

## Myxomycetes Collected in Vanuatu

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Vanuatu is an island country in southwestern Pacific Ocean. It consists of 83 islands extending 1200 km in north-south direction between 13° and 21° south. Its neighbors are Solomon to the north west, New Caledonia to the south west, and Fiji to the east. Myxomycetes of Vanuatu are very poorly known; namely, only two species, *Arcyria cinerea* and *A. denudata*, have been recorded from Espiritu Santo Island and Efate Island, respectively (Yamamoto and Matsumoto 1992).

The present paper is based on a myxomycete collection made during the botanical expedition to Vanuatu organized by the Tsukuba Botanical Garden, National Science Museum, Japan, in collaboration with the Environment Unit, Vanuatu, in 2001. The collection consists of 76 specimens which are classified into 30 taxa. In the following list, these taxa are alphabetically arranged. Among them, 28 taxa are new to Vanuatu. The specimens examined are preserved in the Herbarium, Department of Botany, National Science Museum, Tokyo (TNS), Japan, and their duplicates are in the Herbarium of Department of Forestry, Port Vila (PVNH), Vanuatu.

### CERATIOMYXALES

1. ***Ceratiomyxa fruticulosa*** (O.F. Muell.) T. Macbr., N. Am. Slime-Moulds, 18 (1899).

VA-16 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 24, Oct. 2001, coll. H. Hagiwara); VA-52 (Espiritu Santo Is., Matantas, on bark of a dead tree, 29, Oct. 2001, coll. H. Hagiwara); VA-58 (Espiritu Santo Is., Rotal, on wood of a dead tree, mixed with *Physarum nucleatum*, 30, Oct. 2001, coll. H. Hagiwara).

2. ***Ceratiomyxa fruticulosa* var. *flexuosa*** Lister, Mycet. ed. 2, 26 (1911).

VA-17 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 24, Oct. 2001, coll. H. Hagiwara); VA-26 (Espiritu Santo Is., Butmas, on bark of a dead tree, 28, Oct. 2001, coll. H. Hagiwara).

### LICEALES

3. ***Cribraria cancellata*** (Batsch) Nann.-Bremek. var. ***fusca*** (Lister) Nann.-Bremek., Ned. Myxom., 93 (1974). Fig. 1

VA-66 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara).

This variety differs from the type variety not only morphologically but also ecologically; namely, var. *fusca* has a well-defined calyculus and darker dictydine granules, and more often occurs on decayed wood of broad-leaved trees than that of conifers.

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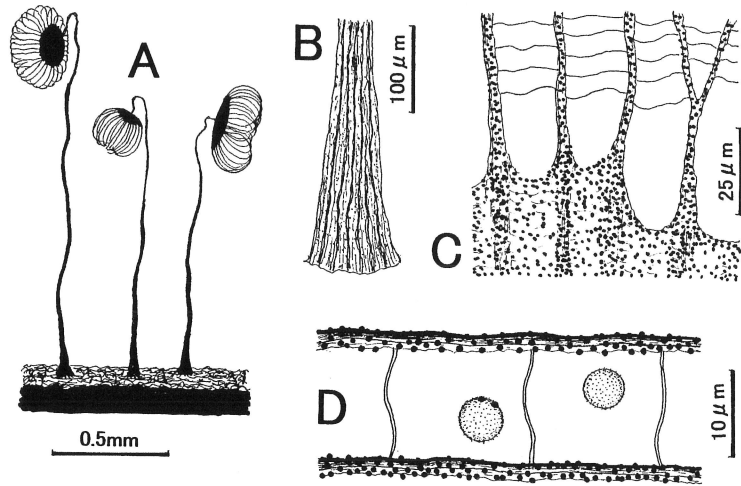


Fig. 1. *Cribraria cancellata* var. *fusca* (VA-66). **A**: Three stalked sporocarps. **B**: Basal part of stalk. **C**: Upper part of calyculus and ribs. **D**: Part of ribs and two spores.

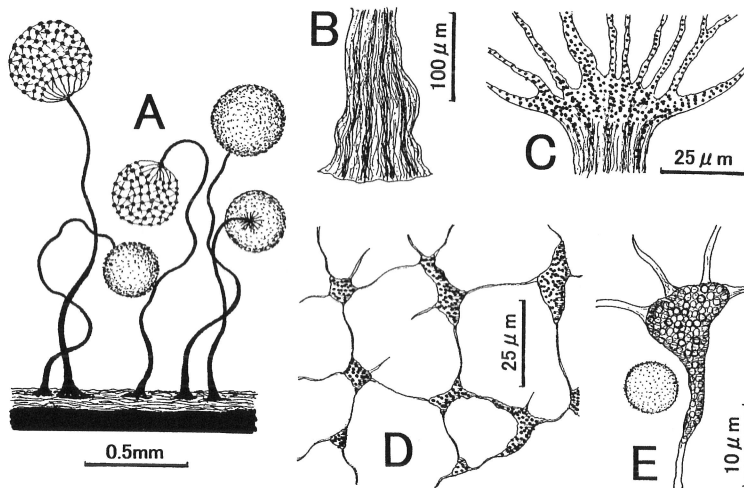


Fig. 2. *Cribraria tenella* (VA-2). **A**: Five stalked sporocarps. **B**: Stalk. **C**: Basal part of sporotheca. **D**: Part of peridial net. **E**: A peridial node and a spore.

4. *Cribraria microcarpa* (Schrad.) Pers., emend. Nann.-Bremek., *Proc. K. Ned. Akad. Wet. C.*, **69**: 340 (1966).

VA-19 (Espiritu Santo Is., Butmas, on bark of a dead tree, 28, Oct. 2001, coll. H. Hagiwara).

5. *Cribraria tenella* Schrad., *Nov. Gen. Pl.*, 6 (1797).

Fig. 2

VA-2 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 21, Oct. 2001, coll. H. Hagiwara).

The sporotheca of VA-2 has ribs in place of a calyculus, though Schrader (1797) illustrated a sporotheca with a distinct calyculus in the original description of *Cribraria tenella*.

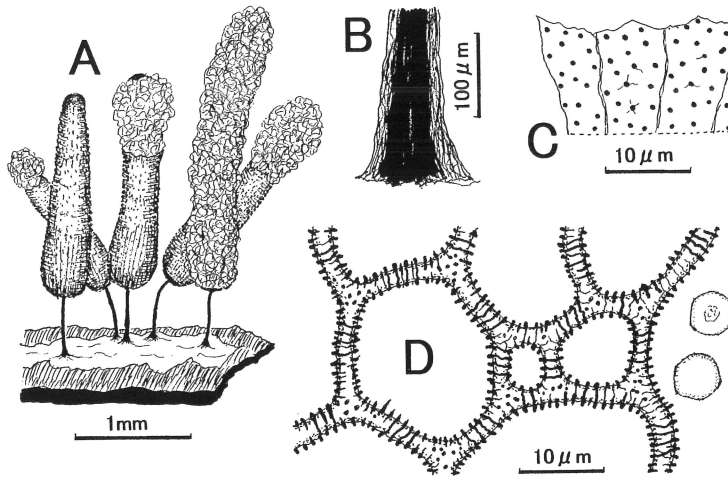


Fig. 3. *Arcyria* cf. *denudata* (VA-70). A: Five stalked sporocarps. B: Basal part of stalk. C: Part of calyculus. D: Part of capillitium and two spores.

6. ***Lycogala exiguum*** A.P. Morgan, *J. Cinc. Soc. Nat. Hist.*, **15**: 134 (1893).

VA-39 (Espiritu Santo Is., Matantas, on wood of a dead tree, 29, Oct. 2001, coll. H. Hagiwara); VA-69 (Anatom Is., Mt. Ukapaerek, on wood of a dead tree, 5, Nov. 2001, coll. H. Hagiwara).

7. ***Reticularia lycoperdon*** Bull. var. ***americana*** Nann.-Bremek., *Acta Bot. Neerl.*, **7**: 773 (1958).

VA-1 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 20, Oct. 2001, coll. H. Hagiwara).

8. ***Tubifera microsperma*** (Berk. & M.A. Curtis) G.W. Martin, *Mycologia*, **39**: 461 (1947).

VA-3 (Espiritu Santo Is., Mt. Tabwemasana, on bark of a dead tree, 21, Oct. 2001, coll. H. Hagiwara).

#### TRICHIALES

9. ***Arcyria cinerea*** (Bull.) Pers., *Syn. Fung.*, 184 (1801).

VA-34 (Espiritu Santo Is., Matantas, on wood of a dead tree, 29, Oct. 2001, coll. H. Hagiwara); VA-67 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara).

10. ***Arcyria denudata*** (L.) Wettst., *Verh. Zool.-Bot. Ges. Wien*, **35**: Abh. 535 (1886).

VA-12 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 22, Oct. 2001, coll. H. Hagiwara); VA-20 & 28 (Espiritu Santo Is., Butmas, on mossy wood of a dead tree, 28, Oct. 2001, coll. H. Hagiwara); VA-35, 36, 53 & 54 (Espiritu Santo Is., Matantas, on wood of a dead tree, 29, Oct. 2001, coll. H. Hagiwara); VA-59 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara); VA-70 & 71 (Anatom Is., Mt. Ukapaerek, on wood of a dead tree, 5, Nov. 2001, coll. H. Hagiwara).

VA-36 and VA-70 have closer decorations of capillitium thread than those of the typical form. They probably belong to a new variety of *Arcyria denudata*. The description based on them is as follows (Fig.

3).

Fructification sporocarpous. Sporocarps densely gregarious, stipitate, erect or slightly declined, up to 3.5 mm tall when expanded. Sporothecae cylindrical or attenuated upwards, when expanded up to 3 mm tall (when unexpanded up to 1.5 mm tall), 0.6 mm wide, ruby to rose-red, often with silvery tint. Stalk dark brown to dark red, filled with cysts, but often dark and opaque by transmitted light. Hypothallus membranous, silvery, sometimes netted, common to the colony. Peridium subfugacious at the lower part of sporotheca. Calyculus small and shallow, with wartlets inside, the wartlets sometimes connected by a fine reticulum. Capillitium netted, crimson to red in mass, pale orange by transmitted light, elastic and expanding ca. 2 times the original length, tightly attached to calyculus. Capillitium thread ca. 3  $\mu\text{m}$  in diam. without decorations, 4–5  $\mu\text{m}$  diam. including decorations, with close-set half rings, spines and cogs. Spores angular, crimson to red in mass, very pale orange to nearly colorless by transmitted light, minutely and palely verruculose, with some to several, dispersed large wartlets, 5.7–7.1  $\mu\text{m}$  (mean = 6.3, sd = 0.39, n = 20) in diam. Plasmodium not observed.

11. **Arcyria** cf. **incarnata** (Pers. ex J.F. Gmel.) Pers., *Obs. Myc.*, 1: 58 (1796).

VA-37 (Espiritu Santo Is., Matantas, on wood of a dead tree, 29, Oct. 2001, coll. H. Hagiwara).

Though unexpanded sporothecae of VA-37 are grayish, its expanded ones look like those of *Arcyria incarnata* by the pinkish tint of its capillitia and spores. However, its capillitium threads are thicker than those of *A. incarnata*.

12. **Hemitrichia clavata** (Pers.) Rostaf. var. **calyculata** (Speg.) Y. Yamam., in Y. Yamam., Hagiwara & Sultana, in Nakaike & Malik (eds.), *Crypt. Fl. Pakistan* Vol. 2, 28 (1993).

VA-4 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 21, Oct. 2001, coll. H. Hagiwara); VA-38 (Espiritu Santo Is., Matantas, on wood of a dead tree, mixed with *Arcyria cinerea*, 29, Oct. 2001, coll. H. Hagiwara); VA-60 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara).

Though this variety is hardly distinguishable from the type variety in the microscopical characteristics of capillitium thread and spore, it is different from the latter in the external appearance of stalk and calyculus. Moreover, both the varieties are ecologically different; namely, var. *calyculata* is common in summer in temperate and tropical lowlands, while var. *clavata* is common in fall in highlands.

13. **Hemitrichia serpula** (Scop.) Rostaf., ex Lister, *Mycet.*, 179 (1894).

VA-5 (Espiritu Santo Is., Mt. Tabwemasana, on fallen twig, 21, Oct. 2001, coll. H. Hagiwara); VA-13 (Espiritu Santo Is., Mt. Tabwemasana, on bark of a dead tree, 22, Oct. 2001, coll. H. Hagiwara); VA-72 (Anatom Is., Mt. Ukapaerek, on bark of a dead tree, 5, Nov. 2001, coll. H. Hagiwara).

14. **Trichia favoginea** (Batsch) Pers. var. **persimilis** (Karsten) Y. Yamam., *Myxom. Biota Jpn.*, 240 (1998).

VA-6 & 7 (Espiritu Santo Is., Mt. Tabwemasana, on bark of a dead tree & on living plant, 21, Oct. 2001, coll. H. Hagiwara).

#### PHYSARALES

15. **Diachea bulbilosa** (Berk. & Broome) Lister, in Penzig, *Myxom. Buit.*, 45 (1898).

VA-8 (Espiritu Santo Is., Mt. Tabwemasana, on living plant, 21, Oct. 2001, coll. H. Hagiwara); VA-30 (Espiritu Santo Is., Butmas, on moss, 28, Oct. 2001, coll. H. Hagiwara).

16. **Didymium leoninum** Berk. & Broome, *J. Linn. Soc.*, **14**: 83 (1873).

VA-31 (Espiritu Santo Is., Butmas, on living plant, 28, Oct. 2001, coll. H. Hagiwara); VA-61 (Espiritu Santo Is., Rotal, on fallen leaf, 30, Oct. 2001, coll. H. Hagiwara).

This species was said to be a Far Eastern one (Gray and Alexopoulos 1968), but recently it is reported from not only Asia but also Oceania (Australia), Central America, South America and Africa (Neubert *et al.* 1995).

17. **Fuligo aurea** (Penzig) Y. Yamam., *Myxom. Biota Jpn.*, 390 (1998).

Syn. *Erionema aureum* Penzig, *Myxom. Buitenz.*, 36, 1898.

VA-40 (Espiritu Santo Is., Matantas, on fallen leaf, 29, Oct. 2001, coll. H. Hagiwara).

This species was said to be a Far Eastern one (Gray and Alexopoulos 1968), but recently it is reported from not only Asia but also Oceania (Australia, New Zealand etc.) and South America (Venezuela) (Neubert *et al.* 1995).

18. **Fuligo septica** (L.) F.H. Wigg., *Prim. Fl. Holsat.*, 112 (1780).

VA-62 (Espiritu Santo Is., Rotal, on bark of a dead tree, 30, Oct. 2001, coll. H. Hagiwara); VA-73 (Anatom Is., Mt. Ukapaerek, on wood of a dead tree, 5, Nov. 2001, coll. T. Iwashina); VA-74 (Anatom Is., Mt. Ukapaerek, on fallen leaf, 5, Nov. 2001, coll. H. Hagiwara).

19. **Physarella oblonga** (Berk. & M.A. Curtis) A.P. Morgan, *J. Cinc. Soc. Nat. Hist.*, **19**: 7 (1896).

VA-21 (Espiritu Santo Is., Butmas, on bark of a dead tree, 28, Oct. 2001, coll. H. Hagiwara); VA-41, 42 & 55 (Espiritu Santo Is., Matantas, on bark of a dead tree, 29, Oct. 2001, coll. H. Hagiwara); VA-63 (Espiritu Santo Is., Rotal, on living plant, 30, Oct. 2001, coll. H. Hagiwara).

VA-55 is similar to *Physarella oblonga* f. *alba* Alexop. in the grayish fructifications without yellow tint, but its lime nodes are not white but yellow.

20. **Physarum melleum** (Berk. & Broome) Masee, *Mon.*, 278 (1892).

VA-32 (Espiritu Santo Is., Butmas, on fallen twig, 28, Oct. 2001, coll. H. Hagiwara).

21. **Physarum nucleatum** Rex, *Proc. Acad. Phila.*, **43**: 389 (1891).

VA-64 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara).

This species has a white, nearly globose pseudocolumella near the center of sporotheca like *Physarum stellatum* (Masee) G.W. Martin. But the stalk of *P. nucleatum* is limeless and straw-colored, while that of *P. stellatum* is limy and white.

22. **Physarum roseum** Berk. & Broome, *J. Linn. Soc.*, **14**: 84 (1873).

VA-23 (Espiritu Santo Is., Butmas, on bark of a dead tree, 28, Oct. 2001, coll. H. Hagiwara).

This species differs from its nearly allied species, *Physarum pulcherrimum* Berk. & Rav., in the limeless stalks.

23. **Physarum stellatum** (Masse) G.W. Martin, *Mycologia*, **39**: 461 (1947).

VA-9 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 21, Oct. 2001, coll. H. Hagiwara); VA-22 (Espiritu Santo Is., Butmas, on bark of a dead tree, 28, Oct. 2001, coll. H. Hagiwara); VA-44, 45, 46, 47, 48 & 56 (Espiritu Santo Is., Matantas, on bark and wood of a dead tree, on moss & on fallen twig, 29, Oct. 2001, coll. H. Hagiwara).

24. **Physarum tenerum** Rex, *Proc. Acad. Phila.*, **42**: 192 (1890).

VA-65 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara).

This species is very like *Physarum globuliferum* (Bull.) Pers. in the external appearance, but it differs from the latter species in the smaller yellow lime nodes.

25. **Physarum viride** (Bull.) Pers., *Ann. Bot. Usteri*, **15**: 6 (1795).

VA-24 (Espiritu Santo Is., Butmas, on bark of a dead tree, 28, Oct. 2001, coll. H. Hagiwara); VA-43 & 57 (Espiritu Santo Is., Matantas, on wood of a dead tree, 29, Oct. 2001, coll. H. Hagiwara).

26. **Physarum viride** f. **aurantium** (Bull.) Y. Yamam., *Myxom. Biota Jpn.*, 495 (1998).

VA-10 (Espiritu Santo Is., Mt. Tabwemasana, on bark of a dead tree, 21, Oct. 2001, coll. H. Hagiwara); VA-14 & 15 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 22, Oct. 2001, coll. H. Hagiwara); VA-76 (Espiritu Santo Is., Matantas, on wood of a dead tree, 29, Oct. 2001, coll. H. Hagiwara).

The sporotheca of VA-14 is discolored and similar to that of *Physarum flavicomum* Berk., but it is distinguished by the yellowish stalk with refuse matter and dichotomously branching capillitium with fusiform nodes.

#### STEMONITALES

27. **Lamproderma arcyronema** Rostaf., *Mon.*, 208 (1874).

VA-11 (Espiritu Santo Is., Mt. Tabwemasana, on wood of a dead tree, 21, Oct. 2001, coll. H. Hagiwara); VA-25 (Espiritu Santo Is., Butmas, on wood of a dead tree, 28, Oct. 2001, coll. H. Hagiwara).

28. **Stemonitis fusca** Roth var. **rufescens** Lister, *Mycet.*, 110 (1894).

VA-75 (Anatom Is., Mt. Ukapaerek, on wood of a dead tree, 5, Nov. 2001, coll. H. Hagiwara).

29. **Stemonitis splendens** Rostaf., *Mon.*, 195 (1874).

VA-33 (Espiritu Santo Is., Butmas, on moss, 28, Oct. 2001, coll. H. Hagiwara); VA-68 (Espiritu Santo Is., Rotal, on wood of a dead tree, 30, Oct. 2001, coll. H. Hagiwara).

30. **Stemonitopsis typhina** (F.H. Wigg.) Nann.-Bremek. var. **similis** (G. Lister) Nann.-Bremek. & Y. Yamam., *Proc. K. Ned. Akad. Wet. C.*, **90**: 348 (1987).

VA-50 & 51 (Espiritu Santo Is., Matantas, on bark of a dead tree, 29, Oct. 2001, coll. H. Hagiwara).

### Summary

Thirty myxomycetes are reported from Vanuatu. Among them twenty-eight taxa are new to this country.

### Acknowledgements

We wish to thank Dr. T. Iwashina for collecting a specimen of *Fuligo septica*. HH deeply thanks Dr. M. Higuchi and Dr. T. Iwashina, the leaders of the botanical expedition that gave him an opportunity to collect myxomycetes in Vanuatu and also thank to Ms. Leimon Kalomor and Mr. Philemon Ala for their thoughtful arrangement for the expedition. This expedition was supported by Grant-in-Aid for Scientific Research, No. 12575013, of the Ministry of Education, Culture, Sports, Science and Technology in Japan.

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