarke (Rubiaceae): a new record of a genus and species of flowering plant for the state of Arunachal Pradesh (India) and its lectotypification**
-- Umeshkumar L. Tiwari & V.K. Rawat, Pp. 12607–12609

***Amorphophallus longiconnectivus* and *A. margaritifera*: additional aroids from Maharashtra with notes on the floral variations**
-- Avinash R. Gholave, Ravikiran S. Govekar, Vasanta I. Kahalkar, Milind M. Sardesai & Shirang R. Yadav, Pp. 12610–12613

Cultivation of the Himalayan seasoning *Allium* in a remote village of Uttarakhand, India
-- Chandra Prakash Kuniyal & Bir Singh Negi, Pp. 12614–12617

Miscellaneous

National Biodiversity Authority

Member



Publisher & Host

