

# Corticoid Fungi (Basidiomycota) Collected in Vanuatu<sup>1</sup>

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Vanuatu (formerly New Hebrides), belonging to Melanesia located at the south west Pacific Ocean, consists of about 80 islands, and these islands extend from latitude 12° to 21°S and from longitude 166° to 170°E. According to Wheatley (1992), Vanuatu has a moist tropical climate and is largely covered with evergreen forests, but the forests are generally lacking in diversity in comparison with those of its neighbors, Solomon Islands, Fiji and Papua New Guinea.

The first report of basidiomycete macrofungi from Vanuatu was by Berkeley (1878). He listed three species, *Auricularia polytricha* (Mont.) Sacc. (as *Hirneola polytricha*), *Ganoderma australe* (Fr.) Pat. (as *Polyporus australis* var. *applanata*) and *Schizophyllum commune* Fr.: Fr., collected on 18 August 1874 during the Challenger Expedition of 1874-1875. Several sporadic reports of basidiomycete macrofungi including some corticioid species have been published since them (Dadant 1954, Dumbleton 1954, Huguenin 1962, 1964a, 1964b, Johnston 1963a, 1963b, Pegler and Waterston 1968a, 1968b). McKenzie (1989) listed approximately 370 fungi (mostly plant pathogens), which were all known fungal species from Vanuatu prior to that time, and 61 basidiomycete macrofungi are included in his comprehensive publication. Among these species, the following 11 species belong to corticioid fungi (some genera of Cantharellales, Ceratobasidiales, Hymenochaetales, Polyporales and Russulales): *Aleurodiscus* sp., *Asterostroma opalum* (Berk. & Broome) Masee, *Athelia rolfsii* (Curzi) C.C. Tu & Kimbr., *Corticium penicillatum* Petch, *Corticium* sp., *Cymatoderma elegans* Jungh. var. *lamellatum* (Berk. & M.A. Curtis) D.A. Reid, *Pellicularia koleroga* Cooke, *Peniophora tristicula* (Berk. & Broome) Boidin & Lanq., *Peniophora* sp., *Phanerochaete salmonicolor* (Berk. & Broome) Jülich, *Stereum ostrea* (Blume & Nees) Fr. and *Thanatephorus cucumeris* (A.B. Frank) Donk. Subsequently, no corticioid species have been reported from Vanuatu so far as I know.

During the 2000 Japan-Vanuatu Joint Scientific Expedition organized by the National Science Museum, Tokyo, more than 300 specimens of corticioid fungi were collected from Efate Island and Espiritu Sant Island, Vanuatu. In the taxonomical study on these specimens, I recognized 31 species belonging to 18 genera until now. All of the species are new records from Vanuatu. For these species, some critical taxonomic characteristics and locations of collections are provided. The following list is part of an ongoing documentation of biodiversity of corticioid fungi in Vanuatu. Duplicates of all specimens examined in this study are deposited in the National Science Museum, Tokyo (TNS) and the Tottori Mycological Institute (TMI).

## Enumeration of corticioid species found in Vanuatu

*Boidinia lacticolor* (Bres.) Hjortstam & Ryvar den, Mycotaxon 14: 77, 1982.

Specimen examined: ESPIRITU SANTO: TMI25517 on decaying stem of *Piper* sp., Mt.

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Tabwemasana (Nokovula, 1000–1100 m alt.), 1, Nov. 2000. This species is distinctive from closely related species of the genus by its clampless hyphae and globose, echinulate basidiospores measuring  $4.5\text{--}5.5 \times 4\text{--}4.5 \mu\text{m}$  (excluding spines). It is probably distributed from subtropical to tropical regions.

***Botryohypochnus isabellinus*** (Fr.) J. Erikss., Svensk Bot. Tidskr. 52: 2, 1958.

Specimen examined: ESPIRITU SANTO: TMI25629 on decaying petiole of *Cyathea* sp., Mt. Tabwemasana (Nokovula, 1000–1085 m alt.), 31, Oct. 2000. This species is readily identified by its aculeate, slightly thick-walled basidiospores measuring  $7.5\text{--}11 \times 6.5\text{--}9 \mu\text{m}$  (excluding spines). It is common and widespread from tropical to cold temperate regions.

***Epithele typhae*** (Fr.) Pat., Essai Taxonomique sur les Familles et les Genres des Hymenomycetes, 59, 1890.

Specimen examined: ESPIRITU SANTO: TMI25500 on decaying petiole of *Metroxylum warburg*, Butmas (450–520 m alt.), 24, Oct. 2000. This species differs from closely related species of the genus by its fusiform, thick-walled basidiospores,  $20\text{--}25 \times 7.5\text{--}9 \mu\text{m}$ . It is probably distributed from temperate to tropical regions.

***Gloiothele lactescens*** (Berk.) Hjortstam, Windahlia 17: 58, 1987.

Specimens examined: ESPIRITU SANTO: TMI25525 on decaying and decorticated trunk of a broad-leaved tree, near Matantas (Vatthe Conservation Area, 50 m alt.), 6, Nov. 2000; TMI25643 on decaying trunk of *Dysoxylum aneityensis*, Butmas (roadside, 440 m alt.), 24, Oct. 2000. Basidiospores ( $5.75\text{--}7 \times 5\text{--}5.75 \mu\text{m}$ ) of these specimens are broader than those ( $5.5\text{--}7 \times 4\text{--}5 \mu\text{m}$ ) described by Boidin *et al.* (1997). This species appears to be a cosmopolitan one.

***Grammothele fuligo*** (Berk. & Broome) Ryvarden, Tran. Brit. Mycol. Soc. 73: 15, 1979.

Specimens examined: EFATE: TMI25543 on decaying stem of *Pandanus* sp., Mele (Hideaway) Island (near Mele, 1–2 m alt.), 12, Nov. 2000. ESPIRITU SANTO: TMI25532 on decaying branch of a broad-leaved tree, Matantas – Butmas (300 m alt.), 7, Nov. 2000; TMI25644 on decaying petiole of *Calamus vanuatuensis*, Butmas (450–520 m alt.), 24, Oct. 2000. In the field, this species is readily distinguishable from closely related species by its substrate (monocotyledons) and bluish white to bluish gray, poroid (anguler) hymenial surface. It is distributed from subtropical to tropical regions.

***Hypoderma argillaceum*** (Bres.) Donk, Fungus 27: 14, 1957.

Specimen examined: ESPIRITU SANTO: TMI25631 on decaying and decorticated trunk of *Dysoxylum aneityensis*, Butmas (roadside, 440 m alt.), 24, Oct. 2000. This species is primarily characterized by having large cystidia, which are tubular with the swollen base and projecting beyond the hymenial surface. It is widely distributed from tropical to cold temperate regions.

***Hypoderma* aff. *praetermissum*** (P. Karst.) J. Erikss. & Strid, Corticiaceae North Eur. 3: 505, 1975.

Specimen examined: EFATE: TMI25634 on decaying branch of a broad-leaved tree, Iririki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. Stephanocyst, which is one of the characteristics for *H. praetermissum*, lacks in this specimen, but all other micromorphological features agree with those of the species. It is widely distributed from tropical to cold temperate regions.

***Hyphoderma puberum*** (Fr.) Wallr., Fl. Crypt. Germany 2: 576, 1833.

Specimens examined: ESPIRITU SANTO: TMI25506 on decaying branch of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1085 m alt.), 31, Oct. EFATE: TMI25622 on decaying branch of a broad-leaved tree, Iririki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species is a widely distributed taxon and is readily identified by its numerous large conical to fusiform lamprocystidia and narrowly ellipsoid to subcylindrical basidiospores measuring  $9\text{--}12 \times 4\text{--}5 \mu\text{m}$ .

***Hyphoderma rude*** (Bres.) Hjortstam & Ryvarden, Mycotaxon 10: 275, 1980.

Specimens examined: ESPIRITU SANTO: TMI25510 on decaying branch of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1085 m alt.), 31, Oct. 2000; TMI25497 on decaying branch of *Piper* sp., Butmas (450–520 m alt.), 24, Oct. 2000; TMI25498 on decaying branch of *Piper* sp., Butmas (450–520 m alt.), 24, Oct. 2000; TMI25531 on decaying branch of a broad-leaved tree, Matantas – Butmas (300 m alt.), 7, Nov. 2000. Diagnostic features of *H. rude* are its odontoid hymenial surface, mucronate gloeocystidia and stephanocysts. This species has been reported from subtropical to tropical regions.

***Hyphodontia barba-jovis*** (Fr.) J. Erikss., Symb. Bot. Upsal. 16: 104, 1958.

Specimen examined: ESPIRITU SANTO: TMI25533 on decaying wood of a broad-leaved tree, Matantas – Butmas (300 m alt.), 7, Nov. 2000. This species is distinguishable from its related species by having tubular, thick-walled (except the apical part) cystidia and broadly ellipsoid basidiospores,  $4.5\text{--}5.5 \times 4\text{--}4.5 \mu\text{m}$ . It is common and widespread from tropical to cold temperate regions.

***Hyphodontia boninense*** (S. Ito & S. Imai) N. Maek., Rep. Tottori Mycol. Inst. 31: 9, 1993.

Specimen examined: EFATE: TMI25491 on decaying branch of *Hernandia nymphaeifolia*, Pang Pang (near Forari River, ca. 5 m alt.), 20, Oct. 2000. This species is morphologically similar to *H. sambuci*, but the latter differs from *H. boninense* in lacking knob-like terminal branches on the subicular hyphae.

***Hyphodontia gossypina*** (Parmasto) Hjortstam, Mycotaxon 39: 416, 1990.

Specimens examined: EFATE: TMI25489 and 25490 on decaying branch of a broad-leaved tree, Klems Hill (ca. 150 m alt.), 20, Oct. 2000; TMI25623 on decaying branch of a broad-leaved tree, Iririki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. ESPIRITU SANTO: TMI25494 on decaying branch of a broad-leaved tree, Erakor Island (near Erakor, 2–5 m alt.), 21, Oct. 2000; TMI25496 on decaying and decorticated branch of a broad-leaved, Erakor Island (near Erakor, 2–5 m alt.), 21, Oct. 2000; TMI25499 on decaying and decorticated stem of *Piper* sp., Butmas (450–520 m alt.), 24, Oct. 2000; TMI25632 on decaying and decorticated stem of *Piper* sp., Butmas (roadside, 440 m alt.), 24, Oct. 2000; TMI25642 on decaying and decorticated branch of a broad-leaved tree, Butmas (450–520 m alt.), 24, Oct. 2000. This species is distributed from temperate to tropical regions and appears to be common in Efate Island and Espiritu Santo Island. It is easily distinguishable from closely related species by its densely odontoid hymenial surface, pseudoskeletal hyphae in the aculei and ellipsoid basidiospores measuring  $4.5\text{--}5 \times 3\text{--}3.5 \mu\text{m}$ .

***Hyphodontia griseliniae*** (G.H. Cunn.) E. Langer, *Biblioth. Mycol.* 154: 120, 1994.

Specimens examined: ESPIRITU SANTO: TMI25640 on decaying petiole of *Angiopteris evecta*, Butmas (450–520 m alt.), 24, Oct. 2000; TMI25641 on decaying branch of a broad-leaved tree, Butmas (450–520 m alt.), 24, Oct. 2000. Basidiospores ( $5.5\text{--}6.5 \times 5\text{--}6 \mu\text{m}$ ) of the two specimens are larger than those ( $4\text{--}5 \mu\text{m}$  in diameter) described by Langer (1994), but all the other features are consistent with the description. This species has previously been reported from subtropical to tropical regions.

***Hyphodontia sambuci*** (Pers.) J. Erikss., *Symb. Bot. Upsal.* 16: 104, 1958.

Specimens examined: ESPIRITU SANTO: TMI25519 on decaying twig of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1100 m alt.), 1, Nov. 2000; TMI25638 on decaying twig of a broad-leaved tree, Kerepua – Nokovula (270–1085 m alt.), 30, Oct. 2000. This species is common and widespread in the world. It is microscopically distinctive from closely related species by capitate to subfusiform leptocystidia and slightly thick-walled, ellipsoid basidiospores measuring  $5\text{--}6.5 \times 4\text{--}5 \mu\text{m}$ .

***Litschauerella clematidis*** (Bourdot & Galzin) J. Erikss. & Ryvardeen, *Corticaceae North Eur.* 4: 839, 1976.

Specimen examined: ESPIRITU SANTO: TMI25630 on decaying branch of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1085 m alt.), 31, Oct. 2000. This species is characterized by narrowly conical lycocystidia encrusted and usually covered with infrequently branched liane-like hyphae, and verrucose, globose basidiospores measuring  $7\text{--}10 \times 6\text{--}8 \mu\text{m}$ . It has been known from subtropical to tropical regions.

***Phanerochaete eburnea*** Sheng H. Wu, *Mycol. Res.* **102**: 1128, 1998.

Specimens examined: EFATE: TMI25493 on decaying branch of *Hibiscus tiliaceus* L., Mele (ca. 150 m alt.), 20, Oct. 2000. ESPIRITU SANTO: TMI25532 on decaying branch of a broad-leaved tree, Matantas – Butmas (300 m alt.), 7, Nov. 2000; TMI25636 on decaying branch of a broad-leaved tree, Kerepua – Nokovula (270–1085 m alt.), 30, Oct. 2000. This is second report of *P. eburnea*, previously known only from Taiwan (Wu 1998). This species is primarily characterized by having numerous encrusted cystidia ( $35\text{--}50 \times 5.5\text{--}7 \mu\text{m}$ ) and ellipsoid basidiospores ( $4.25\text{--}5 \times 3\text{--}3.5 \mu\text{m}$ ).

***Phanerochaete sordida*** (P. Karst.) J. Erikss. & Ryvardeen, *Corticaceae North Eur.* 5: 1023, 1978.

Specimen examined: ESPIRITU SANTO: TMI25533 on decaying and decorticated branch of *Piper* sp., Butmas (450–520 m alt.), 24, Oct. 2000. Diagnostic characters of *P. sordida* are thick-walled subicular hyphae that usually branch at a right angle and intertwined loosely, fusiform to subcylindrical cystidia ( $40\text{--}80 \times 6\text{--}10.5 \mu\text{m}$ ), and ellipsoid to subcylindrical basidiospores ( $5\text{--}7.5 \times 2.5\text{--}3.5 \mu\text{m}$ ). This species is a cosmopolitan one.

***Phanerochaete exilis*** (Burt) Burds., *Mycol. Memoir* 10: 74, 1985.

Specimen examined: EFATE: TMI25625 on decaying wood of a broad-leaved tree, Iririki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species is characterized by its heavily encrusted cystidia and ellipsoid basidiospores measuring  $6\text{--}6.5(-7) \times 3.25\text{--}3.75 \mu\text{m}$ . This species was known

from Mexico and U.S.A. (Florida) (Burdall 1985).

*Phlebia chrysocrea* (Berk. & M.A. Curtis) Burds., Mycologia 67: 497, 1975.

Specimens examined: ESPIRITU SANTO: TMI25505 and 25508 on decaying branch of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1085 m alt.), 31, Oct. 2000. This species is characterized by its smooth to tuberculate and yellowish brown hymenial surface, becoming wine-red in 3% KOH, subfusiform leptobasidium and narrowly ellipsoid to subcylindrical basidiospores measuring  $5\text{--}6 \times 2\text{--}2.5 \mu\text{m}$ . It distributed from temperate to tropical regions.

*Phlebiopsis ravenelli* (Cooke) Hjortstam, Windahlia 17: 58, 1987.

Specimen examined: ESPIRITU SANTO: TMI25536 on decaying wood of a broad-leaved tree, near Marango (250–280 m alt.), 8, Nov. 2000. This species is distinguishable from other species of *Phlebiopsis* by subcylindrical to subfusiform lamprocystidia ( $30\text{--}60 \times 7.5\text{--}13 \mu\text{m}$ ) and ellipsoid to subcylindrical basidiospores ( $4\text{--}5.5 \times 2.5\text{--}3 \mu\text{m}$ ). It has been known temperate to tropical regions.

*Pulcherricium caeruleum* (Lam.: Fr.) Parmasto, Consp. Syst. Cort., 133, 1968.

Specimen examined: ESPIRITU SANTO: TMI25518 on decaying branch of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1100 m alt.), 1, Nov. 2000. This species can be recognized easily in the field by its dark bluish basidiomata and is microscopically characterized by having dendrohyphidia in the hymenium and clavate basidia sometimes with lateral appendages. It is widespread from subtropical to tropical regions except for South America.

*Resinicium friabile* Hjortstam & Melo, Mycotaxon 65: 324, 1997.

Specimen examined: EFATE: TMI25624 on decaying branch of a broad-leaved tree, Irikeri Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species is similar to *R. bicolor* (Alb. & Schwein.: Fr.) Parmasto, but differs in having ellipsoid basidiospores measuring  $4.5\text{--}5 \times 3\text{--}3.5 \mu\text{m}$ . It was known from Brazil and Kenya (Hjortstam and Melo 1997).

*Scopuloides rimosa* (Cooke) Jülich, Persoonia 11: 422, 1982.

Specimens examined: ESPIRITU SANTO: TMI25526 on decaying trunk of a broad-leaved tree, near Matantas (Vatthe Conservation Area, 50 m alt.), 6, Nov. 2000; TMI25527 and 25528 on decaying wood of a broad-leaved tree, near Matantas (Vatthe Conservation Area, 50 m alt.), 6, Nov. 2000; TMI25530 on decaying branch of a broad-leaved tree, Matantas-Butmas (300 m alt.), 7, Nov. 2000; TMI25537 on decaying branch of a broad-leaved tree, near Narango (250–280 m alt.), 8, Nov. 2000. EFATE: TMI25541 on decaying and decorticated branch of a broad-leaved tree, Mele (near Mele Maat Cascades, 50–70 m alt.), 11, Nov. 2000; TMI25615 on decaying branch of a broad-leaved tree, Irikeri Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000; TMI25616 and 25627 on decaying wood of a broad-leaved tree, Irikeri Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. The major diagnostic characteristics of *S. rimosa* are odontoid hymenial surface and numerous lamprocystidia. This species is a cosmopolitan one.

*Subulicystidium brachysporum* (P.H.B. Talbot & Green) Jülich, Persoonia 8: 189, 1975.

Specimen examined: EFATE: TMI25628 on decaying wood of a broad-leaved tree, Irikeri Island

(near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species differs from other members of the genus in having narrowly ellipsoid to banana-shaped basidiospores measuring  $7.5\text{--}9 \times (2\text{--})2.5\text{--}(3) \mu\text{m}$ . It has been collected from subtropical to tropical regions.

***Subulicystidium longisporum*** (Pat.) Parmasto, *Consp. Syst. Cort.*, 121, 1968.

Specimens examined: EFATE: TMI25542 and TMI25620 on decaying wood of a broad-leaved tree, Iriiki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species is common and widespread in the world. It is characterized by having numerous subulate cystidia (ornatocystidia) and narrowly fusiform, usually sigmoid,  $9.5\text{--}16 \times 2\text{--}3 \mu\text{m}$ .

***Subulicystidium meridense*** Oberw., *Biblioth. Mycol.* 61: 343, 1977.

Specimen examined: ESPIRITU SANTO: TMI25520 on decaying wood of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1100 m alt.), 1, Nov. 2000. This species is distinguishable from other species of the genus in its cylindrical to subballantoid basidiospores measuring  $7.5\text{--}9.5 \times 2.5\text{--}3 \mu\text{m}$ . It has been known from subtropical to tropical regions.

***Subulicystidium obtusisporum*** Duhem & Michel, *Crypt. Mycol.* 22: 164, 2001.

Specimens examined: ESPIRITU SANTO: TMI25507 on decaying branch of a broad-leaved tree, Mt. Tabwemasana (Nokovula, 1000–1085 m alt.), 31, Oct. 2000. EFATE: TMI25619 on decaying branch of a broad-leaved tree, Iriiki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This is second report of *S. obtusisporum*, previously known only from southern France. This species can be distinguished from other species of *Subulicystidium* by having cylindrical, narrowly ellipsoid to narrowly fusiform basidiospores,  $10\text{--}12 \times 2.5\text{--}3 \mu\text{m}$ .

***Subulicystidium perlongisporum*** Boidin & Gilles, *Bull. Soc. Mycol. France* 104: 197, 1988.

Specimen examined: ESPIRITU SANTO: TMI25621 on decaying branch of *Gyrocarpus americanus*, Iriiki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species resembles *S. longisporum* ( $17\text{--}23 \times 2\text{--}2.5 \mu\text{m}$ ) but its basidiospores are longer than those of the latter. It has previously been reported from subtropical to tropical regions.

***Trechispora farinacea*** (Pers.: Fr.) Liberta, *Taxon* 15: 318, 1966.

Specimens examined: EFATE: TMI25617 and TMI25618 on decaying branch of a broad-leaved tree, Iriiki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species is a widely distributed taxon and is distinctive in having broadly ellipsoid to ovoid and echinulate basidiospores measuring  $3.5\text{--}4.5 \times 2.5\text{--}3.5 \mu\text{m}$ .

***Tubulicium vermiferum*** (Bourdot) Oberw. ex Jülich, *Persoonia* 10: 335, 1979.

Specimen examined: ESPIRITU SANTO: TMI25637 on decaying petiole of *Cyathea* sp., Kerepua – Nokovula (270–1085 m alt.), 30, Oct. 2000. This species is a widely distributed taxon and is readily identified by its conical lycocystidia with multi-rooted base, encrusted and also sheathed in dendroid branching hyphae, and navicular basidiospores.

*Xenasma rimicolum* (P. Karst.) Donk, Fungus 27: 26, 1957.

Specimen examined: EFATE: TMI25626 on decaying wood of a broad-leaved tree, Iririki Island (near Port Vila, 5–10 m alt.), 11, Nov. 2000. This species is easily distinguishable by its tubular, thick-walled (except the apical part) cystidia and ellipsoid to subglobose basidiospores, 8.5–13.5 × 5.5–9.5 µm. It is widely distributed from tropical to cold temperate regions.

### Summary

Thirty-one species of corticoid fungi belonging to 18 genera (Cantharellales, Hymenochaetales, Polyporales and Russulales, Basidiomycota) are reported based on the specimens collected in Vanuatu during the 2000 Japan-Vanuatu Joint Scientific Expedition. All of these species are new records from Vanuatu.

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