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Cyrtomium falcatum: A new addition to the fern flora of Udhagamandalam, Tamilnadu, India

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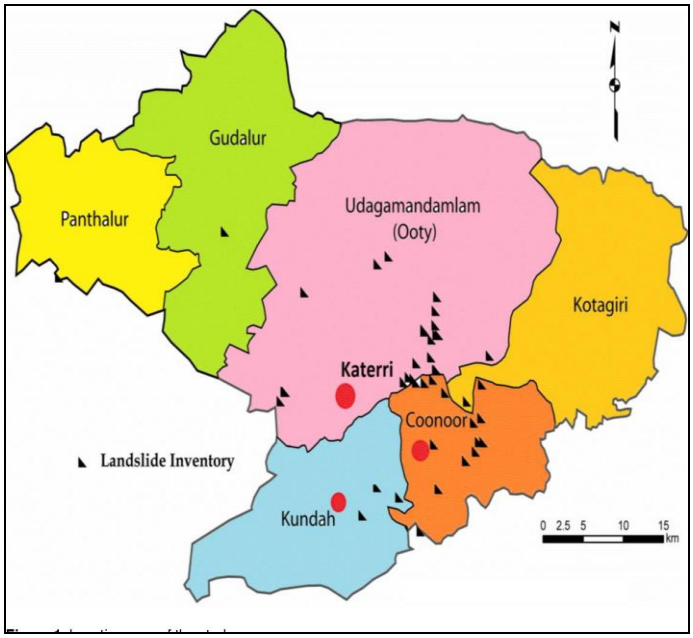
Abstract
The present investigation is about the new record of a fern, *Cyrtomium falcatum* from the Botanical garden of Udhagamandalam, Nilgiri district of Tamil Nadu, India. The lateral pinnae of the *Cyrtomium* genus are obliquely oblong or lanceolate, with noticeable acroscopic auricles, the terminal pinna is forked or trifurcate, the indusium is incised, and the stipe scales are pale brown. The species is described in detail along with illustrations and synonyms. A dichotomous key has been also provided to distinguish the species from other species of *Cyrtomium*.

Keywords: *Cyrtomium falcatum*, fern, identification, new report, udhagamandalam

Introduction
The species *Cyrtomium falcatum* belonging to the family Dryopteridaceae. About 40% species of the genus *Cyrtomium* are distributed in eastern Asia (Mei- Lu and Cheng, 2003, Lu *et al*; 2005) [6, 5]. The genus is divided into two series, Falcata and Fortuneana, based on frond texture and the presence or absence of serrations on leaf margins (Shing, 1965) [7]. *Polystichum*, *Phaneroplebia*, and *Cyrtogonellum* have been considered synonyms of *Cyrtomium* (Tyron and Tyron, 1982). According to phylogenetic analysis of rbcL sequencing data, *Cyrtomium* is a separate monophyletic group that is more closely linked to *Polystichum* than to *Phaneroplebia* (Little and Brarrington, 2003). Molecular phylogenetic analysis shows there are 19 species of *Cyrtomium* (Lu *et al*., 2005) [5], and the results validated *Cyrtomium* as a paraphyletic. Phylogenetic studies based on molecular and morphological data have recently been conducted to clarify the taxonomic status of sections of the *Cyrtomium* (Lu *et al*; 2006) [4]. Diploid, tetraploid, and apomictic triploid karyotypes of *Cyrtomium falcatum* are known (Iwatsuki, 1995) [2]. The present study is about the *Cyrtomium falcatum* collected from Udhagamandalam, Tamil Nadu. This species belongs to falcata series.

Materials and Methods
Fern species were collected from Botanical garden of Udhagamandalam, Nilgiris district of Tamil Nadu (Figure a & b). The collected specimens of the species were prepared by using standard herbarium techniques. The species is identified with the help of Beddome and Fraser- Jenkins (2008) [1] literature etc. The identity of specimen was authenticated from Department of Botany, Annamalai University.

a (Tamil Nadu)



b (Udhagamandalam)

Fig 1

Results

The author found species of the genus *Cyrtomium* on February 27, 2021, at a single location of the Botanical Garden Ooty, 30 kilometers from Coimbatore, Tamil Nadu.

Dryopteridaceae

Synonyms: *Polypodium falcatum* (Lineaus), *Aspidium falcatum* (Linnaeus), *Cyrtomium yiangshanense*, *Dryopteris falcata* (Linnaeus), *Phanerophlebia falcata* (Linnaeus), *Polystichum falcatum* (Linnaeus).

Habitat

It grows from crevices in coastal cliffs, stream banks, rocky slopes and other moist, stable areas.

Description

Plants are 30-40 cm tall. Rhizome erect densely covered with lanceolate brown scales. Scales are pale brown, sometimes blackish brown in the middle, ovate, lower portion fimbricate. Stipe stramineous, 15-27 cm long, 3-4 mm in diameter at base, lower portion densely scaly, rachis with lanceolate brown dentate scales or glabrous; Leaves unipinnately compound, imparipinnate 22-35 × 12-15 cm above contracted. Lateral pinnae 5-14 pairs, alternate, spreading or ascendant, short stalked, lanceolate or ovate-lanceolate, often curved acroscopically; middle pinnae 6-10 × 2.5-3 cm, base obliquely rounded-cuneate, margins entire or repand, occasionally dentate, apex long acuminate or caudate; terminal pinna ovate-lanceolate, forked or trifurcate. Sori on abaxial surface of pinna; indusia margins are slightly incised. 2*n* = 82.

Distribution

Fujian, Guangdong, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang Indochina, Japan, Korea, Pacific islands, Europe, Hawaii, North America, Reunion, China, Malaysia, Taiwan, India, Africa.

The species so far known only from the Japan, China to Hawaii. In India, it reported only from Manipur. So, it is the new report to Southern part of India. Following key has been used to identify the species.

1. Pinnae coriaceous or thick papyraceous, without tooth in apex of pinna
2. Pinna base round; central part of indusium blackish brown ····· *C. falcatum*
3. Pinna base cuneate; throughout part of indusium blackish brown ····· *C. devexiscapulae*
4. Pinnae papyraceous, with serrulate apex of pinna
5. Pinnae narrow lanceolate, gradually narrowing to apex, shinning ……. *C. Laetevirens*
6. Pinnae ovate lanceolate, suddenly narrowing to apex, without shinning
7. Adaxial surface of lamina yellowish green, about 15 lateral pinnae pairs ……...*C. fortunei* var. clivicola
8. Adaxial surface of lamina deep green, about 30 lateral pinnae pairs ……. *C. fortunei* var. fortune

Fig 2

Morphological Characters of *Cyrtomium falcatum*

Table 1

Characters	*C. falcatum*
Plant height (cm)	25-100
Stipe length (cm)	10-40
Scale length (cm)	5-12
Pinna Shape	ovate to oblong-lanceolate, acuminate
Pinna Margin	acerate with long projection
Color	brown to dark brown
Laminae length/width (cm)	15-60/15-25
Shape	broadly lanceolate
Pinna pairs	7-18
Shape	more or less falcate, oblong-ovate, caudately acuminate at apex,coriaceous. dark green on adaxial side, shining
Color	almost present
Presence of auricle	entire
Pinna margin	entire, bicolor, grayish margin with blackish brown in center, not shriveled at maturity
Indusium	

Discussion

The climate of the Udhagamandalam region is such that a large number of ferns growing in natural vegetation, apart from cultivated in the Botanical garden. The present report shows that *Cyrtomium falcatum* cultivated in the Botanical garden may be naturalized in due course of time. The study will provide insight and act as a monumental resource in the field of fern species identification in this region, allowing individuals to become more familiar with this fern species. The current study was done to document the *Cyrtomium* species of Udhagamandalam that constitute a new record, as investigation, inventory, and documenting of phytodiversity (including non-flowering plants) is a microscopic step in the broader goal of sustainable exploitation of earth's resources.

Conclusion

The species got identified on the basis of obliquely oblong or lanceolate lateral pinnae with acroscopic auricles. Terminal pinna was found trifurcate; indusium incised and stipe scales pale-brown. Hence, it is a new addition to the fern flora of Udhagamandalam.

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