

## Hymenophyllaceae (Pteridophytes) of Vanuatu

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Hymenophyllaceae is one of the most diversified fern families in the southern Hemisphere. In Vanuatu, this family was well studied by Braithwaite (1975a) morphologically as well as cytologically, nevertheless, species growing there have not so far been enumerated. In this study, all of the known species in Vanuatu are enumerated with their specimens collected by the current expeditions and deposited in the herbaria, K, P and BM. Consequently, 28 species, including some possibly new records to Vanuatu, are recognized. They are provisionally indicated bigeneric names *Hymenophyllum* and *Trichomanes*.

### KEY TO SPECIES

- 1a. Involucre bivalvate [*Hymenophyllum s. l.*]  
 2a. Abaxial side of rachis glabrous  
 3a. Margin of segment entire  
 4a. Involucre broader than long  
   5a. Wings of rachis less than 2 mm broad .....1. *H. imbricatum*  
   5b. Wings of rachis more than 2 mm broad .....2. *H. bamlerianum*  
 4b. Involucre longer than broad  
   6a. Rhizome densely covered with yellowish hair .....3. *H. flabellatum*  
   6b. Rhizome nearly glabrous  
     7a. Lips of involucre serrate .....4. *H. javanicum*  
     7b. Lips of involucre entire  
       8a. Segments rather sparingly beset .....5. *H. angulosum*  
       8b. Segments rather densely beset .....6. *H. polyanthos*  
 3b. Margin of segment serrate  
   9a. Receptacle extruding from lips .....7. *H. multifidum*  
   9b. Receptacle included in lips .....4. *H. javanicum*  
 2b. Abaxial side of rachis hairy  
 10a. Involucre ovate .....8. *H. subdimidiatum*  
 10b. Involucre slightly campanulate  
   11a. Frond bipinnatifid .....9. *H. affine*  
   11b. Frond tripinnatifid .....10. *H. serrulatum*

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- 1b. Involucre tubular [*Trichomanes s.l.*]
- 12a. Rhizome erect, fronds clustered
- 13a. Fronds pinnatifid .....11. *T. atrovirens*
- 13b. Fronds bipinnatifid to quadripinnatifid
- 14a. Stipe with reddish multicellular hair .....12. *T. apiifolium*
- 14b. Stipe with blackish hair .....13. *T. dentatum*
- 12b. Rhizome long creeping, fronds usually remote (rather close in *T. asae-grayi*)
- 15a. Lamina cells nearly absent .....14. *T. asae-grayi*
- 15b. Lamina cells exist
- 16a. Frond more than 20 cm long
- 17a. Abortive fronds occur on rhizome .....16. *T. aphlebioides*
- 17b. No abortive fronds on rhizome
- 18a. Stipe approximately as long as lamina .....17. *T. maximum*
- 18b. Stipe shorter than lamina .....15. *T. flavo-fuscum*
- 16b. Frond less than 20 cm long
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- 19a. Rhizome densely covered with blackish hair. Root often absent
- 20a. False veinlets absent in frond
- 21a. Marginal cells of lamina elongate
- 22a. Marginal cell-row single
- 23a. Frond irregularly pinnate with proliferous frond .....18. *T. minutum*
- 23b. Frond narrowly lanceolate .....19. *T. endlicherianum*
- 22b. Marginal cell-row double .....20. *T. humile*
- 21b. Marginal cells of lamina not elongate
- 24a. Frond flabellate to pinnate .....18. *T. minutum*
- 24b. Frond simple to digitate .....25. *T. vitiense*
- 20b. False veinlets present in frond
- 25a. Frond pinnately divided .....21. *T. bipunctatum*
- 25b. Frond simple or lobed
- 26a. Submarginal false veinlets present .....22. *T. bimarginatum*
- 26b. Submarginal false veinlets absent .....23. *T. tahitense*
- 19b. Rhizome sparsely covered with light-colored hair. Root present
- 27a. Frond graucous .....24. *T. pallidum*
- 27b. Frond not graucous
- 28a. Marginal hair of frond all single .....26. *T. digitatum*
- 28b. Marginal hair of frond single or forked
- 29a. Lamina usually 5-10 cm long. Lips of involucre glabrous .....27. *T. tomaniense*
- 29b. Lamina smaller, usually 2-3 cm long. Lips of involucre sometimes ciliate  
.....28. *T. aff. cuneatum*

**1. *Hymenophyllum imbricatum* Blume**

(= *Mecodium imbricatum* (Blume) Copel.)

Distribution: Malesia to Polynesia throughout

BANKS ISLANDS: *J. Palmer 11* [K] (Dec-1884).

- ESPIRITU SANTO: *Braithwaite RSNH 2389* [K P] (02-Sep-1971/Mt. Tabwemasana, 5800 ft. alt.), *Iwashina 3052 & 3079b* [TNS] (07-Nov-1996/Between Nokovula and top of Mt. Tabwemasana, on the north ridge of Mt. Tabwemasana, 1600 m alt.), *Iwashina 3174* [TNS] (21-Nov-1996/Between 1st Camp and 2nd Camp, east ridge of Mt. Vutimele, 800 m alt.), *Matsumoto 183 & 187* [TNS] (16-Oct-1997/2nd Camp to Mt. Vutimena, 700–1370 m alt.), *Matsumoto 335* [TNS] (23-Oct-1997/Butmas, ca. 500 m alt.), *Sugimura 00-1114* [TNS] (01-Nov-2000/Between 2nd Camp and top of Mt. Tabwemasana, on the north ridge of Mt. Tabwemasana, 1670 m alt.), *Matsumoto 01-725* [TNS] (23-Oct-2001/Around 2nd Camp (Nokovula), Mt. Tabwemasana range, 1600–1800 m alt.), *Matsumoto 01-758* [TNS] (23-Oct-2001/Nokovula to top of Mt. Tabwemasana, 1070–1350 m alt.).
- EFATE: *Braithwaite RSNH 2044* [K] (05-Jul-1971/Unnamed hill, north of Trig point above Narabut Camp, 1600 ft. alt.).
- ANATOM: *Fraser 745* [K], *Milne 312* [K] (Nov-1853), *Macgillivray 51* [P] (Dec-1858/Mountain Heads), *A. Morrison 86 p. p.* [K] (16-Jun-1896), *A. Morrison 85* [K] (06-Jun-1896/Hills between Ishumu and Anelgauhat), *J. Raynel and M. Schmid RSNH 16124* [K P] (21-Jul-1971/Crête du Nezwon Netounemla, 600 m alt.), *Braithwaite RSNH 2155* [K] (23-Jul-1971/Ridge between Waptiabo and Nezwon Nelgo, south end of Nezwon Nelgo, 2200 ft. alt.).
- Not Located: *Fraser s. n.* [P], *J. W. Pherson 210* [P] (1892).

## 2. *Hymenophyllum bamlerianum* Rosenst.

(= *Mecodium bamlerianum* (Rosenst.) A. F. Braithw.)

Distribution: New Guinea, Solomon Islands and Vanuatu

ESPIRITU SANTO: *Braithwaite RSNH 2400* [K] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4250 ft. alt.), *Sugimura 00-1094* [TNS] (01-Nov-2000/Between 2nd Camp and top of Mt. Tabwemasana, on the north ridge of Mt. Tabwemasana, 1420 m alt.).

Note: This species resembles the previous, and is characterized by its broad, and waved wings of rachis.

## 3. *Hymenophyllum flabellatum* Labill.

(= *Mecodium flabellatum* (Labill.) Copel.)

Distribution: Oceania throughout, excluding New Caledonia

ESPIRITU SANTO: *Braithwaite RSNH 2404* [K P] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4250 ft. alt.), *Iwashina 3200* [TNS] (22-Nov-1996/2nd Camp, east ridge of Mt. Vutimele, 1100 m alt.), *Iwashina 3220* [TNS] (23-Nov-1996/Between 2nd Camp and top of Mt. Vutimele, east ridge of Mt. Vutimele, 1500 m alt.), *Matsumoto 189 & 193* [TNS] (16-Oct-1997/2nd Camp to Mt. Vutimena, 700–1370 m alt.), *Matsumoto 236* [TNS] (18-Oct-1997/ibid., 540–1050 m alt.).

ANATOM: *Aubert de la Rue s. n.* [P] (Aug-1934/Pres du volcan actif, 600–700 m alt.), *Braithwaite RSNH 2132* [K P] (21-Jul-1971/South slopes of Inrero, Southern ridge, 2450 ft. alt.).

Not Located: *Fraser 10905* [P].

## 4. *Hymenophyllum javanicum* A. Spreng.

(= *Mecodium javanicum* (A. Spreng.) Copel.)

-*Hymenophyllum samoense* Baker

Distribution: Asia to Polynesia throughout

ANATOM: *A. Morrison 76* [K] (16-Jun-1896).

Note: This is widely distributed from Malesia to Polynesia, but so far not known from Vanuatu. The specimen *A. Morrison 76*, formerly identified as *H. emarginatum*, undoubtedly belongs to *H. javanicum* - *H. samoense* group. *H. samoense* is generally distinguished from the former by less crisped frond and slightly serrate margin. They are however often hardly distinguishable from each other and two types of frond characterizing the two different species are occasionally found in a sheet of specimen, therefore both of them are placed under *H. javanicum* here.

##### 5. *Hymenophyllum angulosum* Christ

(= *Mecodium angulosum* (Christ) Copel.)

-*Hymenophyllum treubii* Racib. sensu Braithwaite (1969, 1975a)

Distribution: Malesia, Solomon Islands and Vanuatu

ESPIRITU SANTO: *Braithwaite RSNH 2401 & 2409* [K] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4250 ft. alt.).

Note: *H. angulosum* and *H. treubii*, both being described from Malesia region, have quite similar forms of frond. The specimens from Vanuatu have square involucre with crenate lips, and such a soral structure is a characteristic of the latter species.

##### 6. *Hymenophyllum polyanthos* (Sw.) Sw.

(= *Mecodium polyanthos* (Sw.) Copel.)

Distribution: Tropical-subtropical areas of all over the world

ESPIRITU SANTO: *Braithwaite RSNH 2390* [K] (02-Sep-1971/Mt. Tabwemasana, 5800 ft. alt.), *Braithwaite RSNH 2442* [K] (06-Sep-1971/Apouna Valley, 2800 ft. alt.), *Iwashina 3048* [TNS] (07-Nov-1996/Between Nokovula and top of Mt. Tabwemasana, 1600 m alt.), *Matsumoto 238 & 263* [TNS] (18-Oct-1997/2nd Camp to Mt. Vutimena, 540–1050 m alt.), *Sugimura 00-1028* [TNS] (24-Oct-2000/Butmas, in lowland forest, 530 m alt.), *Matsumoto 01-721* [TNS] (23-Oct-2001/Nokovula to Mt. Tabwemasana, 1600–1800 m alt.).

ERROMANGO: *L. Bernardi 13363* p. p. [K] (from 08 to 15-Jun-1968/Ad pedes arborum, in nemore montis Wablo, 600–650 m alt.).

ANATOM: *Ingdis (& Finelair) ? s. n.* [K], *S. F. Kajewski 868* [K] (05-Mar-1929/Anelgauhat Bay, 2500 ft. alt.), *Braithwaite RSNH 2131* [K] (21-Jul-1971/south slopes of Inrero, southern ridge, 2450 ft. alt.).

Not Located: *Fraser s. n.* [P].

Note: This is a quite polymorphic species extending wide area, and there seems to be several forms even within Vanuatu.

##### 7. *Hymenophyllum multifidum* (G. Forst.) Sw.

(= *Meringium multifidum* (G. Forst.) Copel.)

-*Hymenophyllum howense* Brownlie

Distribution: New Zealand, Lord Howe Island, Vanuatu and Fiji

ESPIRITU SANTO: *Braithwaite RSNH 2402* [K] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4250 ft. alt.), *Iwashina 3048b* [TNS] (07-Nov-1996/Between Nokovula and top of Mt. Tabwemasana, 1600 m alt.), *Iwashina 3222* [TNS] (23-Nov-1996/Between 2nd Camp and top of Mt. Vutimele, east ridge of Mt. Vutimele, 1500 m alt.), *Matsumoto 186 & 192* [TNS] (16-Oct-1997/2nd Camp to Mt.

Vutimena, 700–1370 m alt.), *Matsumoto 263b* [TNS] (18-Oct-1997/2nd Camp to Mt. Vutimena, 540–1050 m alt.).

EFATE: *Braithwaite RSNH 2043a* [K] (05-Jul-1971/Unnamed hill, north of Trig point above Narabut Camp, 1600 ft. alt.).

ANATOM: *Braithwaite RSNH 2130* [K] (21-Jul-1971/South slopes of Inrero, southern ridge, 2450 ft. alt.).

Note: Though this species had been known only from New Zealand, Braithwaite (1975a) pointed out that his collections from Vanuatu were well matched with *H. multifidum*, not only from morphological view-point but also from cytological one. Our molecular data (Ebihara *et al.*, unpublished) also support their close relationship.

### 8. *Hymenophyllum subdimidiatum* Rosenst.

-*Hymenophyllum pseudotunbridgense* Watts

Distribution: Australia (Queensland), New Caledonia, Vanuatu and Fiji

ESPIRITU SANTO: *Braithwaite RSNH 2403* [K] (04-Sep-197/Mt. Tabwemasana northeast slopes, 4250 ft. alt.), *Matsumoto 191* [TNS] (16-Oct-1997/2nd camp to Mt. Vutimena, 700–1370 m alt.), *Sugimura 4133* [TNS] (16-Oct-1997/Mt. Vutimena, 1340 m alt.).

Note: These collections from Vanuatu was formerly called *H. pseudotunbridgense* (Brownlie 1960, Braithwaite 1975a) and said to be ranged from Vanuatu to Fiji, while *H. subdimidiatum* was said to be ranged Australia and New Caledonia. We could not see any particular differences between them, and thus it seems an appropriate treatment that *H. pseudotunbridgense* synonymize to *H. subdimidiatum* by Bostock and Spokes (1998). As a result, *H. subdimidiatum* shows a continuous distribution from Eastern Australia to Fiji.

### 9. *Hymenophyllum affine* Brack.

-*Hymenophyllum macgillvrayi* (Baker) Copel.

Distribution: Vanuatu and Fiji

ESPIRITU SANTO: *Matsumoto 263c* [TNS] (18-Oct-1997/2nd Camp to Mt. Vutimena, 540–1050 m alt.).

Note: This species is distinguished from *H. subdimidiatum* with its campanulate involucre and more shallowly lobed pinna. This collection may be the first record from Vanuatu.

### 10. *Hymenophyllum serrulatum* (C. Presl) C. Chr.

-*Meringium meyenianum* C. Presl

Distribution: Peninsular Thailand, Malesia and Vanuatu

EFATE: *Braithwaite RSNH 2027* [K P] (03-Jul-1971/North of Trig point above Narabut Camp, 1300 ft. alt.), *Braithwaite RSNH 2043* [K P] (05-Aug-1971/Unnamed hill, north of Trig point above Narabut Camp, 1600 ft. alt.).

ERROMANGO: *L. Bernardi 13363* p. p. [K] (from 08 to 15-Jun-1968/Ad pedes arborum, in nemore montis Wablo, 600–650 m alt.), *Braithwaite RSNH 2240* [K P] (04-Aug-1971/Nouankau River, west of Ipota, 600 ft. alt.), *Braithwaite RSNH 2253* [K P] (05-Aug-1971/17 km west of Ipota, 1500 ft. alt.), *Braithwaite RSNH 2291* [K] (08-Aug-1971/Nouankau River, ca. 17 km west of Ipota, 460 ft. alt.), *P. Curry 622* [K] (14-Aug-1992/13 km west of Port Narvin, beside logging trail to Dillons Bay, 200 m alt.).

ANATOM: *L. Bernardi* 12970A [K] (05-May-1968/Anawounamaloper semitam ad rivum Inwa Lelgey, 10–180 m alt.), *RSNH 2094 & 2094a* [K] (20-Jul-1971/South slopes of Inrero, 1350 ft. alt.).

Note: Braithwaite (1975a) identified these specimens as *Meringium holochilum* (Bosch) Copel. (= *Hymenophyllum holochilum* (Bosch) H. Christ). Though their chromosome number,  $n = 21$ , strongly suggest that they should be members of “*H. acanthoides* clade” (*Meringium* and its allies; cf. Ebihara *et al.* 2002), their features hardly correspond to Asiatic *H. holochilum*. These complexes around New Guinea region still need further study.

### 11. *Trichomanes atrovirens* Kunze

(= *Cephalomanes atrovirens* (Kunze) C. Presl)

-*Trichomanes boryanum* Kunze

Distribution: Malesia to Polynesia throughout

BANKS ISLANDS: *J. Palmer* 22 [K] (Dec-1884).

VANUA LAVA: *S. F. Kajewski* 461 [K] (12-Jul-1928/400 m alt.).

ESPIRITU SANTO: *Matsumoto* 126 [TNS] (15-Oct-1997/Along Pialapa River, 1st Camp to 2nd Camp, 220–540 m alt.), *Sugimura* 4112 [TNS] (15-Oct-1997/Along Pialapa River, between 1st Camp and 2nd Camp, 500 m alt.), *Matsumoto* 223 & 256 [TNS] (18-Oct-1997/2nd camp to Mt. Vutimena, 540–1050 m alt.).

PENTECOST: *P. Cabalion* 2595 [K] (28-Sep-1984/Emkul, 550 ft. alt.).

EFATE: *F. Mitchell* 230 & *Poms* 3852 [K] (03-May-1926/Near Vila, 200–500 ft. alt.), *Braithwaite RSNH 2051* [K] (05-Jul-1971/Unnamed hill, north of Trig Point above Narabut Camp, 1500 ft. alt.).

ERROMANGO: *Braithwaite RSNH 2234* [K] (04-Aug-1971/Nouankau River, 17 km west of Ipotia, 600 m alt.), *P. Curry* 625 & 636 [K] (14-Aug-1992/*Calophyllum* forest, 13 km west of Port Narvin, beside logging trail to Dillons Bay, 200 m alt.).

ANATOM: *C. Moore s. n.* [K], *Milne* 315 [K] (Nov-1853), *Macgillivray* 897 [K] (Nov-1853), *G. Y. Veitch s. n.* [K] (Feb-1867), *D. A. Morrison* 75 [K] (16-Jun-1896), *S. F. Kajewski* 883 [K] (07-Mar-1929/Anelgauhat Bay, 500 ft. alt.), *L. Bernardi* 12966 [K] (05-May-1968/Viciniarius Anawounamalo per semitam ad rivum Inwa Lelgey, 10–180 m alt.), *Braithwaite RSNH 2096* [K] (20-Jul-1971/South slopes of Inrero, 1350 ft. alt.).

Note: *T. boryanum*, which is widely distributed in the Pacific area, had been distinguished from its close ally, *T. atrovirens* by shape of involucre; *T. boryanum* has “conspicuously” dilated mouth, while *T. atrovirens* has “slightly” dilated one. Iwatsuki (1991) treated *T. boryanum* as *Cephalomanes atrovirens* subsp. *boryanum*. Here, *T. boryanum* is provisionally reduced under *T. atrovirens*, because they are often indistinguishable from each other, even in Vanuatu. From the cytological viewpoint, Braithwaite (1975b) revealed that “*T. boryanum*” is tetraploid in contrast to its Malesian counterpart *T. javanicum*, which is diploid.

### 12. *Trichomanes apiifolium* C. Presl

(= *Callistopteris apiifolia* (C. Presl) Copel.)

Distribution: Southeast Asia to Samoa

BANKS ISLANDS: *J. Palmer* 16 [K] (Dec-1884).

ESPIRITU SANTO: *Braithwaite RSNH 2407* [K] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4200 ft. alt.), *Iwashina* 3173 [TNS] (21-Nov-1996/Between 1st Camp and 2nd Camp, east ridge of Mt.

Vutimele, 800 m alt.), *Iwashina* 3253 [TNS] (26-Nov-1996/Between 2nd Camp and 1st Camp, east ridge of Mt. Vutimele, 900 m alt.), *Matsumoto* 147, 172 & 195 [TNS] (16-Oct-1997/2nd camp to Mt. Vutimena, 700–1370 m alt.), *Matsumoto* 247 & 261 [TNS] (18-Oct-1997/Ibid., 540–1050 m alt.), *Sugimura* 4162 [TNS] (18-Oct-1997/2nd camp to Mt. Vutimena, 870 m alt.).

ERROMANGO: *A. Morrison* 68 [K] (22-Jul-1896/Cook's Bay).

TANNA: *S. F. Kajewski* 164 [K] (15-Mar-1928/Mt. Tokosh Meru, 800 m alt.), *L. Bernardi* 13125 [K] (22-May-1968/In Silva Montana, 500–950 m alt.), *J. Raynal RSNH* 16198 [K] (29-Jul-1971/Cote SE, colline de Simrap au NW d'Itapoua, 700 m alt.).

ANATOM: *C. Moore* 31 [K], *Milne* 319 [K] (Nov-1853/Canjined to Highground), *Macgillvray* 36 [K] (Feb-1859/Mountain Noods), *A. Morrison* 73 [K] (16-Jun-1896), *S. F. Kajewski* 864 [K] (05-Mar-1929/Anelghauhat Bay, 2000 ft. alt.), *Braithwaite RSNH* 2124 [K] (21-Jul-1971/South slopes of Inrero, Southern ridge, 2700 ft. alt.), *Matsumoto* 01-908 [TNS] (05-Nov-2001/Between Anelghowhat and Mt. Ukapaerek, 170–180 m alt.).

Not Located: *R. Moundes* (cult at K) [K] (Mt. Pomase, ca. 762 m alt.).

### 13. *Trichomanes dentatum* Bosch

(= *Selenodesmium dentatum* (Bosch) Copel.)

-*Trichomanes caespifrons* C. Chr. sensu Brownlie (1977)

Distribution: Solomon Islands, New Caledonia to Tahiti

ESPIRITU SANTO: *Braithwaite RSNH* 2108 [K] (20-Jul-1971/South slopes of Inrero, 1150 ft. alt.), *Braithwaite RSNH* 2408 [K] (04-Sep-1971/Mt. Tabwemasana northeast slope, 4200 ft. alt.), *Iwashina* 3226 [TNS] (23-Nov-1996/Between 2nd camp and top of Mt. Vutimele, east ridge of Mt. Vutimele, 1300 m alt.), *Matsumoto* 148 [TNS] (16-Oct-1997/2nd camp to Mt. Vutimena, 700–1370 m alt.), *Sugimura* 4154 [TNS] (18-Oct-1997/Ibid., 700 m alt.), *Matsumoto* 01-778 [TNS] (25-Oct-2001/Nokovula, Mt. Tabwemasana range, 1070 m alt.).

EFATE: *Iwashina* 00-118 [TNS] (14-Nov-2000/Forari Demonstration Forest Area, east Efate, 300 m alt.).

ERROMANGO: *A. Morrison* 70 [K] (20-Jul-1896/Fraisor's Head), *Braithwaite RSNH* 2229 [K] (04-Aug-1971/Nouankau River, 17 km west of Ipota, 600 ft. alt.), *P. Curry* 624, 634 & 637 [K] (14-Aug-1992/*Calophyllum* forest, 13 km west of Port Narvin, beside logging trail to Dillons Bay, 200 m alt.).

TANNA: *Braithwaite RSNH* 2205 [K] (28-Jul-1971/Mt. Toukosmeru, west slopes, 3000 ft. alt.).

ANATOM: *T. Moore?* 37 [K], *Macgillvray s. n.* [K] (1854), *Milne* 322 [K] (1855), *A. Morrison* 69 [K] (16-Jun-1896), *Matsumoto* 01-912 [TNS] (05-Nov-2001/Between Anelghowhat and Mt. Ukapaerek, 170–180 m alt.).

Note: In the former report of this expedition (Matsumoto *et al.* 1998), some Vanuatu specimens having rather curled segments were identified as *T. caespifrons* following Brownlie (1977). In fact, the type collection of *T. caespifrons* is dwarf plants, which do not seem identical with *T. caespifrons* sensu Brownlie (1977). It is therefore inappropriate to apply the name of *T. caespifrons* to Vanuatu species even if *T. dentatum* in a broader sense should a species complex.

### 14. *Trichomanes asae-grayi* Bosch

(= *Macroglena asae-grayi* (Bosch) Copel.)

-*Trichomanes meifolium* Bory p. p.

Distribution: Solomon Islands, New Caledonia, Vanuatu, Fiji and Samoa

ESPIRITU SANTO: *Iwashina* 3227 [TNS] (23-Nov-1996/Between 2nd Camp and top of Mt. Vutimele, east ridge of Mt. Vutimele, 1200 m alt.), *Matsumoto* 190 & 202 [TNS] (16-Oct-1997/2nd camp to Mt. Vutimena, 700–1370 m alt.), *Sugimura* 4134 [TNS] (16-Oct-1997/Mt. Vutimena, 1340 m alt.).

ANATOM: *Macgillvray s. n.* [K], *A. Morrison* 74 [K] (30-Jun-1896/Summit of peak, south of Ithumu, 2250 ft. alt.), *S. F. Kajewski* 867 [K] (05-Mar-1929/Anelgauhat Bay, 2500 ft. alt.), *Braithwaite RSNH* 2125 [K] (21-Jul-1971/South slopes of Inrero, Southern ridge, 2700 ft. alt.).

Note: In Vanuatu, this is easily recognizable with lacked lamina cells. More careful study may clarify relationship between this species and *T. meifolium*, which extends from Mascarene Islands to Malesia.

### 15. *Trichomanes flavo-fuscum* Bosch

(= *Macroglena flavo-fusca* (Bosch) Copel.)

Distribution: New Caledonia and Vanuatu

ERROMANGO: *A. Morrison* 71 [K] (20-Jul-1896/Fraisor's Head), *Braithwaite RSNH* 2254 [K] (05-Aug-1971/17 km west of Ipota, 1500 ft. alt.).

ANATOM: *Braithwaite RSNH* 2126 [K] (21-Jul-1971/South slopes of Inrero, southern ridge, 2700 ft. alt.).

Note: According to Brownlie (1969), this species was endemic to New Caledonia. Actually the features of the specimens from Vanuatu rather show correspondence to *T. flavo-fuscum* than to *T. caudatum*. In general, these species abundantly occur on tree-fern trunks in their range, but apparently only a few specimens have been collected in Vanuatu.

### 16. *Trichomanes aphlebioides* Christ

(= *Vandenboschia aphlebioides* (Christ) Copel.)

Distribution: Southeast Asia to Fiji

BANKS ISLANDS; VANUA LAVA: *S. F. Kajewski* 454 [K] (12-Jul-1928).

GAUA: *G. Douray* 941 [K] (10-Dec-1986/Bord du Lac "Letes").

ESPIRITU SANTO: *Matsumoto* 351 [TNS] (23-Oct-1997/Butmas, ca. 500 m alt.).

### 17. *Trichomanes maximum* Blume

(= *Vandenboschia maxima* (Blume) Copel.)

Distribution: Southeast Asia to Polynesia throughout

ESPIRITU SANTO: *Braithwaite RSNH* 2406 [K] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4200 ft. alt.), *Matsumoto* 258 [TNS] (18-Oct-1997/2nd camp to Mt. Vutimena, 540–1050 m alt.).

ANATOM: *A. Morrison* 72 [K] (26-Jun-1896/Hills between Anelgauhat and Anumei), *Braithwaite RSNH* 2092 [K] (20-Jul-1971/South slopes of Inrero, 1250 ft. alt.).

### 18. *Trichomanes minutum* Blume

(= *Gonocormus minutus* (Blume) Bosch)

-*Trichomanes proliferum* Blume

-*Trichomanes saxifragoides* C. Presl

-*Trichomanes assimile* Mett.

Distribution: Paleotropics throughout

BANKS ISLANDS: *J. Palmer 24* [K] (Dec-1884).

ESPIRITU SANTO: *Braithwaite RSNH 2346* [K] (29-Aug-1971/Apouna Valley, Camp 2, 480 ft. alt.), *Braithwaite RSNH 2352* [K] (31-Aug-1971/Apouna Valley, Camp 3, 1000 ft. alt.), *Braithwaite RSNH 2405* [K P] (04-Sep-1971/Mt. Tabwemasana northeast slopes, 4200 ft. alt.), *Braithwaite RSNH 2444* [K] (06-Sep-1971/Apouna Valley, 2600 ft. alt.), *Iwashina 3030 & 3034* [TNS] (06-Nov-1996/Nokovula, Mt. Tabwemasana range, 1070 m alt.), *Matsumoto 194b* [TNS] (16-Oct-1997/2nd Camp to Mt. Vutimena, 700–1370 m alt.), *Matsumoto 01-649* [TNS] (20-Oct-2001/Camp 1 to Nokovula, Mt. Tabwemasana range, 970 m alt.), *Matsumoto 01-681* [TNS] (21-Oct-2001/Around 2nd Camp (Nokovula), Mt. Tabwemasana range, 1000–1070 m alt.), *Matsumoto 01-811-2* [TNS] (25-Oct-2001/Nokovula to Camp 1, Mt. Tabwemasana range, 600–800 m alt.).

ERROMANGO: *Braithwaite RSNH 2241* [K] (04-Aug-1971/Nouankau River, 17 km west of Ipotia, 600 ft. alt.).

ANATOM: *Macgillvray 53* [BM] (Feb-1860/Mount Noods), *A. Morrison 84* [K] (16-Jun-1896), *Matsumoto 01-932 & 01-958* [TNS] (05-Nov-2001/Between Anelghowhat and Mt. Ukapaerek, 180–200 m alt.).

Note: *Gonocormus* group is one of the most chaotic complexes in Hymenophyllaceae. Here, all of them are provisionally under one species *T. minutum* (cf. Yoroi and Iwatsuki 1977, Iwatsuki 1985). This “species” in Vanuatu is including several forms so-called *T. saxifragoides*, *T. proliferum* and *T. assimile*. Since some collections (*Macgillvray 53*, *Braithwaite RSNH 2405* and *Matsumoto 194b*) have exceptionally elongate marginal cells in frond, they have been misidentified as *T. endlicherianum*.

### 19. *Trichomanes endlicherianum* C. Presl

(= *Crepidopteris endlicheriana* (C. Presl) Copel.)

Distribution: Oceania throughout

ESPIRITU SANTO: *Iwashina 3187* [TNS] (22-Nov-1996/2nd camp, Mt. Vutimele east ridge, 1100 m alt.).

Note: Some collections formerly assigned to this species are actually a form of *T. minutum*. *Iwashina 3187* could be the first record of this species in Vanuatu.

### 20. *Trichomanes humile* G. Forst.

(= *Crepidopteris humilis* (G. Forst.) Copel.)

Distribution: Southeast Asia to Polynesia throughout

ESPIRITU SANTO: *H. S. McKee RSNH 24124* [K] (27-Aug-1971/Big Bay (Malao), 5 m alt.), *Matsumoto 59* [TNS] (08-Oct-1997/Point No.2, east of Butmas, 300 m alt.), *Sugimura 4068* [TNS] (08-Oct-1997/Tanafo to Matantas, edge of forest, 270 m alt.), *Sugimura 00-1161 & 00-1163* [TNS] (07-Nov-2000/Siketket, 300 m alt.), *Matsumoto 01-648* [TNS] (20-Oct-2001/Camp 1 to Nokovula, Mt. Tabwemasana range, 970 m alt.), *Matsumoto 01-871b* [TNS] (30-Oct-2001/Santo Forest Research Station, 150 m alt.).

EFATE: *J. S. Raynel & P. S. Green RSNH 16018* [K P] (02-Jul-1971/Côte N, crête corallienne au S du camp de Narabut, 600 m alt.), *Braithwaite RSNH 2066* [K] (06-Jul-1971/Narabut, Undine Bay, ca. 900 ft. alt.).

**21. *Trichomanes bipunctatum* Poir.**

(= *Crepidomanes bipunctatum* (Poir.) Copel.)

Distribution: Madagascar, Mascarene Islands, Malesia to Polynesia throughout

ESPIRITU SANTO: *Braithwaite RSNH 2325* [K] (26-Aug-1971/Apouna River, just below Camp 2, 460 ft. alt.), *Braithwaite RSNH 4521* [K] (27-Aug-1971/Big Bay, tribe de Malao), *Sugimura 00-1160* [TNS] (07-Nov-2000/Siketket, 300 m alt.), *Matsumoto 01-811* [TNS] (25-Oct-2001/Nokovula to Camp 1, Mt. Tabwemasana range, 600–800 m alt.), *Matsumoto 01-871a* [TNS] (30-Oct-2001/Santo Forest Research Station, 150 m alt.).

EFATE: *P. S. Green RSNH 16017* [K] (02-Jul-1971/Côte N, crête corallienne au S du camp de Narabut, 600 m alt.), *Braithwaite RSNH 2013* [K] (02-Jul-1971/Road from Harris plantation, Undine Bay, up to Narabut, 900 ft. alt.), *Iwashina 00-117* [TNS] (14-Nov-2000/Forari Demonstration Forest Area, east Efate, 300 m alt.).

ANATOM: *C. Moore 34* [K], *A. Morrison 86 p. p.* [K] (16-Jul-1896), *Matsumoto 01-955* [TNS] (05-Nov-2001/Anelghowhat to Mt. Ukapaerek, 180–200 m alt.).

**22. *Trichomanes bimarginatum* Bosch**

(= *Microgonium bimarginatum* (Bosch) Bosch)

Distribution: Asia to Samoa throughout

ESPIRITU SANTO: *Matsumoto 01-820* [TNS] (28-Oct-2001/Butmas, 550 m alt.).

Note: The above listed collection by the current expedition is possibly the first record of this species in Vanuatu.

**23. *Trichomanes tahitense* Nadeau**

(= *Microgonium tahitense* (Nadeau) Tindale)

Distribution: Southeast Asia to Polynesia throughout

ESPIRITU SANTO: *Braithwaite RSNH 2328* [K] (27-Aug-1971/Apouna Valley, 1700 ft. alt.), *Sugimura 4067* [TNS] (08-Oct-1997/Tanafo to Matantas, edge of forest, 270 m alt.), *Sugimura 4107* [TNS] (15-Oct-1997/Along Pialapa River, 1st Camp to 2nd Camp, 250 m alt.), *Matsumoto 346* [TNS] (23-Oct-1997/Butmas, ca. 500 m alt.), *Matsumoto 01-809* [TNS] (25-Oct-2001/Nokovula to Camp 1, Mt. Tabwemasana range, 600–800 m alt.), *Matsumoto 01-842* [TNS] (28-Oct-2001/East of Butmas, 280 m alt.).

**24. *Trichomanes pallidum* Blume**

(= *Pleuromanes pallidum* (Blume) C. Presl)

Distribution: Asia to Polynesia throughout

ESPIRITU SANTO: *Matsumoto 237* [TNS] (18-Oct-1997/2nd camp to Mt. Vutimena, 540–1050 m alt.).

ANATOM: *A. Morrison s. n.* [K] (20-Jun-1896/On summit of peak, ca. 2250 ft. alt.), *A. Morrison s. n.* [K] (06-Jul-1896/Hills between Itumu and Anelgauhat), *Braithwaite RSNH 2129* [K] (21-Jul-1971/South slopes of Inrero, southern ridge, 2600 ft. alt.).

**25. *Trichomanes vitiense* Baker**

(= *Microtrichomanes vitiense* (Baker) Copel.)

-*Trichomanes powellii* Baker

Distribution: Malesia to Samoa (rarely collected every locality)

ESPIRITU SANTO: *Braithwaite RSNH 2445* [K] (06-Sep-1971/Apouna Valley, Camp 2, 1700 ft. alt.).

Note: Though this collection was treated as an intermediate form between *T. vitiense* and *T. powellii* by Braithwaite (1975a), the boundary between them are sometimes obscure. Here, the single collection from Vanuatu is placed under *T. vitiense*.

#### 26. *Trichomanes digitatum* Sw.

(= *Microtrichomanes digitatum* (Sw.) Copel.)

-*Trichomanes taeniatum* Copel.

Distribution: Madagascar, Mascarene Islands, southeast Asia to Polynesia throughout

ERROMANGO: *Braithwaite RSNH 2284* [K] (08-Aug-1971/Nouankau River, 17 km west of Ipota, 700 ft. alt.).

TANNA: *Braithwaite RSNH 2213* [K] (28-Jul-1971/Mt. Toukosmeru, west slopes, 3000 ft. alt.).

ANATOM: *Braithwaite RSNH 2136A* [K] (21-Jul-1971/South slopes of Inrero, southern ridge, 2450 ft. alt.), *Matsumoto 01-948* [TNS] (05-Nov-2001/Anelghowhat to Mt. Ukapaerek, 180–200 m alt.).

#### 27. *Trichomanes tomaniiviense* Brownlie

Distribution: Vanuatu and Fiji (New record to Vanuatu)

ESPIRITU SANTO: *Matsumoto 185 & 194* [TNS] (16-Oct-1997/2nd camp to Mt. Vutimena, 700–1370 m alt.).

Note: This species was described by Brownlie (1977), and has been reported only from Mt. Victoria, Fiji.

#### 28. *Trichomanes* aff. *cuneatum* Christ

ESPIRITU SANTO: *Iwashina 3219* [TNS] (23-Nov-1996/Between 2nd Camp and top of Mt. Vutimele, Mt. Vutimele east ridge, 1500 m alt.).

TANNA: *Braithwaite RSNH 2214A* [K P] (28-Jul-1971/Mt. Toukosmeru, west slopes, 3000 ft. alt.).

ANATOM: *Braithwaite & J. W. Grimes RSNH 2136B* [K] (21-Jul-1971/South slopes of Inrero, southern ridge, 2450 ft. alt.).

Note: It is difficult to find out any particular differences between the two collections by Braithwaite (1975a). The third locality, Mt. Tabwemasana, Espiritu Santo Island, was reported by this expedition. This is possibly an undescribed species.

### Acknowledgements

We are grateful to the curators of the herbaria K P BM. This study was mainly supported by the JSPS Grant for Oversea Research No. 12575013 and No. 08041165 (for T. Iwashina) and partly by No. 12575012 (for K. Iwatsuki).

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