

Pteridophyte Flora of Khao Khiao Area in Khao Yai National Park, Thailand

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ABSTRACT.-A total of 113 species and 2 varieties, in 59 genera within 25 families of pteridophyte were recorded from Khao Khiao area in Khao Yai National Park. Among these, 22 families, 55 genera, 105 species and 2 varieties were ferns, while 3 families, 4 genera and 8 species were fern allies. Three families of ferns, namely Polypodiaceae, Thelypteridaceae, Dryopteridaceae, were among the common families, and included 17, 13 and 12 species, respectively. As regard to habitat, there were 58 species of terrestrials, 30 species of epiphytes and 7 species and 2 varieties of lithophytes. Eighteen species of ferns and fern allies could be found in more than one habitat. Fifty three species and 2 varieties were found in tropical evergreen forest, 34 species were found in hill evergreen forest, 6 species were found in grassland and secondary forest, and 20 species grew in more than one forest type.

KEY WORDS: Pteridophyte, Ferns and Fern allies, Khao Khiao, Khao Yai National Park, Thailand

INTRODUCTION

Khao Yai National Park was the first national park to be created in Thailand. Recently, it was included in the list of UNESCO World Heritage sites due to its great diversity in flora and fauna (UNESCO World Heritage Centre, 2005). In general, the park is a mountainous area, with Khao Khiao as one of the high peaks. This area is an interesting site for fern exploration (Boonkerd, 1996), however it

has a scarce history of botanical exploration despite its extensive diversity of vegetation. During the last five decades, most explorations of plant diversity in Khao Yai have been focused mainly on flowering plants and usually excluded detailed study of pteridophytes. It can be seen that the quantity of data relating to pteridophyte diversity in this area was rather small compared with the vast area of the park.

This study explores pteridophyte diversity at Khao Khiao area in Khao Yai National Park. It is expected that up-to-date data of pteridophyte diversity will be collected and can be further used for conservation and management of this ferny site.

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STUDY SITE

Khao Yai National Park was established in 1962 as the first national park of the country, and covers an approximate area of 2,165.55 km² and lies between latitudes N 14° 05' and 14° 15' and longitudes E 101° 05' and 101° 50' (Royal Forest Department, 2001).

The park occupies parts of Saraburi Province, Nakhon Ratchasima Province and Prachin Buri Province in the east, Nakhon Ratchasima Province in the north, and Nakhon Nayok Province in the south. (Fig.1)

The national park is a mountainous area, part of the Phanom Dongrak Range with altitudes ranging from 250-1,400 m. Its high peaks include Khao Rom (1,351 m), Khao Laem (1,326 m) and Khao Khiao (1,292 m).

The vegetation of the park was classified into 5 types, viz. dry evergreen forest, dry mixed deciduous forest, tropical rain forest, hill evergreen forest, and grassland and secondary forest (Smitinand, 1968).

Khao Khiao is in the central part of Khao Yai National Park, at elevations ranging from 600-1300 m above mean sea level and covering an approximate area of 60 km². This mountain is the origin of various waterfalls and streams, i.e. Heo Narok Waterfall, Sarika Waterfall, Nakhon Nayok River (Tourism Authority of Thailand, 2000). It consists of 3 vegetation types viz. tropical rain forest, hill evergreen forest, and grassland and/or secondary forest.

Khao Yai National Park has three main climatic seasons. The summer season is observed during March-April, it is dry and often windy. The rainy season occurs during May-October and the cold season usually starts in November and finishes in February.

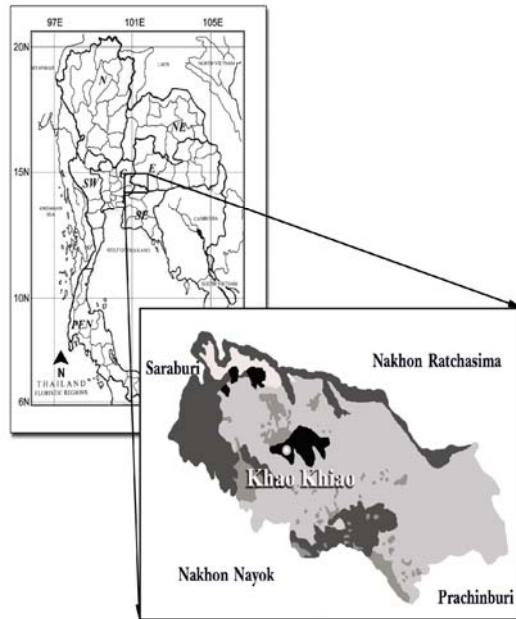


FIGURE 1. Locations of Khao Khiao area, Khao Yai National Park.

The nearest Meteorological station of the study site is Pak Chong Agromet Station, it has data of temperature, humidity and rainfall from 1974-2004. The average annual relative humidity is 70.2 % (Fig.2). The average maximum relative humidity is 98.9 % in October while the average minimum relative humidity is 22.9 % in February. The average temperature is about 25.8 °C while the average maximum temperature is 37.5 °C in April and the average minimum temperature is 10.2 °C in December. The average annual rainfall is 1090 mm., while the highest average monthly rainfall is 214 mm in September and the lowest monthly rainfall of about 5.6 mm in December (Meteorological Department, 2004).

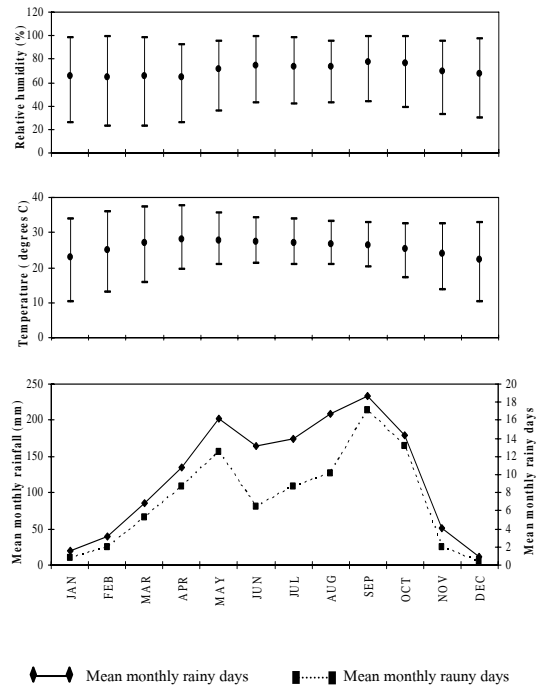


FIGURE 2. Climatological data during the period, 1974-2004, from Pak Chong Agromet Station (Data from the Department of Meteorology, Bangkok, Thailand).

MATERIALS AND METHODS

Field collections of ferns and fern allies were conducted from December 2003 to March 2005 at Khao Khiao, Khao Yai National Park. They were gathered along 12 km of the road number 3182 (Khao Khiao-Pha Trom Jai), extending about 50-100 m from both sides. Three duplicates of complete specimens were collected and photographs were taken.

Dried herbarium specimens were prepared as described in Boonkerd et al. (1987). Morphological characters of ferns and fern allies specimens were studied, then identifications were made using keys and descriptions from Flora of Thailand, Vol. 3, Part 1-4 (Tagawa and Iwatsuki, 1979, 1985, 1988, 1989) and the other taxonomic literature, such as Floras, Manuals,

Monographs, research papers, etc. of neighboring countries.

The collected specimens were proved for identity by comparison with the voucher herbarium specimens that were deposited at BCU, BKF, K, L and P (Herbarium abbreviations according to Holmgrens & Holmgrens, 2005). Authors of scientific names and abbreviations used in this paper follow the conventions covering the author of plant names given in Brummitt and Powell (1992). Classification of ferns and fern allies were according to Boonkerd and Pollawatn (2000). The voucher specimens are deposited at the Professor Kasin Suvatabhandhu Herbarium, Department of Botany, Faculty of Science, Chulalongkorn University (BCU) and the Forest Herbarium (BKF), National Park, Wildlife and Plant Conservation Department.

RESULTS

Two hundred and nineteen specimens of ferns and fern allies were collected and determined into 113 species and 2 varieties, 59 genera, within 25 families. While this study presents the findings from only one transect through this large park, it is nevertheless expected to be a useful foundation for continued pteridological research in this botanically important region. The enumeration of species, together with habit, habitat and abundance of each species are presented in the Appendix.

DISCUSSION AND CONCLUSION

The diversity of ferns and fern allies at Khao Khiao area in Khao Yai National Park was explored from December 2003 to May 2005. A total of 219 specimens were collected. Among these, 22 families, 55 genera, 105 species and 2 varieties were ferns, while 3 families, 4 genera and 8 species were fern allies. Three families of ferns namely Polypodiaceae,

Thelypteridaceae, Dryopteridaceae were among the common families. Polypodiaceae included 17 species in 10 genera while Thelypteridaceae and Dryopteridaceae included 13 species in 6 genera, and 12 species in 7 genera, respectively. With regard to habitats, there were 58 species of terrestrials, 30 species of epiphytes, 7 species and 2 varieties of lithophytes. However, 18 species of ferns and fern allies could be found in more than one habitat. We found that 53 species and 2 varieties occurred in tropical rain forest, while 34 species occurred in hill evergreen forest. Six species were commonly found in grassland and secondary forest. Twenty species may be found in more than one vegetation type.

Diversity of ferns and fern allies in relation to habitat

Ferns and fern allies in the Khao Khiao area of Khao Yai National Park were found on the forest floor (terrestrial), on tree trunks or branches (epiphyte) and on rocks (lithophyte). Furthermore, some species of ferns and fern allies can be found in more than one habitat.

Terrestrial plants

Fifty eight species of ferns and fern allies were terrestrial plant (Appendix). Terrestrial habitat included exposed areas, shady area, stream bank and hill slope. Common species are members of Thelypteridaceae, Dryopteridaceae, Lindsaeaceae, and Woodsiaceae. Most species were found in shady areas which were shaded by tree or shrub canopy. Examples included *Amphineuron terminans*, *Dryopteris subtriangularis* and *Diplazium donianum*. The exposed areas are found along margins of the forests, along stream banks, or the disturbed areas resulting from log cutting or road construction. Examples of terrestrial exposed plants included *Lycopodiella cernua* and *Dicranopteris linearis* var. *linearis*. These pteridophytes usually occur on hill slopes, they more or less protect soil erosion by using their

penetrating roots. Along stream banks where sunlight can penetrate to the forest floors some large ferns, e.g. *Angiopteris evecta*, *Pleconemia irregularis* can be observed. On shady mountain slopes, high air humidity is frequent during the rainy season. It is usually cloudy and foggy in the morning up to midday. Some terrestrial mountain ferns such as *Asplenium normale*, *Diacalpe aspidioides* can be found in hill evergreen forest where such conditions occur. They usually occupy humus rich grounds or rocks. These two species are common in hill evergreen forest or lower montane forest in Thailand and tend to be indicators of this vegetation type.

Epiphytes

Thirty species of ferns and fern allies were epiphytes (Appendix). These species grew on tree-trunks, on mossy tree-trunks or on branches of trees. Common species are members of the families Polypodiaceae, Hymenophyllaceae, Aspleniaceae, Vittariaceae and Davalliaceae. In hill evergreen forest, tree-trunks and branches are usually covered with mosses and leafy liverworts. Common epiphytic pteridophyte species included *Huperzia hamiltonii*, *Lepisorus scolopendrium*, *Hymenophyllum polyanthos*. and *Humata repens*. In some spots where sun light can penetrate to tree-trunks, a large epiphytic fern *Aglaomorpha coronans* can be observed. In contrast, some small ferns, members of the Grammitidaceae, i.e. *Grammitis dorsipila* and *Prosaptia khasyana* are restricted to hill evergreen forest, but in rather small numbers. In some moist and shady places, such as near waterfalls or streamlets in tropical rain forest, there are small or medium-sized epiphytes on shrubs or small trees, e.g. *Asplenium apogamum*, *Antrophyum callifolium* Blume and *Loxogramme involuta*. These ferns avoid total desiccation of the whole plant during the dry season by shriveling of fronds, thus reducing transpiration. After the first rains at the

beginning of the rainy season their fronds fully expand again.

Lithophytes

Seven species and 2 varieties were found as lithophytes (Appendix). At Khao Khiao, lithophytes usually occupy bare or humus-rich rocks in shady areas. In hill evergreen forest, ferns and fern allies usually occur in rock crevices or mossy cliffs. They usually have long-creeping rhizomes for extension over rock surfaces or in rock crevices. Examples include *Humata repens*, *Leucostegia immersa*, *Oleandra musifolia*. Among these three species, *Oleandra musifolia* has drought avoidance behaviour. Plants of this species usually shed their fronds to prevent transpiration, hence only long creeping rhizomes with dense scales can be observed during dry months. In tropical rain forest, lithophytes usually occur in high humidity areas such as along stream banks or on muddy rocks in streamlets. Examples include *Bolbitis virens* var. *virens*, *Bolbitis virens* var. *compacta*, *Bolbitis sinensis* var. *sinensis* and *Trichomanes motleyi*. *Microsorium pteropus* is usually found on muddy rocks near waterfalls or in streamlets. This species can withstand flood conditions for consideration periods and may be described as a rheophyte (Boonkerd, 1996). In some moist spots where sun-light can penetrate to the forest floor, along streamlet banks, *Adiantum philippense* can be observed in clumps on moist or humus-rich rocks.

Some species of ferns and fern allies were found in more than one habitat (Fig.3). It was found that *Asplenium normale*, *Bolbitis heteroclita* and *Phymatosorus nigrescens* can be terrestrials or epiphytes. *Pityrogramma calomelanos*, *Trigonospora ciliata* and *Arachniodes cavalerii* can be terrestrials or lithophytes. Some species can be epiphytes or lithophytes, for example *Asplenium yoshinagae*, *Microsorium insigne* and *Oleandra musifolia*.

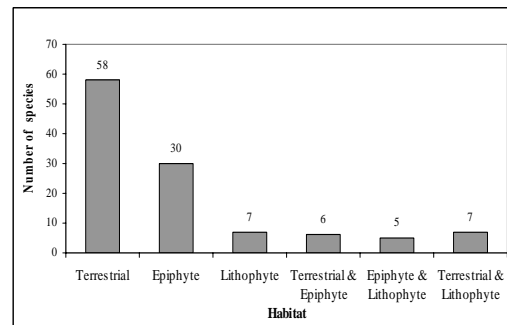


FIGURE 3. Diversity of ferns and fern allies in each habitat

Diversity of ferns and fern allies and vegetation

The vegetation of Khao Khiao area in Khao Yai National Park includes tropical rain forest, hill evergreen forest, grassland and/or secondary forest.

Tropical rain forest

Tropical rain forest was found from 600 to 1,000 m elevation. This forest type usually has humid air and soil throughout the year. There are some streamlets in this area and many fern species were observed on the forest floor. Seventy three species and 2 varieties of ferns and fern allies grow in tropical rain forest, of these 53 species and 2 varieties are confined to this forest type. Tropical rain forest has the highest number of ferns and fern allies as compared with the others. The high diversity is probably due to this type possessing the largest area among the three forest types and may be due in part to the favourable physical factors of this forest type. Moisture and temperature were rather stable during day and night. Sun light has been shaded by the forest canopy and light intensity and quality were suitable for most ferns and fern allies. The close and dense canopy created by the growth of trees and shrubs generally prevents wind from penetrating into the forest interior, even at the margins. So these physical environments promote growth of

most ferns and fern allies, especially terrestrials. The common families included Dryopteridaceae, Pteridaceae, Thelypteridaceae and Lomariopsidaceae. The characteristic species of this forest type included large ferns: *Angiopteris evecta*, *Cibotium barometz*, *Cyathea gigantea*, *Cyathea latebrosa* and *Pleocnemia irregularis*; medium-sized ferns: *Microlepia herbacea*, *Taenitis blechnoides*, *Blechnum orientale*, *Diplazium spp.*, *Pteris biaurita* and *Pteris aspericaulis*. They usually grow near moist spots, e.g. stream banks. The common epiphytes comprised *Huperzia phlegmaria*, *Drynaria sparsisora* and *Microsorium punctatum*.

Hill evergreen forest

Hill evergreen forest is found from 1,000 m elevation to the summit of Khao Khiao (1,292 m). This forest type has rich in number of individuals, but has less diversity of pteridophytes than tropical rain forest. This forest type mainly found on mountain ridges and has a small area as compared with the tropical rain forest. Fifty two species of ferns and fern allies were collected in this vegetation type. Among these, 34 species were restricted to hill evergreen forest. Polypodiaceae, Hymenophyllaceae and Dryopteridaceae were among the common families. Most ferns and fern allies were epiphytes, e.g. *Huperzia hamiltonii*, *Lepisorus scolopendrium*, *Humata repens*, *Pyrrosia lingua* var. *heteractis*. Some species are well adapted to thrive in dry conditions during the dry season, for example, filmy ferns have lamina which contract for reducing transpiration areas. *Lepisorus scolopendrina* and *Goniophlebium spp.* usually shed their fronds. On mossy tree branches or trunks can be seen a member of the Lomariopsidaceae, *Elaphoglossum malayense*. This species has somewhat succulent and light green sterile fronds, and acrostichoid fertile fronds. Its fronds do not shed and can be seen all year round. Among the terrestrial species *Asplenium normale*

and *Diacalpe aspidoides* are common. They usually occur in moist and shady areas and can be indicators of this forest type.

Grassland and secondary forest

Grassland and secondary forest were also found along highway number 3182. This vegetation type has previously been part of tropical rain forest and was disturbed during construction of the road to the summit of Khao Khiao. This forest type has open area with rather low air and soil humidity. These conditions are not favourable for most ferns and fern allies. Only 11 species of ferns and fern allies were observed, of these 6 species were confined to this vegetation (Appendix). However, it was surprising to find 3 members of the Ophioglossaceae, i.e. *Helminthostachys zeylanica*, *Ophioglossum gramineum* and *Ophioglossum petiolatum* in grassland. These species are terrestrials of semi-exposed areas, they often occur near the margin of tropical rain forest. So these ferns may be the remnant of tropical rain forest from the past. In the secondary forest the following species: *Pyrrosia piloselloides*, *Cheilanthes tenuifolia* and *Lygodium microphyllum* can be observed. In addition, some species can be found in both grassland and secondary forest: *Pteridium aquilinum* var. *yarrabense*, *Lygodium salicifolium*.

Some species of ferns and fern allies can be found in more than one vegetation type (Fig.4). Fourteen species such as *Huperzia squarrosa*, *Aglaomorpha coronans* and *Christella parasitica* can be found in both tropical rain forest and hill evergreen forest. *Lygodium salicifolium* can be found in tropical rain forest, grassland and secondary forest. *Lindsaea ensifolia* can be found in both hill evergreen forest and secondary forest. It was found that 4 species can be found in all forest types, viz. *Dicranopteris linearis* var. *linearis*., *Lycopodiella cernua*, *Pteridium aquilinum* subsp. *caudatum* var. *yarrabense* and *Selaginella siamensis*. These species also

have wide distribution throughout Thailand (Tagawa and Iwatsuki, 1979).

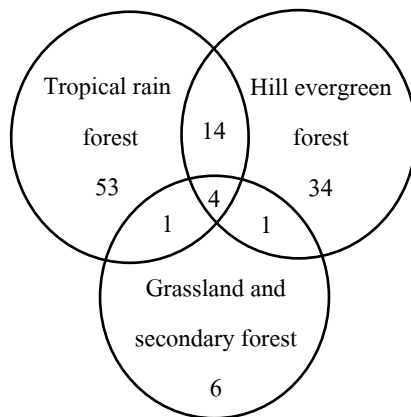


FIGURE 4. Diversity of ferns and fern allies in each vegetation

Rare species

Some species of ferns and fern allies were found in only small numbers, for example *Bolbitis virens* var. *virens*, *Tectaria laotica* and *Microsorium insigne* were found in tropical rain forest, and *Lindsaea hetrophylla* and *Taenitis blechnoides* were found in hill evergreen forest. While some species were found only once e.g *Bolbitis virens* var. *compacta*, *Diplazium esculentum*, *Dryopteris polita*, and *Dryopteris sparsa*.

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APPENDIX

List of the ferns and fern allies at Khao Khiao area in Khao Yai National Park.

Habit: Terrestrial herb = T, Epiphytic herb = E, Lithophytic herb = L

Habitat: Tropical rain forest = 1, Hill evergreen forest = 2, Grassland and secondary forest = 3

Abundance: R = rare, UC = uncommon, C = common, A = abundant

Taxon	Habit	Habitat & Abundance
Lycopodiaceae		
<i>Huperzia hamiltonii</i> (Spreng.) Trevis.	E	2, UC
<i>Huperzia phlegmaria</i> (L.) Rothm.	E	1, C
<i>Huperzia squarrosa</i> (G.Forst.) Trevis.	E	1, 2, UC
<i>Lycopodiella cernua</i> (L.) Pic.Serm.	T	1, 2, 3, A
Selaginellaceae		
<i>Selaginella biformis</i> A.Braun ex Kuhn	T	1, C
<i>Selaginella roxburghii</i> (Hook. & Grev.) Spring	T, L	2, C
<i>Selaginella siamensis</i> Hieron.	T	1, 2, 3, A
Psilotaceae		
<i>Psilotum nudum</i> (L.) P.Beauv.	E, L	1, 2, UC
Marattiaceae		
<i>Angiopteris evecta</i> (G.Forst.) Hoffm.	T	1, C
Ophioglossaceae		
<i>Helminthostachys zeylanica</i> (L.) Hook.	T	3, C
<i>Ophioglossum gramineum</i> Willd.	T	3, UC
<i>Ophioglossum petiolatum</i> Hook.	T	3, UC
Hymenophyllaceae		
<i>Crepidomanes latealatum</i> (Bosch) Copel.	L	1, UC
<i>Crepidomanes latemarginale</i> (Eaton) Copel.	E	1, UC
<i>Crepidomanes maximum</i> (Blume) K.Iwats	L	2, R
<i>Crepidomanes minutum</i> (Blume) K.Iwats	E	1, UC
<i>Hymenophyllum barbatum</i> (Bosch) Baker	E	1, UC
<i>Hymenophyllum exsertum</i> Wall. ex Hook.	E	2, C
<i>Hymenophyllum polyanthos</i> (Sw.) Sw.	E	2, C
<i>Trichomanes motleyi</i> Bosch	L	2, C

Taxon	Habit	Habitat & Abundance
Gleicheniaceae		
<i>Dicranopteris linearis</i> (Burm.f.) Underw. var. <i>linearis</i>	T	1, 2, 3, A
<i>Dicranopteris splendida</i> (Hand.-Mazz.) Tagawa	T	1, 2, A
<i>Gleichenia norrisii</i> Mett. ex Kuhn	T	2, A
Schizaeaceae		
<i>Lygodium microphyllum</i> (Cav.) R.Br.	T	3, C
<i>Lygodium polystachyum</i> Wall. ex T.Moore	T	1, UC
<i>Lygodium salicifolium</i> C.Presl.	T	1, 3, C
Dennstaedtiaceae		
<i>Microlepia herbacea</i> Ching & C.Chr. ex Tardieu & C.Chr.	T	1, C
<i>Pteridium aquilinum</i> (L.) Kuhn subsp. <i>caudatum</i> (L.) R.M.Tryon var. <i>yarrabense</i> Domin	T	1, 2, 3, A
Dicksoniaceae		
<i>Cibotium barometz</i> (L.) J.Sm.	T	1, C
Lindsaeaceae		
<i>Lindsaea chienii</i> Ching	T	2, UC
<i>Lindsaea ensifolia</i> Sw.	T	2, 3, C
<i>Lindsaea heterophylla</i> Dryand.	T	1, R
<i>Lindsaea lucida</i> Blume	T	1, UC
Cyatheaceae		
<i>Cyathea gigantea</i> (Wall. ex Hook.) Holttum	T	1, 2, UC
<i>Cyathea latebrosa</i> (Wall. ex Hook.) Copel.	T	1, 2, UC
Adiantaceae		
<i>Adiantum philippense</i> L.	L	1, A
<i>Cheilanthes pseudofarinosa</i> (Ching & S.K.Wu) K.Iwats.	T, L	1, UC
<i>Cheilanthes tenuifolia</i> (Burm.f.) Sw.	T	3, C
<i>Pityrogramma calomelanos</i> (L.) Link	T, L	1, 2, UC
<i>Taenitis blechnoides</i> (Willd.) Sw.	T	2, R
Pteridaceae		
<i>Pteris aspericaulis</i> Wall. ex J.Agardh	T	1, C
<i>Pteris biaurita</i> L.	T	1, C
<i>Pteris grevilleana</i> Wall. ex J.Agardh	T	1, UC
<i>Pteris vittata</i> L.	T	1, C
Vittariaceae		
<i>Antrophyum callifolium</i> Blume	E	1, UC
<i>Vittaria angustifolia</i> Blume	E	1, 2, UC
<i>Vittaria elongata</i> Sw.	E	1, 2, UC
<i>Vittaria flexuosa</i> Fée	E	1, 2, UC
Aspleniaceae		
<i>Asplenium apogamum</i> N.Murak. & Hatan.	E	1, C

Taxon	Habit	Habitat & Abundance
<i>Asplenium crinicaule</i> Hance	T, E	2, C
<i>Asplenium nidus</i> L. var. <i>nidus</i>	E	1, UC
<i>Asplenium normale</i> D.Don	T, E	2, A
<i>Asplenium yoshinagae</i> Makino	E, L	2, C
<i>Asplenium</i> sp.	E	1, UC
Blechnaceae		
<i>Blechnum orientale</i> L.	T	1, UC
Lomariopsidaceae		
<i>Bolbitis appendiculata</i> (Willd.) K.Iwats	T, L	1, UC
<i>Bolbitis heteroclita</i> (C.Presl.) Ching ex C.Chr.	T, E	1, A
<i>Bolbitis sinensis</i> (Baker) K.Iwats var. <i>sinensis</i>	L	2, A
<i>Bolbitis virens</i> (Wall. ex Hook. & Grev.) Schott var. <i>virens</i>	L	1, R
<i>Bolbitis virens</i> (Wall. ex Hook. & Grev.) Schott var. <i>compacta</i> Hennisman	L	1, R
<i>Elaphoglossum malayense</i> Holttum	E	2, UC
Woodsiaceae		
<i>Diplazium bantamense</i> Blume	T	1, UC
<i>Diplazium donianum</i> (Mett.) Tardieu	T	1, UC
<i>Diplazium esculentum</i> (Retz.) Sw.	T	1, R
<i>Diplazium simplicivenium</i> Holttum	T	1, UC
Dryopteridaceae		
<i>Arachniodes cavalerii</i> (Christ) Ohwi	T, L	2, UC
<i>Diacalpe aspidioides</i> Blume	T	2, C
<i>Dryopteris polita</i> Rosenst.	T	2, R
<i>Dryopteris sparsa</i> (D.Don) Kuntze	T	2, R
<i>Dryopteris subtriangularis</i> (C.Hope) C.Chr.	T	1, 2, C
<i>Heterogonium gurupahense</i> (C.Chr.) Holttum	T	1, UC
<i>Pleocnemia irregularis</i> (C.Presl) Holttum	T	1, UC
<i>Polystichum biaristatum</i> (Blume) T.Moore	T	2, UC
<i>Tectaria fauriei</i> Tagawa	T	1, UC
<i>Tectaria griffithii</i> (Baker) C.Chr.	T	1, UC
<i>Tectaria laotica</i> Tardieu & C.Chr.	T	1, UC
<i>Tectaria</i> sp.	T	2, UC
Thelypteridaceae		
<i>Amphineuron immersum</i> (Blume) Holttum	T	1, R
<i>Amphineuron terminans</i> (J.Sm.) Holttum	T	1, UC
<i>Christella appendiculata</i> (C.Presl) Holttum	T	1, UC
<i>Christella hispidula</i> (Decne) Holttum	T	1, UC
<i>Christella papilio</i> (C.Hope) Holttum	T	1, UC
<i>Christella parasitica</i> (L.) H.Lév.	T	1, 2, A
<i>Christella subelata</i> (Baker) Holttum	T	1, UC
<i>Christella subpubescens</i> (Blume) Holttum	T	1, UC

Taxon	Habit	Habitat & Abundance
<i>Macrothelypteris torresiana</i> (Gaudich.) Ching	T	1, UC
<i>Pneumatopteris truncata</i> (Poir.) Holttum	T	1, UC
<i>Pronephrium nudatum</i> (Roxb.) Holttum	T	1, C
<i>Pronephrium triphyllum</i> (Sw.) Holttum	T	1, C
<i>Trigonospora ciliata</i> (Wall. ex Benth.) Holttum	T, L	1, UC
Davalliaceae		
<i>Davallia embolostegia</i> Copel.	T	2, UC
<i>Davallia trichomanoides</i> Blume var. <i>trichomanoides</i>	E	1, 2, UC
<i>Humata repens</i> (L.f.) Diels	E, L	2, A
<i>Leucostegia immersa</i> (Wall. ex Hook.) C.Presl.	T, L	2, UC
Oleandraceae		
<i>Oleandra musifolia</i> (Blume) C.Presl.	E, L	2, A
Polypodiaceae		
<i>Aglaomorpha coronans</i> (Wall. ex Mett.) Copel.	E	1, 2, UC
<i>Belvisia annamensis</i> (C.Chr.) Tagawa	E	2, UC
<i>Belvisia henryi</i> (Hieron. ex. C.Chr.) Tagawa	E	2, UC
<i>Belvisia mucronata</i> (Fée) Copel.	E	1, 2, UC
<i>Crypsinus oxylobus</i> (Wall. ex Kunze) Sledge	T, E	2, UC
<i>Drynaria rigidula</i> (Sw.) Bedd.	E	1, UC
<i>Drynaria sparsisora</i> (Desv.) T.Moore	E	1, C
<i>Goniophlebium subauriculatum</i> (Blume) C.Presl	E	2, C
<i>Goniophlebium</i> sp.	T	2, UC
<i>Lepisorus scolopendrium</i> (Buch.-Ham. ex D.Don) Tagawa	E	2, C
<i>Loxogramme involuta</i> (D.Don) C.Presl.	E	1, UC
<i>Microsorium insigne</i> (Blume) Copel.	E, L	1, R
<i>Microsorium pteropus</i> (Blume) Copel.	L	1, C
<i>Microsorium punctatum</i> (L.) Copel.	E	1, C
<i>Phymatosorus nigrescens</i> (Blume) Pic.Serm.	T, E	1, UC
<i>Pyrrosia lingua</i> (Thunb.) Farw. var. <i>heteractis</i> (Mett. ex Kuhn) Hovenkamp	T, E	2, A
<i>Pyrrosia piloselloides</i> (L.) M.G.Price	E	3, UC
Grammitidaceae		
<i>Grammitis dorsipila</i> (Christ) C.Chr. & Tardieu	E	2, UC
<i>Prosaptia khasyana</i> (Hook.) C.Chr. & Tardieu	E	2, UC