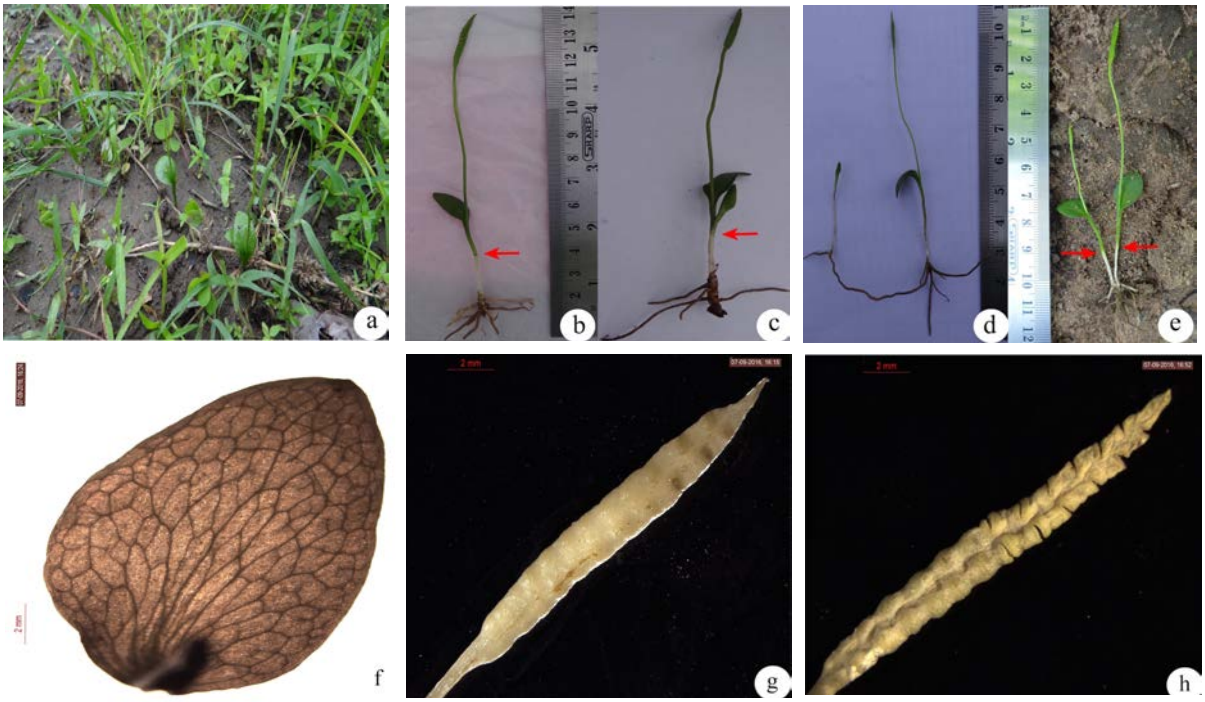
ADDER'S TONGUE FERN

Occurrence of *Ophioglossum reticulatum* in Lankapalli Forest Reserve, Telangana with a note on its variation in India



***Ophioglossum reticulatum*: Natural habitat and habit (a), Typical specimen (b), Plant with two trophophylls (c), Stolon connecting the plant with its plantlet (d), Two plants arising from a stock [arrow indicates the level of burial] (e), Venation of trophophyll (f), Strobilus with sterile base and beak (g) and Dehiscence from top to bottom (h).**

Plantae
(Plant Kingdom)

Tracheophyta
(Phylum of vascular plants)

Ophioglossales
(Order of Pteridophyte plants)

Ophiolossaceae
(Family of Adder's Tongue Ferns)

Ophioglossum reticulatum
(Adder's or Snake Tongue Fern)

Species described by Linnaeus in 1753

Ophioglossum L. is the largest genus in Ophioglossaceae (Pteridophyta), with about 28–54 species spread all over the globe. The species of this genus are known as 'Adder's or 'Snake' tongue ferns. The Ophioglossaceae are represented in India by three genera, namely, *Botrychium* Sw. with 23–26 species, the unispecific *Helminthostachys* Kaulf. and *Ophioglossum* L. with 12 species (Yadav & Tripathi 2002; Goswami et al. 2008; Singh et al. 2009).

IUCN Red List:

Global – Least Concern (Irudayaraj 2011)

Balakrishnan et al. (1960) had presented the taxonomy and distribution of all the known species of *Ophioglossum* in India till then with detailed descriptions

and illustrations. Accordingly, not even a single species of *Ophioglossum* was known in Andhra Pradesh. Rao et al. (1999) reported *O. pedunculosum* Desv. from the hills of Tuni (Eastern Ghats), East Godavari District, Andhra Pradesh. This name is synonymous with *Ophioglossum costatum* R.Br., a widespread species which is often misidentified with *O. nudicaule* L.f. (Raju et al. 2011). Later, Pullaiah et al. (2003) recorded three species of *Ophioglossum* for Andhra Pradesh, namely, *O. gramineum* Willd., *O. nudicaule* L.f. and *O. reticulatum* L., whose areas of spread indicated that they do not fall in the Telangana region. Raju et al. (2011) reported *Ophioglossum costatum*, for the first time from the Telangana region (now a new State carved out of Andhra Pradesh in June 2014, with 10 districts) from the districts of Warangal (Pakhal: Pakhal Wildlife Sanctuary) and Hyderabad (Osmania University campus).

During the phytosociological study (July–August 2016) of Lankapalli Forest Reserve, Khammam District, Telangana, India, the populations of *Ophioglossum* were discovered. The taxon was identified as *Ophioglossum reticulatum* (Pteridophyta: Ophioglossaceae), which constitutes an addition to the Pteridophyte & Flora of Telangana State, India. The present paper, besides reporting this, enlists the species associates, the local threats for its survival and discusses the variation within *Ophioglossum reticulatum* L. in India.

Ophioglossum reticulatum L. Sp. Pl. 2: 1063. 1753; Balakrishnan et al. in Bull. Bot. Suv. India 2: 335. 1960. Mahabale in Bull. Bot. Surv. India 4: 71. 1962; Panigrahi & Dixit in Proc. Nation. Inst. Sci. India 35B: 257.1969; Singh et al. in Taiwania 54: 359. 2009; *O. peruvianum* C.Presl. Suppl. Tend. Pterid. 52. 1845.

Diagnosis: Perennial herb, attaining a height of 6.5–10.8 cm. *Rhizome* cylindrical to sub-globose or shortly linear, 0.7–1.3 cm long, 0.8–1.1 cm diam., with 6–13 horizontal roots; stolons often present. *Trophophylls* 1 or 2, rarely 3, originating from rhizome; fleshy, cordate, ovate to rarely linear, apex acute; stipe and lamina length ratio 2:1. *Lamina* angled at 20–55° from the ground surface, entire or wavy, 1.15–2.5 × 0.5–1.1 cm, usually flat, venation reticulate, midrib absent; fertile lamina sometimes folded or concave; ovate or ovate-lanceolate, fleshy, broadly cuneate at base; apex acute; sterile lamina when present flat; trophophore (from rhizome) 1.9–5.8 cm long, underground part 1.2–2.6 cm. Stipe 1 or 2, 6.9–12.5 cm long, 0.1–0.15 mm wide. *Strobilus* (fertile segment) 1.2–3.1 cm (length) × 0.15–0.25 cm (diam.); apex acuminate with a sterile tip, green; yellowish when ripe; sporangia 10–16 pairs per spike. *Spores* trilete. (Image 1)

Global Distribution: India (Kerala, Tamil Nadu)

Field note: *Ophioglossum reticulatum* (Stalked Adder's tongue) is a rhizome geophyte, appearing seasonally during August-September in shady grassy forest floors, bamboo forests and/or plantations, wetlands and marshy areas throughout India. It can be identified with the trophophyll, which is usually cordate at the base with reticulate venation bearing no clear midrib and originating from the aerial part of the cylindrical rhizome, and the presence of stolons.

Ex-Siccate: India, Telangana, Lankapalli Reserve Forest (Khammam):

Jagannadhapuram forest area (17013'56.8"N & 80047'38.0"E at 181m altitude), 13.ix.2016, coll. *A. Ragan, S. Suthari & V.S. Raju* 1326 (KUW); (17013'55.2"N & 80047'38.7"E at 181m altitude), 14.ix.2016, coll. *V.S.Raju, S. Suthari, R. Kandagatla & S. Gurappa* 1327 (KUW).

Distribution: (a) World: Pantropical: Widespread on the continents and as well the islands alike. (b) India: Northwestern Himalaya (Garhwal, Kumaon); Eastern Himalaya (Arunachal Pradesh, Sikkim, West Bengal); Northeastern India: Assam (Guwahati), Meghalaya (Khasi & Jaintia Hills); Western India: Rajasthan (Jhalawar); Gangetic Plains: Bihar (Parasnath Hills); Uttar Pradesh (Bahraich); Central India: Madhya Pradesh (Pachmarhi, Hosangabad); Peninsular India: Telangana (Khammam District; Current report); Andhra Pradesh (Chittoor); Karnataka (Dakshina Kannada); Tamil Nadu (Kodayar, Kanikatti, Marunduvalmalai, Alamparai, Kolli and Shevroy Hills); Kerala (Chembra Hills, Janjoor, Ponmudi and Thangacherry).

Variation: *Ophioglossum reticulatum* is a highly polymorphic species in India. Having noted the extent of variation, Panigrahi & Dixit (1969) recognized no formal infraspecific taxa due to the intergrading forms. A glimpse of this variation noted in 33 parameters of this species from Rajasthan (Yadav & Tripathi 2002) through Madhya Pradesh (Singh et al. 2009) to Telangana (present study) supports their contention. The characters were found largely overlapping but for the greater size of all measurements of plant body of the Rajasthan specimens. It could be due to higher ploidy in the species since *O. reticulatum* has been reported to exhibit n = 120, c. 510, 515 and even 720. According to Khandelwal (1990), *Ophioglossum* represents an evolutionary dead end through repeated cycles of polyploidy and is possibly at the verge of extinction. The other morphological differences could be due to latitudinal and longitudinal and ecological gradients.

Plant Associates: The following species found (in 1×1m quadrats) associated with *Ophioglossum reticulatum* are *Abildgaardia ovata*, *Blepharis maderaspatensis*, *Cleome aspera*, *Corchorus aestuans*, *Cyanotis axillaris*, *Cyanthellium cinereum*, *Cynodon dactylon*, *Desmodium triflorum*, *Evolvulus nummularius*, *Hybanthus ennaespermus*, *Justicia glauca*, *Lepidagathis cristata*, *Lindernia ciliata*, *Merremia serrata*, *Oldenlandia umbellata*, *Phyllanthus nozeranii*, *Phyllanthus simplex*, *Polygala arvensis*, *Spermacoce articularis* and *Waltheria indica* along with the geophytes *Ledebouria hyacinthina*, *Tacca leontopetaloides* and *Theriophonum minutum*.

Threat: The exotic invasive plant species like *Cynodon dactylon*, *Chromolaena odorata*, *Evolvulus nummularius* and *Hyptis suaveolens* which physically occupy the ground, and slowly and steadily covering the whole habitat are the major threat. The biotic pressure through uncontrolled grazing and the fire promoted by dying bamboo are in the way of survival of this fern.

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