

Flora of Izu Islands

1. Pteridophyta (2)⁽¹⁾

Yukio JOTANI* and Hideaki OHBA**

(With 1 Text-Figure)

伊豆諸島植物誌

1. シダ植物 (2)

常谷幸雄 大場秀章

Family Dennstaedtiaceae

Dennstaedtia BERNH.

1. Frond tripinnate, lamina triangular or ovate-triangular, more than 20 cm long, more than 15 cm wide.

2. *D. scabra*

1. Frond bipinnatifid to bipinnate, lamina lanceolate, 10–20 cm long, less than 10 cm wide.

1. *D. hirsuta*

1. **Dennstaedtia hirsuta** (Sw.) Mett., Ann. Lugd. Bat. 3: 181 (1867): Ohwi, 31 (1957): Tagawa, 49 et 199 (1959). *Microlepia pillosella* MOORE—Hayashi, Yasô 3: 35 (1937). *Fujiifilix pillosella* (Hook.) Nakai et Momose—Nishida, J. Jap. Bot. 31: 375 (1956).

Dry herbarium specimens: Isl. Ohshima (Y. Jotani, 1931 May JOT, F. & M. Kurihara and H. Ohba, 3599, 1967 Oct. TI etc.), Isl. Miyakejima (Y. Jotani, 1934 Aug. JOT) and Isl. Hachijojima (M. Nishida, 1956 Jul. CHIBA).

This species in Isl. Ohshima occurs on a windless bank situated on the edge of a pine forest.

In this genus, this species seems to probably occupy a rather derivative position, which may be thought as to be parallelly analogous to *Microlepia wilfordii* in the genus *Microlepia*, but the monotypic genus *Fujiifilix* Nakai et Momose based on this species seems to be not available as regards the characters examined.

2. **Dennstaedtia scabra** (Wall.) Moore, Ind. Fil. 307 (1861): Ohwi, 31 (1957): Tagawa, 48 et 199 (1959).

Dry herbarium specimens: Isl. Hachijojima (M. Yoshida, 1967 Jun. JOT).

This species seems to occur in a dense and mixed forest near the summit of Mt. Hachijo-Fuji (or Nishiyama). But, of this habitat we are not sure, as we have not observed by ourselves.

⁽¹⁾ Continued from n. 14, 42–61 (1968)

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Microlepia PRESL

1. Adaxial surface of costa densely hairy.
2. Frond pinnate.
2. Frond bipinnate.
1. Adaxial surface of costa glabrous, frond bipinnate.

1. *M. marginata*
2. *M. pseudo-strigosa*
3. *M. strigosa*

1. ***Microlepia marginata*** (PANZER) C, CHR., Ind. Fil. 212 (1905): Ohwi, 32 (1957): Tagawa, 50 et 232 (1959)—Hayashi, Yasô, 3: 35 (1937): Satomi & Maruyama, J. Geobot, 11: 91 (1962).

"*Microlepia marginalis* HANCE"—Koidzumi, Bot. Mag. Tokyo 26: 214 (1912).

Dry herbarium specimens: Isl. Ohshima (G. Koidzumi, 1912 Mar. TI, U. & M. Mizushima, 1950 Dec. TI, Y. Jotani, 1931 May JOT), Isl. Kousushima (JBL, 1966 Jul. JOT), Isl. Miyakejima (K. Hayashi, 1934 Nov. JOT) and Isl. Mikurajima (M. Takahashi, 1932 Oct. TI, Y. Jotani, 1934 Aug. JOT, JBL, 1967 Jul.-Aug. JOT, TI).

This species occurs especially on moderately light floors in planted *Cryptomeria* forests.

Specimens collected from Isl. Mikurajima are corresponding to var. *yakusimensis* H. ITO, in J. Jap. Bot. 18: 197 (1942), which densely bears lucid hairs on the adaxial surface of lamina, but to distinguish such variety may be meaningless because of the character that seems to be a matter of degree and more or less to be continuous.

2. ***Microlepia pseudo-strigosa*** MAKINO, Bot. Mag. Tokyo 28: 337 (1914): Tagawa, 50 et 232 (1959).

Dry herbarium specimen: Isl. Ohshima (H. Ohba, 868, 1964 Nov. TOFO).

This species, of which a young individual, was once collected occurs on the foot of a little cliff covered by evergreen trees.

This species is distributed as shown Fig. 2. The resembling pattern of distribution is known in some flowering plants. This species seems superficially very close to *M. marginata*

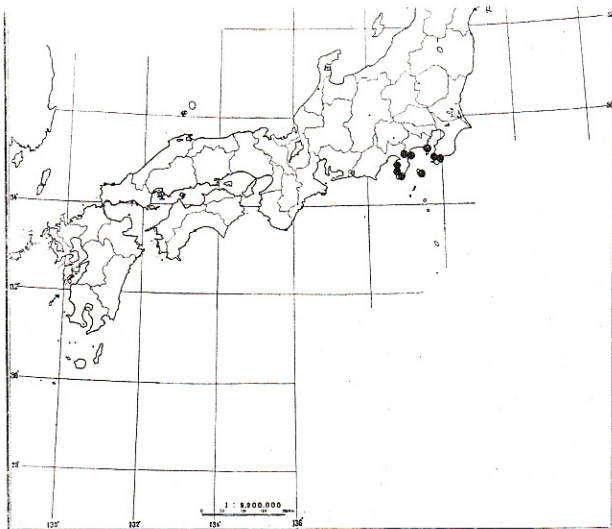


Fig. 2
Distribution map
of *Microlepia*
pseudo-strigosa.

var. *bipinnata*. Cytologically, although the basic chromosome number of this genus is 43, the number 160 which has been observed on this species in many of the root tip cells by Kurita (1963), may have been induced from a tetraploid species such as *M. marginata* having ca 170 chromosomes in a somatic cell. The relationship between *M. marginata* and *M. pseudo-strigosa* may be suggested by having dense hairs on the adaxial surface of costa in both species, and their habitats.

3. ***Microlepia strigosa* (THUNB.) PRESL**, Epim. Bot. 95 (1849): Ohwi, 32 (1957): Tagawa, 50 et 232 (1959)—Hayashi, Yasô 3: 35 (1937): Tuyama, Bot. Mag. Tokyo 52: 548 (1938); J. Jap. Bot. 14: 776 (1938): Mizushima, Misc. Rep. Res. Inst. Natur. Res. 38, 115 (1955).

Dry herbarium specimens: Isl. Kousushima (Y. Jotani, 1932 Aug. JOT, JBL, 1965 Jul. JOT), Isl. Miyakejima (Y. Jotani, 1932 Aug. JOT, 1934 Aug. JOT), Isl. Hachijojima (T. Senda, 1932 Mar. JOT, Y. Jotani, 1931 Aug. JOT, H. Ohba, 3350, 1967 Mar. TOFO, YCM), Isl. Aogashima (T. Tuyama, 1933 Jul. TI, M. Mizushima, 1954 Nov. TI, K. Yamanishi, 1959 Jul. JOT, Y. Jotani, 1958 Jul. JOT) and Isl. Torishima (K. Hisauchi, H. Ito *et al.*, 1930 Jul. TI, T. Tuyama, 1935 Nov. TI).

This species occurs on a sunny stone wall in Isl. Kousushima, while along paths, on clearings or in forests in Isl. Hachijojima. In Isl. Hachijojima, moreover, this species seems to be found related with certain volcanic units; i.e. it grows only on the basalt lavas and pyroclastic materials of the main cone of Mt. Hachijo-Fuji (or Mt. Nishiyama) volcano. The unit is one of the latest ones in this island and has been thought to belong to the age of Holocene, Quaternary.

Family Hypolepidaceae

***Hypolepis* BERNH.**

1. Lamina densely hairy with pluricellular mucilaginous hairs; sori marginal, protected by reflexed tooth.

2. *H. tenuifolia*

1. Lamina hairy; sori submarginal, unprotected.

1. *H. punctata*

1. ***Hypolepis punctata* (THUNB.) METT.**, Kuhn, Fil. Afric. 120 (1868): Ohwi, 36 (1957): Tagawa, 55 et 219 (1959)—Hayashi, Yasô 3: 35 (1937): Tuyama, Bot. Mag. Tokyo 52: 548 (1938): Satomi & Maruyama, J. Geobot. 11: 91 (1962).

Dry herbarium specimens: Isl. Ohshima (Y. Jotani, 1957 Jul. JOT), Isl. Nijijima (Y. Jotani, 1932 Nov. JOT), Isl. Kousushima (Y. Jotani, 1936 Jul. JOT, H. Ohba, 1965 Jul. JOT), Isl. Miyakejima (K. Hayashi, 1935 Jun. JOT), Isl. Mikurajima (Y. Jotani, 1934 Jul. JOT), Isl. Hachijojima (M. Takenaka, 1956 Aug. JOT), Isl. Aogashima (Y. Jotani, 1958 Jul. JOT) and Isl. Torishima (K. Hisauchi, H. Ito *et al.*, 1930 Jul. TI).

On clearings or beside forest-ravines this species has been collected.

2. ***Hypolepis tenuifolia* BERNH.**, Schrad. J. 1 (2): 34 (1806): C. Chr., Ind. Fil. 372 (1906)—Namekata & Kurata, Enum. Jap. Pter. 265 (1961): Satomi & Maruyama, J. Geobot. 11: 91 (1961).

H. alte-gracillima HAYATA: Tagawa, 55 et 219 (1959)—Satomi, J. Geobot. 9: 64 (1960).

Dry herbarium specimens: Isl. Mikurajima (M. Takahashi et T. Ogawa, 1960 Mar. TOFO JBL, 1967

Jul.-Aug. *JOT*).

This species was found on rocky riverain clearings.

Histiopteris J. SM.

1. **Histiopteris incisa** (THUNB.) J. SM., Hist. Fil. 295 (1875): Ohwi, 37 (1957): Tagawa, 56 et 218 (1959)—Jotani, J. Jap. Bot. **12**: 220 (1936): Hayashi, Yasô **3**: 35 (1937).

Dry herbarium specimens: **Isl. Miyakejima** (K. Hayashi, 1935 Jun. *JOT*) and **Isl. Hachijojima** (Y. Jotani, 1952 Jul. *JOT*, I. Hayashi, 1957 Jul. *JOT*).

Poor individuals have been collected on strongly sour grounds. Whether the behaviour of this species is to be regarded as a chemotropic adaptation or as a survival of the result of an interspecific competition is not certain. It is an interesting subject for ecology.

Pteridium Scopoli

1. **Pteridium aquilinum** (LINN.) var. **latiusculum** (DESV.) UND. ex HELLER, Cat. N. Amer. ed. 3, 17 (1909): Tryon, Rhodora **43**: 41 (1941): Ohwi, 37 (1957): Tagawa, 55 et 250 (1959)—Satomi & Maruyama, J. Geobot. **11**: 91 (1962): Ute & Naito, J. Geobot. **13**: 92 (1965). *P. aquilinum* (LINN.) KUHN—Koidzumi, Bot. Mag. Tokyo **26**: 214 (1912). *P. aquilinum* var. *japonicum* NAKAI—Hayashi, Yasô **3**: 36 (1937).

Selected dry herbarium specimens: **Isl. Ohshima** (Y. Jotani, 1930 Jul. *JOT*), **Isl. Toshima** (Y. Jotani, 1933 Jul. *JOT*), **Isl. Niijima** (Y. Jotani, 1932 Nov. *JOT*), **Isl. Kouzushima** (Y. Jotani, 1932 Aug. *JOT*, JBL, 1965 Jul. *JOT*), **Isl. Miyakejima** (Y. Jotani, 1934 Aug. *JOT*), **Isl. Mikurajima** (Y. Jotani, 1934 Aug. *JOT*), **Isl. Hachijojima** (H. Ito, 1930 Jul. *TI*, Y. Jotani, 1931 Aug. *JOT*) and **Isl. Aogashima** (Y. Jotani, 1958 Jul. *JOT*).

This species commonly occurs, but the population in each island is limited in numbers and in habitats. It grows especially on edges of forests, on old clearings or abandoned fields.

Family Pteridaceae

Pteris LINN.

1. Frond pinnate or bipinnatifid.
 2. Terminal pinna undivided.
 3. Frond bipinnatifid, pinnae of upper parts decurrent, having a few false-veins in mesophyll.
 5. *P. multifida*
 3. Frond pinnate, without false-veins in mesophyll.
 4. Apex of sterile pinna acute.
 2. *P. cretica* subsp. *nipponica*
 4. Apex of sterile pinna caudate or tapering.
 1. *P. cretica* subsp. *cretica*
 2. Terminal pinna pinnatifid.
 3. Pinnules entire, vein tips reach to margin.
 6. *P. quadriaurita*
 3. Pinnules not entire.
 4. Having spines on costal base of adaxial surface, lobes less than 4 mm wide.
 3. *P. dispar*

4. Without spine on costal base of adaxial surface, lobes more than 5 mm wide.

4. *P. excelsa*

1. Frond triparted, each part bipinnatifid, veins free.

7. *P. wallichiana*

1. ***Pteris cretica*** LINN., Mant. 130 (1767): Ohwi, 39 (1957): Tagawa, 58 et 250 (1959).

subsp. ***cretica***

—Hayashi, Yasô 3: 36 (1937): Satomi & Maruyama, J. Geobot. (Kanazawa) 11: 91 (1962).

Dry herbarium specimen: Isl. Miyakejima (K. Hayashi, 58, 1937 Nov. TI). Localities in other islands have been reported, e.g. Isl. Ohshima by Koidzumi (Bot. Mag. Tokyo 26: 213 (1912)), Isl. Mikurajima by Satomi & Maruyama, above cited, etc.

2. ***Pteris cretica*** LINN. subsp. ***nipponica*** (SHIEH) JOTANI et H. OHBA* *P. cretica* var. *albo-lineata* HOOK.: Ohwi, 39 (1957): Tagawa, 58 et 250 (1959)—Hayashi, Yasô 3: 36 (1937): Satomi & Maruyama, J. Geobot. 11: 91 (1962).

“*P. cretica*”—Koidzumi, Bot. Mag. Tokyo 26: 213 (1912).

Selected dry herbarium specimens: Isl. Ohshima (? 1887 Apr. TI, Y. Jotani 1931 May JOT), Isl. Toshima (Y. Jotani, 1933 Jul. JOT), Isl. Nijima (Y. Jotani, 1933 Jun. JOT), Isl. Miyakejima (K. Hayashi, 1937 Nov. TI, Y. Jotani, 1932 Aug. JOT), Isl. Mikurajima (M. Takahashi, 1932 Oct. TI, Y. Jotani, 1934 Jul. JOT, N. Satomi, 1962 Jul. TI, JBL, Jul.-Aug. 1968 TI etc) and Isl. Hachijojima (Y. Jotani, 1952 Jul. JOT, H. Ohba, 3270, 1967 Mar. TOFO).

This fern occurs along edges of forests, on old clearings in forests or forest-ravines. Several swarms are found in some islands, e.g. Isl. Mikurajima, but a few in others.

Tagawa (1959) has pointed out that so-called *Pteris cretica* var. *albo-lineata* might specifically be distinguishable from the var. *cretica*. Shieh (1966) newly described *Pteris nipponica* based on the acute apex of dark green pinnae which are occasionally variegated along the midrib. Though our examined materials, which include a large number of intermediate forms between *P. cretica* and *P. nipponica*, seem to be difficult to fit in such a distinct specific taxon, those diagnostic characters already mentioned by Shieh seem to indicate subspecific differences.

3. ***Pteris dispar*** KUNZE, Bot. Zeit 6: 539 (1848): Ohwi, 40 (1957): Tagawa, 58 et 250 (1959)—Satomi & Maruyama, J. Geobot. 11: 91 (1962).

“*P. quadriaurita*”—Hayashi, Yasô 3: 36 (1937).

Dry herbarium specimens: Isl. Ohshima (Y. Jotani, 1933 May JOT), Isl. Nijima (Y. Jotani, 1932 Nov. JOT), Isl. Shikinejima (Y. Jotani, 1933 Aug. JOT), Isl. Kousushima (Y. Jotani, 1932 Aug. JOT, JBL, 1965 Jul. JOT), Isl. Miyakejima (Y. Jotani, 1932 Aug. JOT), Isl. Mikurajima (JBL, 1967 Jul.-Aug. TI) and Isl. Hachijojima (T. Nakai, 1920 Jun. TI, Y. Jotani, 1931 Jan. JOT, H. Ohba, 3279, 1967 Mar. YCM, 3300, 1967 Mar. TOFO).

This species occurs in thickets, on the edge of forests or on shady banks. All the habitats

* ***Pteris cretica*** LINN. subsp. ***nipponica*** (SHIEH) JOTANI et H. OHBA, *stat. nov.*

Pteris nipponica SHIEH, Bot. Mag. Tokyo 79: 285 (1966).

P. cretica var. *albo-lineata* HOOK. sensu Tagawa, Col. Ill. Jap. Pterid. 58 (1959).

seem to be somewhat sunny and dry.

4. *Pteris excelsa* GAUD., Freyc. Voy. Bot. 388 (1827): Shieh, Bot. Mag. Tokyo 79: 289 (1966).

P. inaequalis BAK. var. *aequata* (MIQ.) TAGAWA: Ohwi, 41 (1957): Tagawa, 59 et 250 (1959).

Dry herbarium specimen: Isl. Toshima (Y. Ando, 1968 Jul. JOT, TI).

This species occurs on the floor of planted *Cryptomeria*-forest in the crater of the summit of Isl. Toshima.

5. *Pteris multifida* POIR., Enc. V, 714 (1804): Ohwi, 39 (1957): Tagawa, 58 et 251 (1959)—Hayashi, Yasô 3: 36 (1937).

Dry herbarium specimens: Isl. Ohshima (Y. Jotani, 1927 Mar, 1935 Sept. JOT). Reported from Isl. Miyakejima (Hayashi).

6. *Pteris quadriaurita* RETZ., Observ. Bot. 6: 38 (1791): Hook., Sp. Fil. 2: 179 (1852): Ohwi, 40 (1957).

P. fauriei Hieron.: Tagawa, 59 et 250 (1959)—Hieronymus, Hedwingia 55: 345 (1914): Mizushima, Mis. Rep. Res. Inst. Natur. Res. 38, 115 (1955), 41 2, 77 (1956): Satomi & Maruyama, J. Geobot. 11: 91 (1962).

P. hachijoensis Nakai, nom. nud.—Hayashi, Yasô 3: 36 (1937): Tuyama, Bot. Mag. Tokyo 52: 548 (1938); J. Jap. Bot. 14: 776 (1938).

Selected dry herbarium specimens: Isl. Ohshima (Y. Jotani, 1963 Nov. JOT), Isl. Toshima (Y. Jotani, 1957 Jul. JOT), Isl. Nijima (Y. Jotani, 1932 Nov. JOT), Isl. Kouzushima (Y. Jotani, 1932 Aug. JOT, JBL, 1965 Jul. JOT, H. Ohba 1965 Dec. TI), Isl. Miyakejima (Y. Jotani, 1932 Aug. JOT, K. Hayashi, 1935 Feb. TNS, ?, 1887 May TI), Isl. Mikurajima (M. Takahashi, 1932 Oct. TI, Y. Jotani, 1934 Jul. JOT, JBL, 1967 Jul.-Aug. TI etc.), Isl. Hachijojima (? 1887 May TI, H. Ito, 1930 Jul. TI, M. Ogata, 1921 TI, T. Tuyama 1933 Jul. TI, Y. Jotani, 1930 Dec. JOT, H. Ohba, 3263, 1967 Mar. YCM, 3271, TOFO, 3276, 3287 TI), Isl. Hachijoko-jima (Y. Jotani, 1958 Jul. JOT), Isl. Aogashima (N. Matsuzaki, 1920 Jun. TI, S. Yamaguchi, 1930 Aug. TI, T. Tuyama, 1933 Jul. TI, M. Mizushima, 1954 Nov. TI, Y. Jotani, 1958 Jul. JOT) and Isl. Torishima (K. Hisauchi, H. Ito et al., 1930 Jul. TI, T. Tuyama, 1935 Nov. TI, Y. Jotani, 1961 Apr. JOT).

This species occurs at in moderately light and moist places, especially on forest floors, old clearings and along edges of forests near seashores.

Hieronymus (1914) and Copeland (1952) newly described a large number of species which are regarded as being closely allied to *Pteris quadriaurita*. *P. quadriaurita*, at the first, was described in 1791 by Retzius based on a specimen collected in Ceylon by König, and then, it has been regarded as polymorphic in the tropics of both Old and New World.

This species examined in our botanized area seems to accord with *Pteris fauriei* Hieron., in splitting sense, which is based on specimens collected from Formosa, Amoy and Japan in which our Isl. Hachijojima (i.e. insula Hadjidjo, originally) is included, and the materials of ours can be described as follows.

Rhizome stout, short, oblique, covered with a mass of densely brown-hairy roots; *scales* light brown, lanceolate, 5 mm long, less than 1 mm wide at the base, with pale edges; *stipes*

40–60 cm long, rufo-stramineous on the lower part, and often dorsal, drying stramineous upwards, scaly at base only; *lamina* deltoidovate, chartaceous, glabrous on both surfaces, 30–45 cm long, 20–40 cm wide; *rachis* usually drying stramineous; *pinnæ* 3–5 pairs, the basal ones much the largest, with 1 or 2 additional pinnules on lower side of costa, shortly decurrent base, subsessile, the middle ones 15–20 cm long, 2–5 cm wide, pinnatifid nearly down to costa into 20–30 pairs of linear-subfalcate, obtuse; *lobes* under the caudate apex, entire, 2–4 cm long, less than 6 mm wide at base, with 10–15 pairs of 2-forked and very prominent veinlets; *veinlets* submarginal; with one stout spine at the base of the adaxial surface of costules; *sori* continuous from near the sinus up to almost apex; *pseudoindusia* membranaceous, gray, entire.

In our materials, some seem to be alike to the specimens collected from the Bonin Islands. The allied species in the islands has been also regarded as *P. fauriei* HIERON. by Shieh (1966). But some specimens cannot be clearly distinguishable from the Pacific allied one which seems to be probably identified with *P. macracantha* COEPL., and in some cases both the species seem to be continuous. Also, *P. fauriei* seems to rarely make somewhat intermediate forms with one of allied splitted species, e.g. *P. natiensis* TAGAWA or *P. kiuschiuensis* HIERON. in Southern Kyushu, Japan.

The systematics of the allied species of *P. quadriaurita* by Hieronymus and Copeland have been based on characters in details to be observed only in herbarium specimens. The critical studies to be concerned with those diagnostic characters have not been made, as yet. Recently Walker (1958) pointed out, in his experimental studies of the group of *P. quadriaurita* in Ceylon, that in many species which are superficially very much alike, differences exist in such fundamental characters as the level of polyploidy, the type of breeding system, the features of spores and the details of the juvenile plants and that they can be correlated with relatively small but constant features on dried specimens. Moreover, Walker (1962), Kurita (1962) and Mitui (1966) cytologically studied the allied species of *P. quadriaurita* in Japan; i.e. *P. fauriei*, $n = ca\ 87$, $2n = 87$ apogamous, triploid (Walker), and $n = 87$, apogamous (Mitui), *P. kiuschiuensis*, $2n = 87$ apogamous, triploid (Walker), and $n = 58$, $2n = 58$, diploid (Kurita), *P. setulosocostulata*, $n = 87$, apogamous, triploid (Mitui). Those chromosome numbers seem to suggest that those representatives would be the polyploids of Ceylonese *P. quadriaurita*, *sen. strict.*, showing $n = 29$ and $2n = 58$.

Though Walker has recommended that the name *P. quadriaurita* should not in future be used in any sense other than that of *Retzius sens. strict.* and that other names should be found for the very numerous superficially similar species in other parts of the world, we cannot, at present, adopt the splitting species of *P. quadriaurita*, *sen. lat.* such as *P. fauriei*, because much more comparative studies of cytological and experimental taxonomy would be required to justify the further splitting species.

7. *Pteris wallichiana* AGARDH, Rec. Sp. Gen. Pter. 69 (1839): Ohwi, 41 (1957): Tagawa, 60 et 251 (1959)—Hayashi, Yasô 3: 36 (1937): Tuyama, J. Jap. Bot. 14: 776 (1938).

P. wallichiana var. *magna* TAGAWA—Mizushima, Mis. Rep. Res. Inst. Natur. Res. 38, 115; 41.2, 77 (1956), Satomi & Maruyama, J. Geobot. 11: 91 (1962).

Dry herbarium specimens: Isl. Kouzushima (Y. Jotani, 1936 Jul. JOT, H. Ohba, 2031, 1965 Jul. TI), Isl. Miyakejima (Y. Jotani, 1934 Aug. JOT), Isl. Mikurajima (Y. Jotani, 1934 Aug. JOT, JBL, 1967 Jul.-Aug. JOT), Isl. Hachijojima (M. Ogata, 1921 Sept. TI, T. Senda, 1931 Mar. JOT, H. Ohba, 3344, 1967 Mar. TI, TOFO) and Isl. Aogashima (T. Tuyama, 1933 Jul. TI, S. Yamaguchi, 1930 Aug. TI, N. Matsuzaki, 1920 Jun. TI, K. Asanuma, 1956 Oct. JOT, Y. Jotani, 1958 Jul. JOT). Reported from Isl. Hachijo-ko-jima (Yokoyama (1952)).

This species which we observed occurs in moderately sunny old clearings near villages or in forests.

Uncertain species.

Pteris kleiniana PRESL—Christ, Warburg's Monsunia I: 70 (1900).

Christ has cited the specimens from Isl. Hachijojima (i.e. Insel Hadjidjo, originally). Christensen treated it as a synonym of *Pteris geminata* WALL. in his Index Filicum.

References of the family Pteridaceae

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 ——— 1962: Cytology and Evolution in the fern genus *Pteris* L., *Evolution* 16: 27-43.

Family Adiantaceae

Adiantum LINN.

1. Frond pedately branching.
 3. *A. pedatum*
1. Frond 2 or more compound.
 2. Lamina bipinnate; pinnules deeply cleft, thin; sori usually more than 2 in each pinnule.
 1. *A. capillus-veneris*
 2. Lamina 3- or 4-pinnate; pinnules obcuneate, rather firm; sori at the bottom of deep marginal notches, usually one.
 2. *A. monochlamys*

1. *Adiantum capillus-veneris* LINN., Sp. Pl. 2: 1096 (1753): Ohwi, 46 (1957): Tagawa, 65 et 174 (1959)—Hayashi, Yasô 3: 34 (1937): Mizushima, Misc. Rep. Res. Inst. Natur. Res. 38, 114 (1955): Satomi & Maruyama, J. Geobot. 11: 91 (1962).

Dry herbarium specimens: Isl. Miyakejima (K. Hayashi, 1932 Aug. JOT, 1934 Aug. TNS, 1936 Aug. TNS, Y. Jotani, 1932 Aug. JOT, 1937 Aug. JOT, TNS, I. Sasaki, 1937 Feb. TI), Isl. Hachijojima (? 1887 May, TI, S. Okubo, 1887 May TI, M. Shirai, (1887 May) TI, Y. Jotani, 1931 Jan. JOT, TNS, J. Ohwi & N.

Maruyama, 1949 May *TNS*, M. Ogata, 1921 Sept. *TI*, M. Hutoh, 5845, 1952 May *TNS*, H. Ohba, 3318, 1967 May *TI*, *TOFO*, *YCM*) and *Isl. Aogashima* (M. Mizushima, 1954 Nov. *TI*, K. Yamanishi, 1959 Jul. *JOT*). Reported from *Isl. Mikurajima* (Satomi & Maruyama).

This species occurs especially on windless little cliffs or cavern walls.

2. *Adiantum monochlamys* EAT., Proc. Amer. Acad. 4: 110 (1858): Ohwi, 46 (1957): Tagawa, 65 et 174 (1959).

Dry herbarium specimen: *Isl. Ohshima* (K. Naito, 1960 Nov. *JOT* 28943).

Rare. On rocks?

3. *Adiantum pedatum* LINN., Sp. Pl. 2: 1095 (1753): Ohwi, 48 (1957): Tagawa, 66 et 174 (1959)—Koidzumi, Bot. Mag. Tokyo 26: 214 (1912) Hayashi, Yasô 3: 34 (1937).

Dry herbarium specimens: *Isl. Ohshima* (M. Shirai, 1887 Apr. *TNS*) and *Isl. Miyakejima* (N. Toda, 1934 Aug. *JOT*).

In Japan, Adiantoid ferns including such Japanese species are often cultivated. Therefore, the bad specimen collected in *Isl. Miyakejima* is not sure to be native.

Coniogramme FÉE

1. Pinnæ and pinnules usually oblong-lanceolate, short -caudate; lateral veinlets almost free, one or twice forked in parallel, terminated below the marginal cartilaginous teeth.

1. *C. intermedia*

1. Pinnæ and pinnules usually lanceolate; lateral veinlets almost anastomosing, ending submargin.

2. *C. japonica*

1. *Coniogramme intermedia* HIERON., Hedwig. 57: 301 (1916): Tagawa, 61 et 191 (1959)—Satomi & Maruyama, J. Geobot. 11: 91 (1962).

"*C. fraxinea* (DON) DIELS"—Hayashi, Yasô 3: 34 (1937).

C. fraxinea var. *intermedia* (HIERN.) C. CHR.: Ohwi, 42 (1957).

Dry herbarium specimens: *Isl. Ohshima* (Y. Jotani, 1957 Jul. *JOT*, H. Ohba, 867, 1967 Nov. *TI*), *Isl. Toshima* (Y. Jotani, 1933 Jul. *TNS*, *JOT*), *Isl. Miyakejima* (K. Hayashi, 1934 Aug. *JOT*), *Isl. Mikurajima* (JBL, 1967 Jul.-Aug. *TI*, *JOT*) and *Isl. Hachijojima* (Y. Jotani, 1952 Jul. *JOT*, H. Ohba, 3360, 1967 Mar. *TOFO*).

This species occurs especially on moist humus-rich floors in planted *Cryptomeria* forests.

This species resembles true *Coniogramma fraxinea* from the Himalayas, which differs from our species by having entire pinnæ of still larger size and much thicker texture.

Such a form in our species which is distinguished by the presence of hairs on the abaxial surface of the lamina and has been named var. *villosa* CHING, seems to be too insignificant to justify in taxonomy because the character is more or less continuous.

2. *Coniogramme japonica* (THUNB.) DIELS, in Engl. et Prantl, Nat. Pfl. Fam. 1 (4): 262 (1899): Ohwi, 42 (1957): Tagawa, 61 et 191 (1959).

Notogramme japonica PRESL—Hayashi, Yasô 3: 36 (1937).

Dry herbarium specimens: *Isl. Ohshima* (Y. Jotani, 1931 Sept. *TNS*, *JOT*), *Isl. Kouzushima* (Y. Jotani, 1932 Aug. *TNS*, *JOT*, H. Ohba, 1965 Dec. *JOT*), *Isl. Miyakejima* (Y. Jotani, 1934 Aug. *TNS*, *JOT*) and *Isl. Hachijojima* (M. Yoshida, 1967 Jul. *JOT*).

Onychium KAULF.

1. **Onychium japonicum** (THUNB.) Kunze, Bot. Zeit. **1848**: 507 (1848): Ohwi, *45* (1957): Tagawa, *68 et 236* (1959).

—Christ, Warburg's Monsunia **I**: 68 (1900): Hayashi, Yasô **3**: 36 (1937): Tuyama, J. Jap. Bot. **14**: 776 (1938): Mizushima, Misc. Rep. Res. Inst. Natur. Res. **38**, *115* (1955): Satomi & Maruyama, J. Geobot. **11**: 91 (1962): Ute & Naito, J. Geobot. **13**: 92 (1965).

Selected dry herbarium specimens: **Isl. Ohshima** (Y. Jotani, 1930 Aug. *JOT*), **Isl. Toshima** (Y. Jotani, 1933 Jul. *JOT*), **Isl. Nijijima** (?), 1887 Apr. *TI*, Y. Jotani, 1932 Nov. *JOT*), **Isl. Shikinejima** (Y. Jotani, 1933 Aug. *JOT*), **Isl. Kouzushima** (Y. Jotani, 1932 Aug. *JOT*), **Isl. Miyakejima** (Y. Jotani, 1932 Aug. *JOT*), **Isl. Mikurajima** (M. Takahashi, 1932 Oct. *TI*, T. Jotani, 1934 Jul. *JOT*, JBL, 1967 Jul.-Aug. *TI etc.*), **Isl. Hachijojima** (H. Ito, 1930 Jul. *TI*, Y. Jotani, 1930 Dec. *JOT*, H. Ohba, *333I*, 1967 Mar. *TOFO*) and **Isl. Aogashima** (S. Yamaguchi, 1930 Aug. *TI*, Y. Jotani, 1958 Jul. *JOT*). Reported from Isl. Hachijo-ko-jima (Yokoyama (1952)).

This species occurs on moderately light floors in forests, on banks or on edges of forests.

Family Vittariaceae**Vittaria SM.**

1. **Vittaria flexuosa** FÉE, 3t Mém. Foug. *16* (1851): Ohwi, *162* (1957): Tagawa, *169 et 260* (1959)—Satomi & Maruyama, J. Geobot. **11**: 93 (1962): Ute & Naito, J. Geobot. **13**: 93 (1965).

V. japonica MIQ.—Hayashi, Yasô **3**: 37 (1937).

“*V. elongata* Sw.”—Christ, Warburg's Monsunia **I**: 57 (1900).

Selected dry herbarium specimens: **Isl. Toshima** (Y. Jotani, 1933 Jul. *JOT*), **Isl. Kouzushima** (Y. Jotani, 1933 Jul. *JOT*, H. Ohba, 1966 Jul. *JOT*), **Isl. Miyakejima** (Y. Jotani, 1932 Aug. *JOT*), **Isl. Mikurajima** (M. Takahashi, 1932 Oct. *TI*, Y. Jotani, 1934 Jul. *JOT*, JBL, 1967 Jul.-Aug. *TI, JOT*) and **Isl. Hachijojima** (?), 1887 May *TI*, H. Ito, 1930 Jul. *TI*, T. Tuyama, 1936 Mar. *TI*, Y. Jotani, 1952 Jul. *JOT*).

This species occurs on mossy tree-trunks or humus-rich rocks in shady forests.

Family Lindsaeaceae**Lindsaea DRYAND.**

1. Frond simply pinnate with dimidiate pinnae.
 2. Stipe more than 3 cm long, usually 6–12 cm long, stramineous or brownish, lamina 10–20 cm long or more, 1.5–3.5 cm wide, pinnae not obliquely triangular, sori interrupted into coenosori terminating 2–4 veinlets.

3. *L. odorata*

2. Stipe 2–3 cm long, castaneous, lamina 3–7 cm long, 1–1.5 cm wide, pinnae obliquely triangular, sori usually continuous along the whole upper side.

2. *L. japonica*

1. Frond bipinnate or rarely pinnate with pinnae not dimidiate, the upper ones gradually reduced.

1. *L. cambodgensis*

1. **Lindsaea cambodgensis** CHRIST, Not. Syst. **1**: 58 (1909): Kramer, Blumea **15**: 563 (1967).

L. chienii CHING; Tagawa, 53 et 226 (1959)—Satomi & Maruyama, J. Geobot. **11**: 91 (1962).
L. orbiculata (LAM.) METT. var. *chienii* (CHING) OHWI, 35 (1957).

Dry herbarium specimens: Isl. Kousushima (? 1887 May TI, Y. Jotani, 1932 Aug. JOT, H. Ohba, 2040 1965 Jul. TI), Isl. Nijima (H. Kurihara, 1938 Apr. JOT), Isl. Mikurajima (Y. Jotani, 1934 Jul. JOT, JBL, 1967 TI etc.), Isl. Hachijojima (? 1887 May TI, H. Ito, 1930 Jul. TI, T. Ohba, 1931 JOT, H. Ohba, 3207, 1967 Mar. TOFO) and Isl. Aogashima (T. Tuyama, 1933 Jul. TI).

This species occurs on rather dry and humus-rich forest floors.

This species was previously called *L. tenera* DRYAND. and the adoption of the name follows Kramer (1967). In 1937, Tagawa has reported this species as to be *L. chienii* CHING which was based on the specimen of South China. But any particular differences between *L. cambodgensis* and *L. chienii* cannot be observed in our herbarium materials examined, and the differences in details ought to be referable to individual variations. A more detailed observation of those allied species is necessary before one can make a more definite taxonomic conclusion.

In the genus *Lindsaea*, any common species are not found between the Izu Islands and the Bonin Islands. In the former, three species cited here are recognizable, while in the latter, only a species, i.e. *L. repanda* KUNZE, Bot. Zeit **1848**: 541 (1848), is represented.

2. *Lindsaea japonica* (BAK.) DIELS, in Engl. et Prantl. Nat. Pfl.-fam. **1**: 221 (1899): Tagawa, Acta Phytotax. Geobot. **6**: 27 (1937); 53 et 226 (1959): Ohwi, 35 (1957).

Dry herbarium specimens: Isl. Hachijojima (H. Ohba, 3278, 1967 Mar. TI, YCM, 3302, 3268 TOFO).

This small fern occurs on rocks in or beside forest-ravines at less than 100 m in altitude. The behaviour of the altitudinal distribution seems to be distinctly different from *L. odorata*.

3. *Lindsaea odorata* ROXB., Calc. J. **4**: 551 (1844): Kramer, Blumea **15**: 567 (1967).

L. cultrata auct. omn. poster., non (WILLD.) SW.: Ohwi, 34 (1957): Tagawa, 53 et 226 (1959).

Dry herbarium specimens: Isl. Hachijojima (? 1887 May TI, A. Yamamoto, 1930 Jul. TI, T. Tuyama, 1933 Jul. TI, H. Ito, 1930 Jul. TI, Y. Jotani, 1936 Apr. JOT, H. Ohba, 3235, 1967 Mar. TI, YCM, 3374, TI, TOFO).

This species in this island occurs on moist cliffy banks about 300 m in altitude.

Sphenomeris MAXON

1. Lamina thick, coriaceous, lucid, light green, ovate to triangularly ovate, rhizoma scales lanceolate with a suddenly broadened pleriseriate base, consisting of thin walled cells in 4 to 6 rows near the base, 2 to 3 rows in the middle.

1. *S. chinensis* subsp. *biflora*

1. Lamina oblong-lanceolate or ovate-lanceolate, usually chartaceous, non lucidly green, rhizoma scales linear, consisting of 2 to 3 (4) rows of cells near the base.

2. *S. chinensis* subsp. *chinensis*

1. Sphenomeris chinensis (LINN.) MAXON subsp. **biflora** (KAULF.) JOTANI et H. OHBA*

* *Sphenomeris chinensis* (LINN.) subsp. *biflora* (KAULF.) JOTANI et H. OHBA, stat. nov.
Davallia biflora KAULF., Enum. 221 (1824).

Sphenomeris biflora TAGAWA, J. Jap. Bot. **33**: 203 (1958).

Stenoloma littorale TAGAWA, Acta Phytotax. Geobot. **6**: 225 (1937).

Sp. chinensis (LINN.) MAXON var. *littoralis* (TAGAWA) OHWI, 36 (1957).

Sp. biflora TAGAWA: Satomi & Maruyama, J. Geobot. **11**: 91 (1962): Ute & Naito, *ibid.* **13**: 92 (1965).

Sp. chusana var. *littoralis* (TAGAWA) H. ITO ex MIZUSHIMA—Mizushima, Misc. Rep. Res. Inst. Natur. Res. 38, 115 (1955); 41.2, 78 (1956).

Stenoloma littorale TAGAWA—Tuyama, Bot. Mag. Tokyo **52**: 550 (1938).

St. chusana var. *littorale* H. ITO ex TUYAMA—Tuyama, J. Jap. Bot. **14**: 776 (1938).

“*St. chusana* (LINN.) CHING”—Hayashi, Yasô **3**: 37 (1937),

“*Lindsaya tenuifolia* (Sw.)”—Christ, Warburg’s Monsunia **I**: 85 (1900), *pro. parte*.

Selected dry herbarium specimens: **Isl. Ohshima** (M. Mizushima, 1950 Aug. *TI*, Y. Jotani, 1958 Apr. *JOT*, H. Ohba, 844, 1964 Nov. *TNS*, 878, *TI*, 869, *TOFO*, *et al.* 3607, 1967 Oct. *TI* etc.), **Isl. Toshima** (Y. Jotani, 1933 Jul. *JOT*, 1957 Jul. *JOT*), **Isl. Shikinejima** (Y. Jotani, 1933 Aug. *JOT*), **Isl. Koushijima** (Y. Jotani, 1936 Jul. *JOT*, H. Ohba, 2024, 1965 Jul. *TI*, 2076, 1965 Dec. *TI*), **Isl. Miyakejima** (Y. Jotani, 1932 Aug. *JOT*, K. Hayashi, 1935 Oct. *JOT*, N. Satomi, 22345, 1963 Oct. *TI*), **Isl. Mikurajima** (M. Takahashi, 1932 Oct. *TI*, JBL, 1967 Jul.-Aug. *TI* etc.), **Isl. Hachiojima** (Y. Jotani, 1931 Jan. *JOT*, H. Ito, 1930 Jul. *TI*, T. Tuyama, 1933 Jul. *TI*, S. Akiyama, *TI*, T. Nakai, 1920 Jun. *TI*, H. Ohba, 3307, 1967 Mar. *TOFO*), **Isl. Aogashima** (N. Matsuzaki, 1920 Jun. *TI*, S. Yamaguchi, 1930 Aug. *TI*, M. Mizushima, 1954 Nov. *TI*, Y. Jotani, 1958 Jul. *JOT*) and **Isl. Torishima** (K. Hisauchi, H. Ito *et al.*, 1930 Jul. *TI*, T. Tuyama, 1935 Nov. *TI*, Y. Jotani, 1961 Apr. *JOT*).

This littoral fern occurs especially on sunny banks along paths or cliffs near seashores.

Sphenomeris chinensis is a widespread and very variable species. Especially the variation of the fronds, which was already noted by Holttum (1954), is considerable. This subspecies, which is newly proposed by us, mainly occurs in littoral regions and it sometimes closely resemble the subsp. *chinensis*. The differences in some details mentioned by Tagawa (1937 and 1959) and Kramer (1967), i.e. rhizoma scales and the size of spores, and moreover, the differences of juvenile fronds seem to be available for the intraspecific distinction. According to Kurita and Nishida (1963), both species (i.e. both subspecies in the present paper) ought to be apparently distinguished from each other on the view-points of their cytology. However it would be desirable to supplement the result with more data from other materials.

2. *Sphenomeris chinensis* (LINN.) MAXON subsp. *chinensis* (LINN.), J. Washington Acad. Sci. **3: 144 (1913): Ohwi, 36 (1957): Kramer, Blumea **15**: 572 (1967).**

Sp. chusana (LINN.) COPEL.: Tagawa, 54 et 257 (1959)—Mizushima, Misc. Rep. Res. Inst. Natur. Res. 38, 115 (1955); 41.2, 78 (1956): Satomi & Maruyama, J. Geobot. **11**: 91 (1962): Ute & Naito, *ibid.* **13**: 92 (1965).

Odontosoria chinensis KUHN var. *tenuifolia* (SW.) MAKINO—Koidzumi, Bot. Mag. Tokyo **26**: 213 (1912).

Stenoloma chusana CHING var. *tenuifolia* NEMOTO—Hayashi, Yasô **3**: 37 (1937).

Lindsaya tenuifolia (Sw.)—Christ, Warburg’s Monsunia **I**: 85 (1900), *pro. parte*.

Selected dry herbarium specimens: **Isl. Ohshima** (G. Koidzumi, 1912 Mar. *TI*, Y. Jotani, 1932 Jun. *JOT*, H. Ohba, 850, 1964 Nov. *TNS*, *TI*, 3611, 1967 Oct. *TI* etc.), **Isl. Toshima** (Y. Jotani, 1933 Jul. *JOT*, 1957 Jul.

JOT), Isl. Niijima (Y. Jotani, 1932 Nov. *JOT*), Isl. Shikinejima (Y. Jotani, 1933 Aug. *JOT*), Isl. Kouzushima (Y. Jotani, 1932 Aug. *JOT*), Isl. Miyakejima (K. Hayashi, 1935 Feb. *JOT*), Isl. Mikurajima (Y. Jotani, 1934 Aug. *JOT*, JBL, 1967 Jul.-Aug. *TI* etc.), Isl. Hachijojima (Y. Jotani, 1930 Dec. *JOT*, H. Ohba, 3392, 1967 Mar. *TOFO*, *YCM*) and Isl. Aogashima (M. Mizushima, 1954 Nov. *TI*, K. Asanuma, 1956 Oct. *JOT*). Reported from Isl. Hachijo-ko-jima (Yokoyama (1952)).

This fern occurs in forests, on banks along paths, cliffs or on stone walls.

The size and form of fronds are very variable due to the influence of the habitat.

References of the family Lindsaeaceae

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- 1937: The Genus *Stenoloma* of Japan. *Acta Phytotax. Geobot.* 6: 224-228.