

SHORT COMMUNICATION

A Note on New Records of Ferns at Ayer Hitam Forest Reserve, Johor, Malaysia

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ABSTRACT

On a scientific expedition to Ayer Hitam Forest Reserve at Muar, Johor, Malaysia, 71 fern species belonging to 16 families and 25 genera were collected and identified. Fifty-one of the ferns are native to Peninsular Malaysia while the remaining 20 are non-native. Five newly recorded fern species in Johor, Southern Peninsular Malaysia, namely *Angiopteris helferiana*, *Lindsaea trichomanoides*, *Lomariopsis brackenridgei*, *Pteris umbrosa* and *Pteris cretica* were briefly described.

Keywords: Ayer Hitam, ferns, Peninsular Malaysia

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Ferns are known to be seedless vascular plants which are distributed widely across various ecological zones of the world (Yusuf, 2010). They are important components of tropical and temperate forests by dominating most of the forest floors. About 1,165 fern species have been recorded from the Malaysian rainforests (Parris & Latiff, 1997). Only about 647 fern species have been reported for Peninsular Malaysia (Maideen & Damanhuri, 2015). Several authors have reported the fern species compositions and diversity of many forests in Peninsular Malaysia. However, published data on the fern species of Muar forests are very rare. Hence, this study provides a brief description of the newly recorded ferns observed at the Ayer Hitam Forest Reserve, Muar, Johor, Southern Peninsular Malaysia.

This ferns survey was done at the Ayer Hitam Forest Reserve (AHFR), Muar, Johor, Southern Peninsular Malaysia in August 2019. AHFR is located within the latitude 2°27.8"N and longitude 102°48'1.799"E. The AHFR has been classified as the largest peat swamp forest in Johor with an area of 3,797 ha. Several anthropogenic factors have led to the loss of about 138 ha of forest land in Muar between the

years 2010 and 2019 (<https://www.globalforestwatch.org>).

The ferns were collected using a preferential non-random sampling method along four tracks in this forest (Akomolafe & Rahmad, 2019). The complete ferns fronds were identified in the field. Those with difficult identification were collected, pressed and taken to the herbarium for proper examination. The ferns' identities and naturalization were established using the fern floras (Piggott, 1988; Parris *et al.*, 2010), biodiversity databases [Malaysia Biodiversity Information System (MyBIS), Global Biodiversity Information Facility (GBIF) and International Plant Names Index (IPNI, 2020)].

A total of 71 fern species were identified at all the study tracks in the Ayer Hitam Forest (Table 1). Out of this, 51 ferns have become naturalised to Malaysia while the remaining 20 are non-native. This number of fern species represents 10.97% of the total of 647 reported for Peninsular Malaysia (Maideen & Damanhuri, 2015). A larger percentage (60%) of these ferns species has not been evaluated for conservation status by the Malaysian Biodiversity Information System. It is very significant to note

Table 1. Checklist of the ferns at the Ayer Hitam Forest Reserve, Johor

No.	Species	Family	Native to Malaysia
1	<i>Adiantum aethiopicum</i> L.	Adiantaceae	X
2	<i>Adiantum capillus-veneris</i> L.	Adiantaceae	√
3	<i>Adiantum trapeziforme</i> L.	Adiantaceae	X
4	<i>Angiopteris evecta</i> (Forst.) Hoffm.	Marattiaceae	√
5	<i>Angiopteris helferiana</i> C. Presl	Marattiaceae	X
6	<i>Arachniodes haniffii</i> (Holtt.) Ching	Dryopteridaceae	X
7	<i>Asplenium antiquum</i> Makino	Aspleniaceae	X
8	<i>Asplenium australasicum</i> Hook.	Aspleniaceae	√
9	<i>Asplenium batuense</i> Alderw.	Aspleniaceae	√
10	<i>Asplenium caudatum</i> G. Forst.	Aspleniaceae	√
11	<i>Asplenium nitidum</i> Sw.	Aspleniaceae	√
12	<i>Asplenium longissimum</i> Blume	Aspleniaceae	√
13	<i>Asplenium nidus</i> L.	Aspleniaceae	√
14	<i>Asplenium normale</i> Don	Aspleniaceae	√
15	<i>Asplenium polyodont</i> G. Forst.	Aspleniaceae	√
16	<i>Asplenium robustum</i> Blume	Aspleniaceae	√
17	<i>Asplenium scortechinii</i> Bedd.	Aspleniaceae	√
18	<i>Asplenium belangeri</i> Kunze	Aspleniaceae	√
19	<i>Blechnum orientale</i> L.	Blechnaceae	X
20	<i>Blechnum patersonii</i> (R.Br.) Mett.	Blechnaceae	√
21	<i>Bolbitis heteroclita</i> (Pr.) Ching	Dryopteridaceae	X
22	<i>Bolbitis quoyana</i> (Gaudich.) Ching	Dryopteridaceae	√
23	<i>Bolbitis sinuate</i> (C. Presl.) Henn.	Dryopteridaceae	√
24	<i>Bolbitis virens</i> (Wall.) Schott	Dryopteridaceae	√
25	<i>Coryopteris viscosa</i> (Baker) Holttum	Thelypteridaceae	√
26	<i>Davallia divaricata</i> Bl.	Davalliaceae	√
27	<i>Davallia denticulata</i> (Burm.) Mett.	Davalliaceae	√
28	<i>Davallia solida</i> (Forst.) Sw.	Davalliaceae	X
29	<i>Dicranopteris linearis</i> var. <i>linearis</i> (Burm.) Underwood	Gleichenaceae	√
30	<i>Drynaria rigidula</i> (Sw.) Bedd.	Drynariaceae	√
31	<i>Drynaria sparsisora</i> (Desv.) Moore	Drynariaceae	√
32	<i>Dryopteris sparsa</i> (Don) Kuntze	Dryopteridaceae	√
33	<i>Heterogonium pinnatum</i> (Copel.) Holttum	Tectariaceae	√
34	<i>Leucostegia pallida</i> (Mett.) Copel.	Davalliaceae	√
35	<i>Lindsaea bouillodii</i> Christ	Dennstaedtiaceae	X
36	<i>Lindsaea ensifolia</i> Sw.	Dennstaedtiaceae	√
37	<i>Lindsaea lancea</i> (L.) Bedd.	Dennstaedtiaceae	X
38	<i>Lindsaea lucida</i> Bl.	Dennstaedtiaceae	√
39	<i>Lindsaea oblanceolata</i> Alderw.	Dennstaedtiaceae	√
40	<i>Lindsaea odorata</i> Roxb.	Dennstaedtiaceae	X
41	<i>Lindsaea orbiculata</i> (Lam.) Mett.	Dennstaedtiaceae	√
42	<i>Lindsaea rigida</i> J.Sm.	Dennstaedtiaceae	√
43	<i>Lindsaea scandens</i> Hook.	Dennstaedtiaceae	√
44	<i>Lindsaea trichomanoides</i> Dryand.	Dennstaedtiaceae	X
45	<i>Lomariopsis brackenridgei</i> Carruth.	Lomariopsidaceae	X
46	<i>Microlepia speluncae</i> (L.) Moore	Dennstaedtiaceae	X
47	<i>Nephrolepis biserrata</i> (Sw.) Schott	Nephrolepidaceae	√
48	<i>Nephrolepis cordifolia</i> (L.) Presl	Nephrolepidaceae	√
49	<i>Nephrolepis exaltata</i> (L.) Schott	Nephrolepidaceae	X
50	<i>Nephrolepis undulata</i> (Sw.) J.Sm.	Nephrolepidaceae	X
51	<i>Pityrogramma calomelanos</i> (L.) Link	Pteridaceae	√
52	<i>Pteridrys australis</i> Ching	Tectariaceae	√
53	<i>Pteris cretica</i> L.	Pteridaceae	√
54	<i>Pteris longipinnula</i> Wall.	Pteridaceae	X
55	<i>Pteris semipinnata</i> L.	Pteridaceae	√

Note: '√' indicates native to Malaysia, 'X' indicates not native to Malaysia

Table 1. Continued

No.	Species	Family	Native to Malaysia
56	<i>Pteris umbrosa</i> R.Br.	Pteridaceae	√
57	<i>Pteris venulosa</i> Blume	Pteridaceae	X
58	<i>Pteris vittata</i> L.	Pteridaceae	√
59	<i>Pyrrhosia lanceolata</i> (L.) Farw.	Polypodiaceae	√
60	<i>Pyrrhosia longifolia</i> (Burm. F.) Morton	Polypodiaceae	√
61	<i>Pyrrhosia piloselloides</i> (L.) M.G. Price	Polypodiaceae	√
62	<i>Sphenomeris chinensis</i> (L.) Maxon	Dennstaedtiaceae	√
63	<i>Sticherus truncatus</i> (Willd.) Nakai	Gleicheniaceae	X
64	<i>Tectaria coadunata</i> (J.Sm) C. Chr.	Tectariaceae	√
65	<i>Tectaria crenata</i> Cav.	Tectariaceae	√
66	<i>Tectaria decurrens</i> (Pr.) Copel	Tectariaceae	√
67	<i>Tectaria grandidentata</i> (Ces.) Holttum	Tectariaceae	√
68	<i>Tectaria impressa</i> (Fee) Holttum	Tectariaceae	√
69	<i>Tectaria oligophylla</i> (Rosenst.) C. Chr.	Tectariaceae	√
70	<i>Tectaria singaporeana</i> (Wall. ex Hook. & Grev.) Copel.	Tectariaceae	X
71	<i>Thelypteris paleata</i> (Copel.) Holttum	Thelypteridaceae	√

Note: '√' indicates native to Malaysia, 'X' indicates not native to Malaysia

that *Davallia solida* has been identified as nearly threatened and adequate effort should be made in conserving this fern. Perhaps, there are lots more that are undergoing threats due to human activities in this forest and other forests in Malaysia. This cannot be ascertained unless more attention is paid to the assessment of the conservation status of ferns in Malaysia. *Angiopteris helferiana*, *Lindsaea trichomanoides*, *Lomariopsis brackenridgei*, *Pteris umbrosa* and *P. cretica* were newly recorded to be found in Johor, Peninsular Malaysia in this study.

Angiopteris helferiana C. Presl

Description: *Angiopteris helferiana* is a terrestrial fern having erect and massive rhizomes which are often covered with dark brown hairs. It has bipinnate fronds with hairy stripes that can grow up to 180 cm. The pinnae shape ranges from oblong to lanceolate with an acute outline. The dimensions of the pinnae are about 70 cm long and 40 cm wide. The pinnae are rounded at the base (Figure 1).

Geographical Distribution: *Angiopteris helferiana* is found in many forests having watercourses and shades (Singh *et al.*, 2012). It is widely distributed in some Asia countries such as India, China, Nepal, Sri Lanka, Thailand, Laos, and Cambodia (Lamichhane *et al.*, 2019). However, no study has reported it to be found in Southern Peninsular Malaysia.

Ecological Impacts / Economic Uses: Its rhizome has been used for local medicine in treating several ailments in India (Singh & Upadhyay, 2014) and the young leaves are edible in Cambodia (Phon, 2000).



Figure 1. Fronds of *Angiopteris helferiana*

Lindsaea trichomanoides Dryand

Description: It is a small terrestrial fern having erect fronds with a height ranging from 5 to 25

cm. It has a short creeping rhizome. Its pinnae are about 4 to 10 mm long with a shape ranging between lanceolate, triangular and oblong. The upper pinnae are reduced in size compared with others. Its veins are free and sori are arranged on the veins ending. Its spores are trilete (Kramer & McCarthy, 1998) (Figure 2).

Geographical Distribution: It is mainly distributed in lowland and montane forests in Australia and New Zealand. It is also found in closed forests where it occupies the floor. No record of its presence has been reported for Southern Peninsular Malaysia.

Ecological Impacts / Economic Uses: There is no available information on its economic uses.



Figure 2. Fronds of *Lindsaea trichomanoides*

***Lomariopsis brackenridgei* Carruth**

Description: It is a small terrestrial fern. The fronds are short and dimorphic. Fertile pinnae are narrower than sterile ones. The pinnae are between 15 – 18 cm long and 1.5 – 2.5 cm wide. The margins of the pinnae are serrated with free and simple venation. The tip of the pinnae is acuminate (Figure 3).

Geographical Distribution: It is widely distributed in lowland rain forests in Fiji, Samoa, Tahiti, and Austral Islands.

Ecological Impacts / Economic Uses: There is no available information on its economic uses.



Figure 3. Fronds of *Lomariopsis brackenridgei*

***Pteris cretica* L**

Description: *Pteris cretica* also known as the Cretan brake fern is a widely distributed fern. It has a slender creeping rhizome which can be brownish at maturity. The stipe of the fronds ranges from 25 to 75 cm long. It has about 1-3 pairs of pinnae which are separated. The leaf blades are irregularly ovate, 5-parted with a terminal leaflet (pinna). Its sterile pinnae are broader than the fertile ones. The venation could be simple, free or forked. Its sori are arranged narrowly on both sides (except at apices) at the abaxial of the pinnae (Webb *et al.*, 1988; Nauman, 1993) (Figure 4).

Geographical Distribution: *Pteris cretica* has been found in many dry or wet forests across some tropical countries. It is also widely found in regrowth and disturbed forests. It is native to southern Europe, Africa and some countries in Asia including Indonesia, China, Thailand, Vietnam, Taiwan, and Japan (Robinson, 2009). Previous studies have not reported it to be found in Southern Peninsular Malaysia.

Ecological Impacts / Economic Uses: It is mainly used for aesthetic purposes (Stace, 2010). This fern alongside *Pteris vittata* is very useful in the phytoremediation of polluted soils (Elless *et al.*, 2007).



Figure 4. Fronds of *Pteris cretica*

***Pteris umbrosa* R. Br**

Description: It is also known as the Jungle brake fern. Its rhizomes are short, erect or horizontal. It has a narrow and brown coloured stipe. The fronds can grow up to 100 – 250 cm long. The apices of the pinnae are tapering and the bases are long decurrent. The venation can be simple or forked with serrated margins. The sori are continuously arranged at the margins of the abaxial of the pinnae (Figure 5).

Geographical Distribution: It is widely distributed in rainforests in Australia and New Zealand.

Ecological Impacts / Economic Uses: it is known to be a good phytoremediator of heavy metals in the soil (Koller *et al.*, 2007).



Figure 5. Fronds of *Pteris umbrosa*

This survey has been able to identify the five newly recorded ferns at Ayer Hitam Forest Reserve. These new records can be added to the existing number of ferns reported for Southern Peninsular Malaysia. Further taxonomic descriptions and molecular studies should be employed in establishing these newly recorded ferns.

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