

POLYPORES THAT DECAY TREES OF INDIAN BOTANIC GARDEN

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ABSTRACT

Fifty two species of wood-rotting polyporoid hymenomycetes were found associated with decay of trees of Indian Botanic Garden. Most of them caused white rots. *Oxyporus latemarginata* (Dur. & Mont.) Donk, *Phellinus glaucescens* (Petch) Ryv. and *Rigidoporus vitreus* (Fr.) Donk have not been reported earlier from India. *Corioloopsis luzonensis* (Murr.) Sharma is a new combination proposed. *Casuarina equisetifolia* Forst. is the most frequent host.

INTRODUCTION

The Indian Botanic Garden is situated on the right bank of the river Hooghly (4.5 m alt.) and comprises an area of 112 hectares of alluvial soil. The approximate annual rainfall is 1536 mm and temperature ranges from 21°-35°C. Because of a population of about 12000 hard-wood tree species and diversity of ecological microhabitats, this area provides a potentially rich locality for wood-rotting fungi. In this presentation only polyporaceous fungi have been considered.

These fungi produce basidiocarps that remain dry and dormant over a long period of low precipitation and humidity. Following the precipitation during summer, they revive and begin sporulation very quickly. These fungi have been collected during the months of August to October from 1980-87. The specimens have been given the authors collection numbers (JRS...) and are deposited in the Cryptogamic herbarium, Botanical Survey of India, Howrah, West Bengal (CAL); Department of Biology, University of Oslo, Norway (O); and Departamento de Ciencias, Biologicas, Buenos Aires, Argentina (BAFC).

The numbers of collections cited for each

species is not indicative of the prevalence of a species in the area, as most common species were collected only once for a record. Each collection number is followed by the herbarium name where that collection is deposited.

A total of 52 species of polyporaceous fungi belonging to families Corticiaceae, Hymenochaetaceae, Ganodermataceae and Polyporaceae were found associated with white or brown rots of dead/living trees of Indian Botanic Garden. In order to their frequency of occurrence *Ganoderma lucidum* (Fr.) Karst., *Phellinus pectinatus* (Kl.) Quel., *P. senex* (Nees & Mont.) Imaz., *P. caryophyllii* (Rac.) Ryv. and *Trametes scabrosa* (Pers.) Cunn. are most encountered species. Among the most frequently associated hosts are *Casuarina equisetifolia* Forst., *Schleichera oleosa* (Lour.) Oken., *Swietenia mahagonii* (L.) Jacq., *Polyalthia longifolia* (Sonn.) Thw., *Elaeodendron glaucum* Pers. and *Brownia hybrida* Hort. ex Back. There is hardly any tree of these species which is not infected by one or other species of these fungi.

Rigidoporus vitreus (Fr.) Donk, *Phellinus glaucescens* (Petch) Ryv. and *Oxyporus latemarginata* (Dur. & Mont.) Donk are new records from India and are described in detail. *Corioloopsis luzonensis* (Murr.) Sharma is a new combination proposed (Type examined).

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Colours are quoted from Kelly and Judd (1955). Hyphal types and amyloidy were tested following Ryvarden and Johanson (1980). Drawings were made with the help of Camera lucida.

1. **Amylosporus campbellii** (Berk.) Ryv., Norw. J. Bot. 24 : 217, 1977.

On ground; probably a parasite on grass, JRS 58916 (CAL).

2. **Antrodia serialis** (Fr.) Donk, Persoonia 4 : 340, 1966.

Associated with brown cuboidal rot; on *Berberis fortunei* Lindl., JRS 58972 (CAL) and *Swietenia macrophylla* King, JRS 58951 (CAL, O).

3. **Aurificaria indica** (Masse) Reid, Kew Bull. 17 : 279, 1963.

Associated with white rot; on *Schleichera oleosa* (Lour.) Oken, JRS 58974 (CAL, O) and *Lepisanthes tetraphylla* (Vahl.) Radlk., JRS 58904 (CAL).

4. **A. shorae** (Wake.) Ryv., Mycotaxon 5 : 335, 1977.

Associated with white pocket rot; on *Schleichera oleosa* (Lour.) Oken, JRS 58905 (CAL, BAFC).

5. **Bjerkendera fumosa** (Fr.) Karst., Medd. Soc. Fauna Fl. Fenn. 5 : 38, 1879.

Associated with white rot; on dead trunk of *Swietenia mahagonii* (L.) Jacq., JRS 58721 (CAL).

6. **Coltricia cinnamomea** (Pers.) Murr., Bull. Torrey Bot. Cl. 31 : 343, 1904.

Rot unknown; on *Borassus flabellifer* Linn., JRS 59771 (CAL).

7. **Coriolopsis caperata** (Berk.) Murr., N. Am. Fl. 9 : 77, 1908.

Associated with white rot; on dead standing trunk of *Dalbergia sissoo* Roxb., JRS 58924 (CAL).

8. **C. luzonensis** (Murr.) Sharma Comb. nov.
Basonym : *Polyporus luzonensis* Murr.,

Bull. Torrey Bot. Cl. 34 : 476, 1907. (Type examined).

Associated with white rot; on dead poles, JRS 59960 (CAL) and logs of hard woods, JRS 58903 (CAL, O).

9. **C. telfarii** (Kl.) Ryv., Norw. J. Bot. 19 : 230, 1972.

Associated with white rot; on poles of hardwoods, JRS 58904 (CAL).

10. **Cyclomyces tabacinus** (Mont.) Pat., Essai Taxon. Hymenom., p. 98, 1900.

Associated with white pocket rot; on the rotting stumps of *Polyalthia longifolia* (Sonn.) Thw., JRS 58989 (CAL).

11. **Ganoderma applanatum** (Gray) Pat., Bull. Soc. Mycol. Fr. 5 : 67, 1889.

Associated with white mottled rot; on *Polyalthia longifolia* (Sonn.) Thw., JRS 58919 (CAL) and *Cassia siamea* Lam., JRS 58920 (CAL). This species has a typical occurrence on older trees in large trunk wounds. The rot is more destructive to *Polyalthia longifolia* and usually extends to a few feet from the point of entry. The trees become hollow and weak at the bases and are snapped by wind currents.

12. **G. australe** (Fr.) Pat., Bull. Soc. Mycol. Fr. 5 : 67, 1889.

Associated with white rot; on *Borassus flabellifer*, JRS 58923 (CAL).

13. **G. lucidum** (Fr.) Karst., Rev. Mycol. 3 : 17, 1881.

Associated with white rot; on *Casuarina equisetifolia* Forst. JRS 58927 (CAL); the basidiocarps develop at or near the ground level but rarely also on the upper parts of tree trunks.

14. **G. webrianum** (Bres. & Henn.) Steyaert, Persoonia 7 : 79, 1972.

Associated with white stringy rot; on *Casuarina equisetifolia* Forst., JRS 58917 (CAL, O); *Brownia hybrida* Hort. ex Back.,

JRS 58918 (CAL) and *Nephelium longana* Camb., JRS 58929 (CAL, O).

15. Grammothele fuligo (Berk. & Br.) Ryv., Trans. Brit. Mycol. Soc. 73 : 15, 1979.

Rot unknown ; on dead leaf bases of Palms, JRS 58266 (CAL) and Bamboos, JRS 58966 (CAL, O).

16. Hexagonia apiaria (Pers.) Fr., Epicr. Syst. Mycol., p. 497, 1838.

Associated with white rot ; on dead branches of living *Schleichera oleosa* (Lour.) Oken, JRS 58901 (CAL).

17. H. tenuis (Hook.) Fr., Epicr. Syst. Mycol., p. 498, 1838.

Associated with white fibrous rot ; on dead branches of *Mangifera indica* Linn., JRS 58938 (CAL), *Albizia lebbeck* (Linn.) Benth., JRS 58940 (CAL) and *Brownea hybrida* Hort. ex Back., JRS 58950 (CAL).

18. Irpex flavus Klotzsch, Linnaea 8 : 488, 1833.

Associated with white rot ; on dead thin branches of *Peltophorum pterocarpum* Backer ex Heyne, JRS 58991 (CAL).

19. I. vellerius Berk. & Broome, J. Linn. Soc. Lond. 14 : 61, 1875.

Associated with white rot ; on the rotting poles of hardwoods, JRS 60599 (CAL).

20. Lenzites acuta Berk., Hook. Lond. Journ. Bot. 1 : 46, 1842.

Associated with white rot ; on dead lying trunks of hardwoods, JRS 59000 (CAL).

21. L. elegans (Fr.) Pat., Essai Taxon. Hymenom., p. 89, 1900.

Associated with white stringy rot ; on the rotting poles of hardwoods, JRS 58998 (CAL).

22. Loweporus tephroporus (Mont.) Ryv., A Preliminary polypore flora of East Africa, p. 416, 1980.

Associated with white spongy rot ; on dead standing tree trunk of *Cassia renigera* Wall. 58999 (CAL) and also common on poles of hardwoods, JRS 58226 (CAL).

23. Merulius eurocephalus (Berk. & Br.) Petch, Roy. Bot. Gdns. Peradeniya Ann. 4 : 408, 1910.

Associated with white spongy rot ; on Bamboos, JRS 58996 (CAL).

24. Nigrofomes melanoporus (Mont.) Murr., Bull. Torrey Bot. Cl. 31 : 425, 1904.

Associated with white rot ; on *Peltophorum pterocarpum* Backer ex Heyne, JRS 58933 (CAL).

25. Oxyporus latemarginata (Dur. & Mont.) Donk, Persoonia 4 : 342, 1966.

Fruitbody annual or rarely perennial becoming widely effused, up to 40 cm long, 2-5 mm thick, adnate, coriaceous tough when fresh, hard and rigid on drying ; pore surface white to yellowish white or grey yellowish white, yellowish brown on drying ; pores 2-4 per mm, angular, splitting and dentate with age ; tubes 6-8 mm deep ; subiculum yellowish to greyish white, 1-2 mm thick, soft fibrous.

Hyphal system monomitic ; generative hyphae hyaline, branched, thin to thick walled, 2.5-5 μ m wide ; cystidia frequent to rare, ventricose to clavate, capitately encrusted, embedded or projecting, 10-25 $\times$ 3-8 μ m ; basidia clavate, 4-sterigmate, 15-25 $\times$ 6-8 μ m, with a basal septum ; spores broadly ellipsoid, thin walled, 3.5-(6)-5.5(6) $\times$ 2.5-4 μ m, non-amyloid.

Collections examined : JRS 78335 (CAL, O) on a dead standing tree of *Dalbergia sissoo* Roxb., Indian Botanic Garden, Howrah, West Bengal, 1985 ; JRS 60610 (CAL) base of a rotting hard wood pole, Indian Botanic Garden, Howrah, West Bengal, 1987.

O. latemarginata is associated with white butt rot. Widely effused whitish fruitbodies with larger pores and ventricose, capitately encrusted cystidia are enough to distinguish this species.

26. Perenniporia ochroleuca (Berk.) Ryv., Norw. J. Bot. 19 : 233, 1972.

Associated with white rot ; on dead thin branches of *Ixora coccinea* Linn., JRS 58914 (CAL) and *Casuarina equisetifolia* Forst., JRS 56714 (CAL).

27. *Phellinus adamantinus* (Berk.) Ryv., Norw. J. Bot. 19 : 234, 1972.

Associated with white rot ; on *Casuarina equisetifolia* Forst., JRS 58908 (CAL, O).

28. *P. allardii* (Bres.) Ryv., Norw. J. Bot. 19 : 234, 1972.

Associated with white stringy rot ; on *Gauzuma tomentosa* Kunth, JRS 53689 (CAL, O).

29. *P. caryophyllii* (Rac.) Ryv., A Preliminary polypore flora of East Africa, p. 149, 1980.

Associated with white spongy rot ; on *Canthium parviflorum* Lamk., JRS 58944 (CAL) ; *Schleichera oleosa* (Lour.) Oken, JRS 58943 (CAL) ; *Casuarina equisetifolia* Forst., JRS 58923 (CAL) and *Gliricida sepium* (Jacq.) Walp., JRS 58925 (CAL).

30. *P. contiguus* (Fr.) Pat., Essai Taxon. Hymenom., p. 97, 1900.

Associated with white rot ; on rotting Bamboos, JRS 60910 (CAL, O).

31. *P. ferreus* (Pers.) Bourd. & Galz., Hymenom. Fr., p. 627, 1928.

Associated with white rot ; on dead branches of *Calophyllum inophyllum* Linn., JRS 78310 (CAL, O).

32. *P. durissimus* (Lloyd) Roy, Mycologia 71 : 1005, 1979.

Associated with white rot ; on *Swietenia mahagonii* Jacq., JRS 58922 (CAL) and *Terminalia catappa* L., JRS 58926 (CAL).

33. *P. fastuosus* (Lev.) Ryv., Norw. J. Bot. 19 : 234, 1972.

Associated with white pocket rot ; on *Terminalia catappa* L., JRS 59101 (CAL, O).

34. *P. ferrugineo-velutinus* (Henn.) Ryv., Ryv. Norw. J. Bot. 19 : 234, 1972.

Associated with white rot ; on dead trunks

and branches of *Brownia hybrida* Hort. ex Backer, JRS 58903 (CAL, O).

35. *P. glaucescens* (Petch) Ryv., Norw. J. Bot. 19 : 234, 1972.

Fruitbody resupinate, widely effused, adnate, up to 2 cm thick, coriaceous tough when fresh, woody hard on drying ; margin tomentose, thin, narrow, light to dark olivaceous brown ; pore surface light brown to light yellowish brown ; pores entire to sinuate with age, 4-6 per mm, indistinctly stratified ; subiculum up to 1 mm thick, yellowish brown.

Hyphal system dimitic ; generative hyphae hyaline to pale yellow, septate, 2-3.5 μ m wide ; skeletal hyphae pale rusty brown, 3-5 μ m wide ; setae absent to scattered, subventricose to acuminate, 18-28 $\times$ 5-8 μ m ; spores subglobose to broadly ellipsoid, 3.5-4.5(5) $\times$ 3-3.5 μ m, non-amyloid.

Collections examined : JRS 78314 (Cal, O), on living tree trunk of *Brownia hybrida* Hort. ex Backer, Indian Botanic Garden, Howrah, West Bengal, 1987.

The presence of hymenial setae is a very variable character of this species. Petch (1916) reported setae absent while Ryvarden *et al.* (1980) found them in African collections. In the Indian specimens, the setae are rare to be scattered and are difficult to observe sometimes. *P. glaucescens* is close to *P. ferrugineo-velutinus* (Henn.) Ryv. in both micro and macroscopic characters. But the latter has a reddish brown and a thinner fruitbody (0.5 mm) and regular pores. Further, *P. ferrugineo-velutinus* has smaller [13-16(20) $\times$ 5-7 μ m] and abundant setae and smaller spores [2.5-3.5(4) $\times$ 1.5-2.5 μ m]. Associated with white rot.

36. *P. lamaensis* (Murr.) Heim, Ann. Crypto. Exot. 7 (1) : 21-22, 1934.

Associated with brown rot ; on *Artocarpus communis* Forst., JRS 78913 (CAL) ; dead trunk of *Samanea saman* (Jacq.) Merrill, JRS 56221 (CAL).

- 37. *Phellinus melanodermus*** (Pat.) Fidalgo, Mem. New York Bot. Gardn. 17 : 135, 1968.
Associated with white pocket rot ; on *Schleichera oleosa* (Lour.) Oken, JRS 58906 (CAL, O, BAFC).
- 38. *P. pachyphloeus*** (Pat.) Pat., Essai Taxon. Hymenom., p. 97, 1900.
Associated with white rot ; on *Ficus bengalensis* Linn., JRS 60604 (CAL).
- 39. *P. pectinatus*** (Kl.) Quel., Enrich. Fung., p. 173, 1886.
Associated with white stringy rot ; on *Swietenia mahagonii* Jacq., JRS 58920 (CAL) and *S. macrophylla* King, JRS 58921 (CAL).
- 40. *P. punctatus*** (Fr.) Pilat, Atl. Champ. Europe 3 : 530, 1942.
Associated with white rot ; on living JRS 56729 (CAL) and dead *Chrysophyllum cainito* L., JRS 58915 (CAL, O, BAFC).
- 41. *P. purpureo-gilvus*** (Petch) Ryv., Norw. J. Bot. 19 : 235, 1972.
Associated with white rot ; on dried thin branches of *Albizia lebbek* (L.) Benth., JRS 78313 (CAL).
- 42. *P. rimosus*** (Berk.) Pilat, Ann. Mycol. 38 : 80, 1940.
Associated with white rot ; on *Lagerstroemia flos-reginae* Retz., JRS 58991 (CAL).
- 43. *P. senex*** (Nees & Mont.) Imaz., Bull. Govern. Forest Exp. Sta. 57 : 115, 1952.
Associated with white rot ; on *Swietenia mahagonii*, JRS 58947 (CAL) ; *Brownia hybrida* Hort. ex Backer JRS 78916 (CAL) and *Anogeissus acuminata* (Roxb.) Wall. ex Bedd., JRS 58996 (CAL).
- 44. *P. subluteus*** (Murr.) Ryv., Norw. J. Bot. 19 : 235, 1972.
Rot unknown ; on *Peltophorum pterocarpum* Backer ex Heyne, JRS 60721 (CAL) and *Elaeodendron glaucum* Pers., JRS 58971 (CAL).
- 45. *Pycnoporus sanguineus*** (Fr.) Murr., Bull. Torrey Bot. Cl. 31 : 431, 1904.
Associated with white stringy rot ; on poles and logs of hardwoods, JRS 60772 (CAL).
- 46. *Rigidoporus lineatus*** (Pers.) Ryv., Norw. J. Bot. 19 : 236, 1972.
Associated with white pocket rot ; on Bamboos, JRS 58969 (CAL) ; and *Diospyros ebenum* Koenig, JRS 58965 (CAL).
- 47. *R. nigrescens*** (Bres.) Donk, Persoonia 4 : 341, 1966.
Associated with white rot ; on *Tabebuia chryxantha* Nicols., JRS 58902 (CAL, O) and dead standing palm-trunk, JRS 60614 (CAL, BAFC).
- 48. *R. microporus*** (Fr.) Overeem., Icon. Fung. Malayensum 5 : 1, 1924.
Associated with white rot ; on *Putranjiva roxburghii* Wall., JRS 58965 (CAL).
- 49. *R. vitreus*** (Fr.) Donk, Persoonia 4 : 341, 1966.
Fruithody annual, resupinate to widely effused on vertical or oblique surfaces forming rudimentary pilei-like parts in between, up to 10 mm thick, waxy, watery-fleshy when fresh, shrinking and brittle on drying ; pores surface pinkish white to pinkish yellow or yellowish white when fresh, brownish on drying and bruising ; pores round, 4-6 per mm ; tubes distinct, up to 4 mm deep ; subiculum yellowish white to yellowish brown on drying, up to 6 mm thick.
Hyphal system monomitic ; generative hyphae hyaline to pale yellow, branched, up to 4 μ m wide, septate ; cystidia present, apically encrusted, cylindrical to subcylindrical ; spores globose to subglobose, 4-5(5.5) μ m in diameter, hyaline.
Collections examined : JRS 58912 (CAL, O) bases of Palms, Indian Botanic Garden, Howrah, West Bengal, 1986 ; JRS 58932 (CAL) bases of Bamboos, Indian Botanic Garden, Howrah, West Bengal, 1987.
The waxy and watery-fleshy fruitbody and colour change of pore surface on bruising are distinguishing field characters. It is

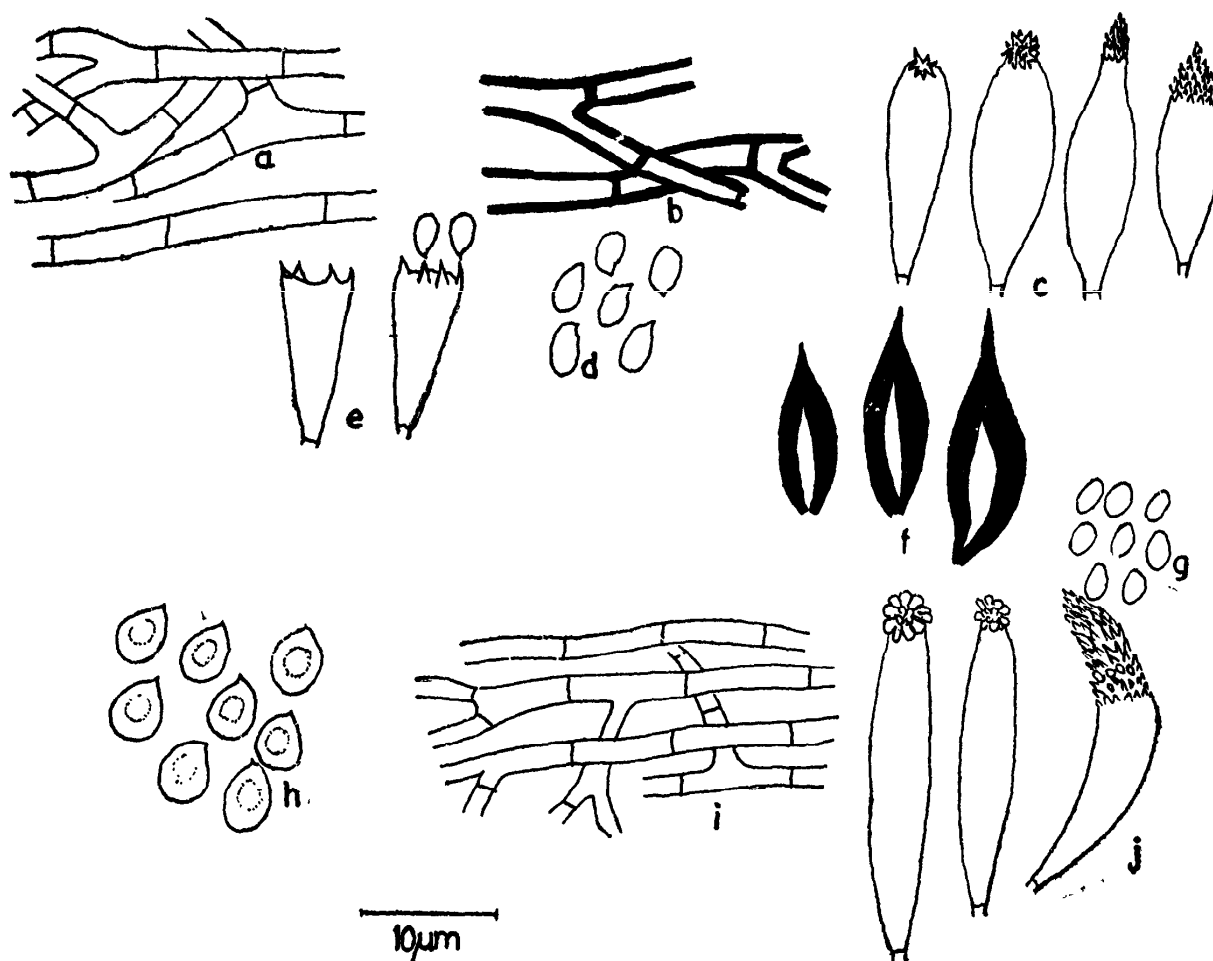


Fig. 1. (a-j) : *Oxyporus latemarginata* (a-e): a. Thin walled generative hyphae. b. Thick walled generative hyphae. c. Capitately incrustated cystidia. d. Basidiospores. e. Basidia : *Phellinus glaucescens* (f-g): f. Hymenial setae. g. Basidiospores ; *Rigidoporus vitreus* (h-j): h. Basidiospores. i. Generative hyphae. j. Incrustated cystidia.

widely effused, spreading over to the soil and encircles old debris and stones. Associated with white rot.

50. *Schizopora paradoxa* (Fr.) Donk, Persoonia 55 : 76, 1967.

Associated with white rot ; on poles and logs of hardwoods, JRS 58913 (CAL, O).

51. *Trametes pubescens* (Fr.) Pilat, Atlas Champ. Europe 3 : 268, 1938.

Associated with white rot ; on dead lying tree trunks of *Swietenia mahagonii* Jacq., JRS 72721 (CAL) and *Polyalthia longifolia* (Sonn.) Thw., JRS 72727 (CAL).

52. *T. scabrosa* (Pers.) Cunn., Bull. N. Z. Sci. Ind. Res. 164 : 162-63, 1965.

Associated with white stringy rot ; on dead tree trunks of *Ficus bengalensis* Linn., JRS 73120 (CAL) and *Elaeodendron glaucum* Pers., JRS 58732 (CAL).

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Plate 1 (a-d) : a. A hollow trunk base of *Polyalthia longifolia* caused by *G. applanatum*, b. Main trunk of *Anogeissus acuminata* got snapped by wind currents after butt rot caused by *P. senex*, c. *P. durissimus* on *Elaeodendron glaucum* causing butt rot, d. Heart rot of *Terminalia catappa* caused by *P. fastuosus*.

Argentina, for confirming the identity of many specimens.

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