

22. CERVICOLOR, ASTEROSTROMA (Berk. & Curt.) Mass., *Jour. Linn. Soc.*, 25, 1889: 155.  
*cervicolor*, *Corticium* Berk. & Curt., *Grev.*, 1, 1873: 179.  
*corticola*, *Asterostroma* Mass., *Jour. Linn. Soc.*, 25, 1889: 155.  
*albidocarneum*, *Asterostroma* Mass., *l.c.*

New Zealand collections match the type ex Alabama. No specimens from the region are in Kew herbarium.

*cervinum*, *Hydnium* Berk., *Fl. Tas.*, 2, 1860: 256. The type, ex "Tasmania, Archer", is a sterile fragment on decayed wood. It appears to be portion of a *Grandinia*.

23. CHEESMANII, PENIOPHORA Wakef., *Kew Bull. Misc. Inf.*, 1915: 371.

The type at Kew is ex "Moruya, N.S.W., W. N. Cheesman, 1914".

24. CHLORINUS, TOMENTELLA (Mass.) nov. comb.

*chlorinus*, *Hypochnus* Mass., *Kew Bull. Misc. Inf.*, 1901: 158.

The type at Kew, ex "Tasmania, Rodway, No. 266" has coloured, globose verruculose spores.

*chrysocreas*, *Corticium* Berk. & Curt. = *Odontia archeri*.

25. CINERASCENS, PENIOPHORA (Schw.) Sacc., *Syll. Fung.*, 6, 1888: 646.

*cinerascens* (*Stereum*) *Thelephora* Schw., *Trans. Am. Phil. Soc.*, 4, 1832: 167.

*cinerascens*, *Hymenochaete* (Schw.) Lev., *Ann. Sci. Nat.*, Ser. III, 5, 1846: 152.

*aschistum*, *Corticium* Berk. & Curt., *Proc. Am. Acad. Arts and Sci.*, 4, 1858: 123.

*moricola*, *Stereum* Berk., *Grev.*, 1, 1873: 162.

*dissitum*, *Stereum* Berk., *l.c.*, p. 164.

*ephebrium*, *Corticium* Berk. & Curt., *l.c.*, p. 178.

*berkeleyi*, *Peniophora* Cke., *Grev.*, 8, 1879: 20.

*neglectum*, *Stereum* Peck, *N.Y. State Mus. Rept.* 33, 1880: 22.

*schweinitzii*, *Peniophora* Mass., *Jour. Linn. Soc.*, 25, 1889: 145.

*cinerascens*, *Stereum* (Schw.) Mass., *Jour. Linn. Soc.*, 27, 1890: 179.

*occidentalis*, *Peniophora* Ell. & Ev., *Bull. Torrey Bot. Club*, 24, 1897: 277.

*cinerascens*, *Lloydella* (Schw.) Bres., in *Lloyd's Myc. Notes*, No. 5, 1900: 51.

*purpurascens*, *Stereum* Lloyd, Letter 53, 1914: 15.

Collections at Kew from the region are ex "Samoa, C. G. Lloyd", "Port Denison, Q., Shann, f. 15" (placed by Cooke under *Stereum schomburgkii*), "Clarence River, N.S.W., Wilcox", three specimens filed by Cooke under *Stereum rugosum*, and "N.Z., Colenso, No. 619", placed by Cooke under *Stereum ochroleucum*.

26. CINEREA, PENIOPHORA (Pers. ex Fr.) Cke., *Grev.*, 8, 1879: 20.

*cinerea*, *Thelephora* Pers., ex Fr., *Syst. Myc.*, 1, 1821: 435.

*cinereum*, *Corticium* (Pers.) Fr., *Epicrisis*, 1838: 563.

Though common in New Zealand there are no collections from the region in Kew herbarium. Those filed under the cover, ex "N.Z., 1866, b.268" and "Mamaku, W. N. Cheesman, 1914" are of *P. caesia*.

27. CAERULEUM, CORTICIUM Fr., *Epicrisis*, 1838: 562.

Collections from the region under this cover at Kew are "Port Denison, Q., Shann, f.11", "Condamine River, Q., 1880, F.V.M.", "Clarence River, N.S.W." and "Clarence River, N.S.W., Miss Thornton, No. 1". One filed under the cover by Cooke, ex "Strickland River, New Guinea, Bauerlen, No. 10" is the sterile stroma of a *Hypoxylon*.

*cinnabarinum*, *Corticium* Mass., *Jour. Linn. Soc.*, 27, 1890: 140.

The type, ex "Clarence River, N.S.W., Wilcox", was by Cooke labelled 'dubium' and filed under the unnamed species. Mässe later described the collection as a new species and stated that spores were "subglobose 5-6 $\mu$ ". Examination showed the collection to consist of a daub of red barn paint on the bark of a shrub, probably forwarded by the collector by way of a joke. Sections showed the specimen to be without hyphae or spores, and to consist of amorphous pigment granules embedded in a film of dried oil.

28. CIRRHATUM, HYDNUM Pers., ex Fr., *Syst. Myc.*, 1, 1821: 411.

*meruloides*, *Hydnum* Berk. & Br., *Trans. Linn. Soc.*, Ser. II, 2, 1833: 63.

A collection ex "Gippsland, Vic., 1884, No. 27" appears to be of this species. A deformed specimen ex "Brisbane, Q., Bailey, No. 246" is the type of *H. meruloides*.  
*clavarioides*, *Hydnum* Berk. & Curt. A collection referred to the species by Cooke, ex "Clarendon River, N.S.W., Mrs. Hodgkinson" does not resemble the type from Cuba.

29. CLELANDII, GRANDINIA Wakef., *Trans. Proc. Roy. Soc. S. Aust.*, 1930: 156.

The type is ex "New South Wales, J. B. Cleland, 1928 A".

30. COMEDENS, CORTICIUM (Nees ex Fr.) Fr., *Epicrisis*, 1838: 565.

*comedens*, *Thelephora* (Nees) Fr., *Syst. Myc.*, 1, 1821: 447.

*decorticans*, *Thelephora* Pers., *Myc. Eur.*, 1, 1822: 137.

*cartylei*, *Corticium* Mass., *Jour. Linn. Soc.*, 27, 1890: 148.

Though not uncommon in New Zealand, there are no specimens at Kew from the region.

*complicatum*, *Stereum* Fr. = *Stereum rameale*.

*concolor*, *Stereum* Berk., *Fl. Tas.*, 2, 1860: 259. The type, ex "Tasmania, W. Archer, Esq." consists of three fragments too incomplete to identify. Their microstructure suggests the species was based on young specimens of *Stereum lobatum*.

31. CONFLUENS, CORTICIUM Fr., *Epicrisis*, 1838: 564.

*confluens*, *Thelephora* Fr., *Syst. Myc.*, 1, 1821: 447.

A collection named by Miss Wakefield, ex "State Nursery, Creswick, Vic., W. N. Cheesman, 1914", is under this cover at Kew.

*confluens*, *Craterellus* Berk. & Curt. = *Craterellus odoratus*.

*confusum*, *Stereum* Berk. = *Stereum sowerbeii*.

32. CONGESTA, THELEPHORA Berk., *Jour. Linn. Soc.*, 13, 1873: 168.

The type, ex "Yarra Yarra Plains, Vic., Jan. 1864" consists of five plants in good condition. A second collection, ex "Gainsford, Q., E. Bowman" contains plants about twice as large as those of the type yet possessing the same microstructure. Other collections are "Brisbane, Q., Bailey, Nos. 732, 775". One filed under the cover by Cooke, ex "Victoria, Dr. Winter" is of *Stereum elegans*.

*contrarium*, *Stereum* Berk. On the type sheet is a collection ex "N.Z., Puhī Puhī, T. Kirk, No. 221" of an endemic New Zealand species, *Stereum aotearoae*.

*cookei*, *Coniophora* Mass. = *Coniophora arida*.

33. CORALLOIDES, HYDNUM Fr., *Syst. Myc.*, 1, 1821: 408.

*novae-zealandiae*, *Hydnum* Col., *Trans. N.Z. Inst.*, 21, 1888: 79.

Two collections from New Zealand are under the cover at Kew, "N.Z., Dall" and the type of *H. novae-zealandiae*, ex "N.Z., Colenso, b.761" which is merely a large form of this European species.

*corrugae*, *Stereum* Lloyd = *Stereum percome*.

*corticola*, *Asterostroma* Mass. = *Asterostroma cervicolor*.

*crassa*, *Hymenochaete* (Lev.) Berk. = *Peniophora vinosa*.

*cretaceum*, *Corticium* (Pers. ex Fr.) Fr. Two collections from the region are filed under the cover at Kew. "Tasmania" is a fragment that cannot now be identified; "N.Z., Colenso, b.404" so named by Cooke consists of a sheet of resin on bark of *Dacrydium cupressinum*.

34. CRINALE, HYDNUM Fr., *Epicrisis*, 1838: 516.

*tabacinum*, *Hydnum* Cke., *Grev.*, 14, 1886: 129.

*ferruginosa*, *Caldesiella* Sacc., *Syll. Fung.*, 6, 1888: 478.

The type of *H. tabacinum* ex "N.Z., Colenso, b.150" matches authentic specimens of *H. crinale* from Europe in Kew herbarium.

*crociareas*, *Hymenochaete* Berk. & Br. On the sheet of the type of *Hymenochaete innatum* Cke. & Mass. ex "Daintree River, Q." (a species of *Epithele*) Bresadola had

written "= *H. crociereas* B. & Br. (of Ceylon, but not of N. America)". On the sheet of *H. crociereas* (Berk. & Curt.) he had noted "This is the true *H. crociereas* Berk. & Br. of Ceylon". *H. crociereas* (Berk. & Curt.) is a synonym of *Odontia archeri*.

35. CROCIDENS, HYDNUM Cke., *Grev.*, 19, 1890: 45.

*wellingtonii*, *Hydnum* Lloyd, *Myc. Notes*, No. 69, 1923: 1200.

The type at Kew, ex "Port Phillip, Vic., French, Aug. 1890" is in good condition. A second collection of the species, ex "Brisbane, Q., F. M. Bailey, No. 757", was filed by Cooke under *Hydnum laevigatum*. The species is also common in New Zealand, where it was named *Hydnum wellingtonii*. Spore measurements given by Cooke are too small, since in the type they are the same as in New Zealand collections, namely 6.5-8 $\mu$ , globose, smooth, collapsed.

*crustosa*, *Odontia* (Pers. ex Fr.) Quel. One collection at Kew, ex "Tasmania", under the cover of *Grandinia crustosa*, labelled *G. australis*, is now merely a fragment of decayed wood. A second, ex "Victoria, Mrs. Martin, No. 494", is a species of *Sebacina*.

36. CRUSTOSA, PENIOPHORA Cke., *Grev.*, 8, 1879: 56.

The type at Kew is ex "N.Z., Waitaki, No. 347". A second collection ex "N.Z., Colenso", is under the cover of *Corticium laeve*.

*cupulaeformis*, *Cyphella* Berk. & Rav. A collection ex "Buller Valley, N.Z., T. Kirk, No. 236" placed under this cover by Cooke, is of *Cyphella totara*, a species common in New Zealand on *Podocarpus totara*.

*curreyi*, *Cyphella* Berk. & Br., *Ann. Mag. Nat. Hist.*, Ser. III, 7, 1861: 379. Cooke placed under this cover "N.Z., Murimotu, T. Kirk, No. 241", "N.Z., T. Kirk, on Antirrhinum leaves, No. 36" and "Melbourne, Vic., No. 376". The first was not examined, being fragmentary; the latter are collections of *C. villosa*. *C. curreyi* is a synonym of *C. albo-violascens* (A. & S.) Karst.

*cyathiforme*, *Stereum* Fr. A collection ex "New Guinea, Armit", placed under this cover by Cooke, is of *Stereum elegans*.

*delicatum*, *Hydnum* (Kl.) Fr. Cooke so referred a collection of *Veluticeps tabacina* ex "Darling Downs, Q., No. 1095".

*delicatum*, *Hydnum* (Kl.) Fr. = *Heterochaete delicata*.

37. DENDRITICA, CLADODERRIS Pers., in Freycinet's Voyage 'Uranie', 1826: 22.

*spongiosa*, *Cladoderis* Fr., in Wahlberg's Fung. Natalensis, 1848: 20.

Two collections at Kew, filed under *C. spongiosa*, ex "New Guinea" and "North Queensland" appear to be of this species. Under the cover of *C. dendritica* are two collections of *Stereum caperatum* ex "Clarence River, N.S.W."

38. DENSA, CYPHELLA Berk., *Fl. N.Z.*, 2, 1855: 184.

The type is at Kew, ex "N.Z., Cape Kidnapper, Colenso, on living bark of *Corynocarpus laevigata*".

*discoidea*, *Cyphella* Cke., *Grev.* 12, 1884: 85. The type, ex "N.Z., Napier, W. Colenso, b.30", collected on living leaves of *Hypochoeris radicata*, was said to possess "brief basidia, spores globose, smooth, 4 $\mu$ ". It consists of several white bodies loosely attached to the leaf hairs, which on examination proved to be empty spider egg-cases composed of woven filaments 0.5 $\mu$  diameter.

*dispersum*, *Hydnum* Berk., *Lond. Jour. Bot.*, 4, 1845: 58. The type ex "Swan River, W. Aus., Drummond, No. 207" now consists of several scattered sterile spines without a subiculum.

*dorsale*, *Stereum* Kalch. Cooke applied the name to a specimen of *Stereum lobatum* ex "Airey's Inlet, Vic., Miss Berthon" which he placed under the cover of *S. vellereum*. Massee subsequently labelled it *S. vellereum* var. *australiense*.

39. ELEGANS, STEREUUM (Meyer) Sacc., *Syll. Fung.*, 6, 1888: 553.

*elegans*, *Thelephora* Meyer, ex Fr., *Syst. Myc.*, 1, 1821: 430.

Abundant collections from this region are at Kew, dispersed under no less than ten species. Correctly named are "Australia, W. N. Cheesman, 1914", "Gainsford, Q., Bowman", "Goode Island, Q., Powell", "Endeavour River, Q., Persieh", "Wangaretta, Vic.", "Omeo, J. Sterling", "Gippsland, Vic., Webb", "Little Bendigo, Vic., G. Day", "Clarendon, Vic., Tepper, No. 860", "Moe Swamp, Gippsland, Vic.", "Melbourne, Vic., F. Reader, No. 28", and "Tasmania, New Norfolk, Winter, No. 324". Under *Stereum pusillum* Berkeley placed "V.D.L., Gunn". Under *S. nitidulum* Cooke filed "North Queensland" and "Endeavour River, Q., Persieh". Under *S. cyathiforme* he placed "New Guinea, Armit" and under *S. thozetii* "Endeavour River, Q.", "New Guinea, Armit" and "Gippsland, Vic.". A rosetted form, ex "Gippsland, Vic." Cooke filed under *S. petaloides*. One collection from New Zealand, ex "Wairarapa, Dry River, T. Kirk, No. 140" Cooke placed under *S. obliquum*. He also filed "Victoria, Dr. Winter" under *Thelephora congesta*; "Brisbane, Q., Bailey", "Illawarra, N.S.W., Camara" and "Gippsland, Vic., Murray" under *Stereum atrum*; and under *Stereum sprucei* placed "Australia, No. 7".

*evolvens*, *Corticium* Fr. Under *C. laeve* (a synonym) are several collections at Kew from the region, none being of this species. "Tasmania, W. Archer Esq." and "Tasmania" are sterile, but do not possess the same microstructure; "New Zealand" and "New Zealand, Sinclair" are of *Peniophora incarnata*; "New Zealand, Colenso" consists of three lots, two of *Hymenochaete unicolor*, the third a sterile *Corticium*; "N.Z., Colenso, b.55" is of *Peniophora crustosa*; "Colenso, b.402" is an *Aleurodiscus*; "Colenso, b.288" a sterile *Corticium*; "Colenso, b.386" a specimen of *Corticium scutellare*; and "Strickland River, New Guinea, Bauerlen, 1885" one of the peltate ascomycetes.

*exsculpta*, *Thelephora* Berk., *Jour. Linn. Soc.*, 13, 1873: 168. The type, ex "Dandenong Ranges, Vic.", is a *Septobasidium* in poor condition.

40. FARINACEA, GRANDINIA (Pers. ex Fr.) Bourd. & Galz., *Bull. Soc. Myc. Fr.*, 30, 1914: 253.

*farinaceum*, *Hydnum* Pers. ex Fr., *Syst. Myc.*, 1, 1821: 419.

*farinacea*, *Odontia* (Pers. ex Fr.) Bres., *Ann. Myc.*, 1, 1903: 87.

At Kew are two collections from the region, both identified by Miss Wakefield, "Kuitipo, S. Aus., J. B. Cleland, Aug. 1928" and "Adelaide, S. Aus., J. B. Cleland, Aug. 1928".

*fasciculata*, *Solenia* Pers. = *Solenia candida*.

41. FILAMENTOSA, PENIOPHORA (Berk. & Curt.) Burt, ex Coker in *Elisha Mitchell Jour. Sci.*, 36, 1921: 162.

*filamentosum*, *Corticium* Berk. & Curt., *Grev.*, 1, 1873: 178.

Though common in New Zealand, there are only two collections at Kew from the region, "Tasmania" and "Dunedin, N.Z., J. Murray, Feb. 1951", the former placed by Berkeley under *Corticium sulfureum*.

*filicicola*, *Cyphella* Cke., *Grev.*, 14, 1886: 129.

*pteridophila*, *Cyphella* Cke. in herb.; Sacc., *Syll. Fung.*, 6, 1888: 683.

*cookei*, *Cyphella* Sacc. & Syd., *Syll. Fung.*, 14, 1899: 231.

Collections at Kew are the type, ex "N.Z., Colenso, b.80", "N.Z., Colenso, b.965, b.1245" and "N.Z., Dr. Th. M. Ralph, ex herb. F.v.M.", the last carelessly recorded by Cooke as from Australia. All were found on living leaves of a species of *Hymenophyllum*. Spores were said to be elliptical, hyaline,  $12 \times 4\mu$ . Examination showed the 'species' to have been based on empty egg-cases of some butterfly or moth, amorphous bodies without hyphae or spores, loosely attached to the fronds.

*filicicola*, *Hydnum* Berk. = *Odontia arguta*.

42. FIMBRIATA, ODONTIA (Pers. ex Fr.) Fr., *Epicrisis*, 1838: 529.

*fimbriatum*, *Hydnum* (Pers.) Fr., *Syst. Myc.*, 1, 1821: 421.  
*secernibilis*, *Odontia* Berk., *Fl. Tas.*, 2, 1860: 257.

On the sheet of the type of *O. secernibilis* at Kew, ex "Tasmania, W. Archer Esq.", H. J. Banker correctly referred the species as a synonym of *O. fimbriata*. This is the only collection from the region at Kew.

*flavum*, *Hydnum* Swartz. ex Berk. = *Mycobonia flavum* (Swartz) Pat.

Under the cover of *Hydnum flavum* Cooke placed two collections. "Toowoomba, Q., Hartmann" is a specimen of *Epithete glauca*; "Clarence River, N.S.W., Wilcox" cannot be named as the hymenium has been destroyed by insects.

43. FLORIFORME, STEREUM Bresadola, ex Lloyd in *Stipitate Stereums*, 24, 1913; *Annales Mycologici*, 18, 1920: 44.

On the type sheet of *Stereum moselei* are mounted three collections ex "Airey's Inlet, Vic., Miss Berthon" which Bresadola noted were of a different species, and appended a brief description. This Lloyd (*l.c.*) later published. Bresadola in 1920 formally but incompletely (since he did not note gloecystidia) described the species.

*frustulosum*, *Stereum* (Pers.) Fr. Under this cover Cooke placed two collections from New Zealand. Lars Romell (May, 1906) referred both to *Stereum rufum* on the sheet. They are New Zealand endemic species, "N.Z., Colenso, b.252" being a collection of *Aleurodiscus berggreni*, "N.Z., Colenso, b.297" a related undescribed *Aleurodiscus*.

44. FULIGINOSA, HYMENOCHAETE (Pers.) Lev., *Ann. Sci. Nat.*, Ser. III, 5, 1846: 152.

*fuliginosa*, *Thelephora* Pers., *Myc. Eur.*, 1, 1822: 145.

Two collections from the region are at Kew. "Moruya, N.S.W., W. N. Cheesman, 1914" was correctly named by Miss Wakefield, "Tasmania" placed by Cooke under *H. rubiginosa*. Both agree with specimens so named by Berkeley, but differ from plants to which the name was applied by Bresadola and certain other European mycologists.

*gausapatum*, *Stereum* Fr. = *Stereum spadiceum*.

*glabrescens*, *Hydnum* Berk. & Br. = *Hydnum muelleri*.

45. GLAUCA, EPITHELE (Cke.) Wakef., in Cleland's *Toadstools . . . of S. Aust.*, 1935: 256.

*glauca*, *Grandinia* Cke., *Grev.*, 17, 1889: 55.

Collections from the region at Kew are the type of *Grandinia glauca* ex "Brisbane, Q., Bailey, No. 627", "Toowoomba, Q., Hartmann" placed by Cooke under *Hydnum flavum*, and "Victoria, J. B. Cleland, 1929".

*globosa*, *Cyphella* Rodw., *Papers and Proc. Roy. Soc. Tas.*, 1917, 1918: 108. No specimens are in Kew herbarium.

46. GRANULOSA, GRANDINIA (Pers.) Fr., *Epicrisis*, 1838: 527.

*granulosa*, *Thelephora* Pers. ex Fr., *Syst. Myc.*, 1, 1821: 446.

Of the collections from the region at Kew placed under this cover by Cooke, "N.Z., Colenso, b.133" is an *Odontia*; "N.Z., Colenso, b.389" consists of two lots, one of *Grandinia granulosa*, the other a sterile *Corticium*; "Tasmania" is a sterile *Grandinia*.

47. GRISEO-ZONATA, THELEPHORA Cke., *Grev.*, 19, 1891: 104.

No specimens from the region are at Kew. New Zealand collections resemble the type from Aiken, South Carolina, a form of *T. terrestris* worthy of a specific name.

48. HABGALLAE, PENIOPHORA (Berk. & Br.) Cke., *Grev.*, 8, 1879: 20.

*habgallae*, *Corticium* Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 72.

*poroniaeforme*, *Artocreas* Berk. & Br., *l.c.*, p. 73.

*poroniaeformis*, *Matula* (Berk. & Br.) Mass., *Jour. Roy. Micr. Soc.*, 1888: 173.

*rompelii*, *Michenera* Rick, *Ann. Myc.*, 2, 1904: 243.

*rompelii*, *Matula* (Rick) Lloyd, *Myc. Notes*, No. 30, 1908: 391.

*cornua*, *Cytidia* Lloyd, *Myc. Notes*, No. 47, 1917: 656.

*corneus*, *Aleurodiscus* Lloyd, *Myc. Notes*, No. 62, 1920: 930.

*capensis*, *Aleurodiscus* Lloyd, *l.c.*

*capensis*, *Gloeosoma* Lloyd, *Myc. Notes*, No. 65, 1921: 1088.

*habgallae*, *Cytidia* (Berk. & Br.) Martin, *Lloydia*, 5, 1942: 160.

Though present in Australia and New Zealand, there are no collections from the region in Kew herbarium.

49. HELVETICA, GRANDINIA (Pers.) Fr., *Hym. Eur.*, 1874: 627.

*helveticum*, *Hydnum* Pers. *Myc. Eur.*, 2, 1825: 184.

One collection from the region is at Kew, identified by Miss Wakefield, ex "Nambour, Blackall Range, Q., W. N. Cheesman, 1914".

50. HIRSUTUM, STEREUM (Willd.) Fr., *Epierisis*, 1838: 549.

*hirsuta*, *Thelephora* Willd., ex Fr., *Syst. Myc.*, 1, 1821: 439.

*varicolor*, *Stereum* Lloyd, Letter 53, 1914: 10.

Specimens from the region under this cover at Kew are of three species. Correctly named are "Brisbane, Q., Broome, No. 185", "Porongorup, W. Aus.", "Port Jackson, N.S.W., W. Buckingham", "Pennant Hills, N.S.W., Challenger Expedition", "Clarence River, N.S.W., Dr. Beckler", "Upper Yarra River, Vic., F.v.M.", "Near Ballarat, Vic., C. French" and "Domain, Auckland, N.Z., W. N. Cheesman, 1914". The following collections are of *Stereum rameale*: "Mulgrave River, Q., No. 849", "Mt. Lofty Range, S. Aus., F.v.M.", "Sealers' Cove, Vic., F.v.M., No. 142", "New England, N.S.W.", "Melbourne, Vic., Le Fevre, No 208", "V.D.L., herb. Hooker, No. 20" (one collection of *S. rameale*, a second of *S. vellereum*) and "Chatham Islands, N.Z., Travers". One collection ex "Swan River, W. Aus., No. 159" is of *S. vellereum*; and that ex "Tasmania, W. Archer" consist of three species, *S. hirsutum*, *S. rameale* and *S. vellereum*.

51. HISPIDULUM, STEREUM (Berk.) nov. comb.

*reflexa*, *Phlebia* Berk., *Hook. Jour. Bot.*, 3, 1851: 168.

*hispidula*, *Phlebia* Berk., *Jour. Linn. Soc.*, 13, 1873: 167.

*lugubris*, *Stereum* Cke., *Grav.*, 12, 1884: 85.

*stereoides*, *Thelephora* Cke. & Mass., *Grav.*, 18, 1889: 5.

*butleri*, *Auricularia* Mass., *Kew Bull. Misc. Inf.*, 1906: 94.

*reflexa*, *Auricularia* (Berk.) Bres., *Ann. Myc.*, 9, 1911: 551.

*ceriferum*, *Stereum* Wakef., *Kew Bull. Misc. Inf.*, 1915: 370.

Bresadola referred the species to *Auricularia rugosissima* (Lev.) Bres. (*Ann. Myc.*, 14, 1916: 231) which, though similar in external appearance, differs profoundly in micro-structure. Under the cover of *Phlebia reflexa* at Kew are the following collections from the region, "Moruya, N.S.W., W. N. Cheesman, 1914" and "N.Z., Colenso, b.39, b.338, b.365". Under *Stereum lugubris* is placed the type collection ex "N.Z., Colenso, b.23"; under *Thelephora stereoides* the type ex "Oakleigh, Vic., Mrs. Martin, No. 450"; under *Phlebia hispidula* the type ex "Australia, Dr. Schomburgk, S.13"; under *Stereum ceriferum* the type ex "N.Z., Rotorua, W. N. Cheesman, 1914". One collection ex "Western Australia" Cooke filed under *Stereum illudens*. *Auricularia butleri* was erected on a collection from Dehra Dun, India.

The combination *Stereum reflexum* was applied by Lloyd (*Myc. Notes*, No. 66, 1922: 1128) to a collection from Sumatra. Stevenson & Cash (*Lloyd Library and Mus. Bull.*, 35, 1936: 57) stated that although Lloyd did not describe the species he filed with the collection a brief note which they published. From this, though too incomplete to enable the species to be identified, it is evident the species is not the same as that known as *Phlebia reflexa*, differing in the presence of a colour zone beneath the pileus hairs, among other features. Possibly Lloyd's specimen was of *Stereum lobatum*. The species under consideration is a *Stereum*, and has been named *S. hispidulum* since that name was applied by Berkeley to a collection he labelled *Phlebia hispidula*, the type of which at Kew matches collections of *P. reflexa* and the other synonyms listed.

*hollandii*, *Stereum* Lloyd = *Stereum prolificans*.

52. ILLUDENS, STEREUM Berk., *Lond. Jour. Bot.*, 4, 1845: 59.

*archeri*, Stereum Berk., *Fl. Tas.*, 2, 1860: 259.

*pannosum*, Stereum Cke., *Grev.*, 8, 1879: 56.

*archeri* (*Veluticeps*) *Hymenochaete* (Berk.) Cke., *Grev.*, 8, 1880: 149.

*spiniferum*, Stereum Lloyd, Letter 51, 1914: 4.

*beyrichii*, *Lloydella* (Fr.) Bres., in herb. Kew.

Collections at Kew from the region correctly named are the type ex "Swan River, W. Aus., No. 158", "Brisbane, Q., No. 567", "National Park, S. Aus., W. N. Cheesman, 1914", "Sugar Loaf Mts., N.S.W., F.v.M.", "Pennant Hills, N.S.W., Challenger Expedition", "Tift Creek, F.v.M.", "Sealers' Cove, Vic., F.v.M.", "Melbourne, Vic., G. Le Fevre, No. 205", "Narranoom, Vic., E. Stranger", "Moe, Gippsland, Vic., Webb", "Near Ballarat, Vic., C. French", "Airey's Inlet, Vic., Miss Berthon", "Gippsland, Vic., Murray", "Tasmania, Gunn, Nos. 13, 64", "V.D.L., Stuart", "Tasmania, W. Archer, Esq.", "Back River Gully, Tas., 321 H", "N.Z., T. Kirk, Nos. 68, 99" and "N.Z., Colenso, b.176". Filed under *Stereum prolificans* but labelled *S. shraderi* is "Clarence River, N.S.W., F.v.M.". Under *S. spiniferum* are the type ex "Australia, J. T. Paul" and "Gulung, N.S.W., Dr. Barnard". Labelled *Stereum ferrugineum* but filed under *Hymenochaete rubiginosa* is "N.Z., Colenso, b.153". The type of *Stereum archeri* is ex "Tasmania". Under *Stereum pannosum* are placed "Waitaki, N.Z., No. 342", "Dunedin, N.Z., No. 315" (both cited as the type by Cooke), "Papakura, N.Z., T. Kirk, No. 61" and "N.Z., Colenso, b.906". Filed under the cover of *S. illudens* are "West Australia", which is a collection of *Stereum hispidulum*, and "Condamine River, Q., No. 800", which is of a species of *Hymenochaete*.

53. INCARNATA, PENIOPHORA (Pers.) Karst., *Hedw.*, 28, 1889: 27.

*incarnata*, *Thelephora* Pers., *Myc. Eur.*, 1, 1822: 130.

*incarnatum*, *Corticium* (Pers.) Fr., *Epicrisis*, 1838: 564.

Collections from the region under this cover at Kew are "Swan River, W. Aus., No. 165", which is not *P. incarnata* but now unidentifiable; "N.Z., Whakarewarewa, E. J. Butler, July 1923", identified by Miss Wakefield; "New Zealand" and "N.Z., Sinclair", the last filed under *Corticium laeve* by Cooke.

54. INFUNDIBULIFORMIS, CLADODERRIS (KL.) Fr., in Wahlberg's *Fungi Natalensis*, 1848: 21.

*infundibuliforme*, *Actinostroma* Klotzsch, *Nova Acta Nat. Cur.*, Suppl. 1, 1848: 237.

*australica*, *Cladoderris* Berk., ex Cke., *Grev.*, 11, 1882: 28, *nomen nudum*.

The only collection from the region at Kew is ex "Gippsland, Vic.". Labelled on the sheet by Berkeley as *Cladoderris dendritica*, Lloyd held it to be a specimen of *C. spongiosa* and Cooke made it the type of *C. australica*.

*innatum*, *Hymenochaete* Cke. & Mass., *Grev.*, 15, 1887: 99. The type, ex "Daintree River, Q.", proved on examination to be a species of *Epithele*. Bresadola noted on the sheet that the collection "= *Hymenochaete crocicreas* Berk. & Br."

55. INSIGNIS, CRATERELLUS Cke., *Grev.*, 19, 1890: 2.

The type is at Kew, ex "N.Z., Colenso, No. 518".

*insularis*, *Hymenochaete* Berk. Cooke placed a collection under this cover, ex "Toowoomba, Q., Hartmann" which is of *Duportella tristrictula*.

*intermedia*, *Peniophora* Mass. = *Peniophora vinosa*.

*intybaea*, *Thelephora* Pers. ex Fr. A collection placed under the cover by Cooke, ex "Sydney, N.S.W., Miss Scott" is of *Thelephora terrestris*.

*investiens*, *Hydnum* Berk., *Lond. Jour. Bot.*, 4, 1845: 57. The type, ex "Swan River, W. Aus., Drummond, No. 138, on black boys" is a resupinate fragment now unidentifiable.

56. INVOLUCRUM, STEREUM Fr., *Epicrisis*, 1838: 546.

Collections from the region at Kew are ex "New Guinea, Armit", "Strickland River, New Guinea, 1885", "Fly River, New Guinea, W. Bauerlen, No. 49", "Fly River, New Guinea, Everell's Expedition", "North Queensland" and "Daintree River, Q.". The last consists of three lots which were placed by Cooke under *S. molle*.

Fries, Saccardo (1888, p. 560) and Massee (1890, p. 176) cited the author of the species as Klotzsch, *Linnæa*, 7, 1832: 499, but there is no reference to the species in any volume of *Linnæa*.

isidiodes, Hydnum Berk., *Lond. Jour. Bot.*, 4, 1845: 58. The type, ex "Swan River, W. Aus., Drummond, No. 149", consists of two sterile fragments which were said to have grown upon a specimen of *Polyporus gryphaeformis*. A second collection placed under the cover by Cooke, ex "Gippsland, Vic., Miss Campbell" is not of the same species.

*kalchbrenneri*, *Hymenochaete* Mass. = *Peniophora vinosa*.

*kunzei*, *Hymenochaete* (Hook.) Mass. = *Thelephora luteobadida*.

*laciniata*, *Thelephora* (Pers.) Fr. = *Thelephora terrestris*.

*lacteum*, *Corticium* Fr. Under this cover Cooke placed a collection ex "Victoria, Miss Campbell". It is the white *Septobasidium*, *S. simmondsii* Couch, which grows upon living species of *Hakea* and *Acacia*.

*laeve*, *Corticium* (Pers. ex Fr.) Sacc. = *Corticium evolvens*.

57. LAEVIGATUM, HYDNUM (Swartz) Fr., *Syst. Myc.*, 1, 1821: 399.

Of the two collections from the region placed under this cover "Tasmania" agrees with authentic European specimens; "Brisbane, Q., F. M. Bailey, No. 757" is a specimen of *H. crocidens*.

*lumellatum*, *Stereum* (Berk. & Curt.) Cke. = *Stereum caperatum*.

*latissimum*, *Stereum* Berk., *Fl. N.Z.*, 2, 1855: 183. No specimens are in Kew herbarium.

*lutum*, *Stereum* Cke. & Mass. = *Stereum percome*.

*leichkardtianum*, *Stereum* (Lev.) Mass. = *Stereum lobatum*.

58. LIVIDUM, CORTICIUM (Pers.) Fr., *Epicrisis*, 1838: 563.

*livida*, *Thelephora* Pers., ex Fr., *Syst. Myc.*, 1, 1821: 447.

Two collections are in Kew herbarium, both named by Miss Wakefield, namely, "Lisarow, N.S.W., J. B. Cleland" and "Hawkesbury River, N.S.W., J. B. Cleland, Dec. 1914".

59. LOBATUM, STEREUM (Kunze) Fr., *Epicrisis*, 1838: 547.

*lobata*, *Thelephora* Kze., in Weigelt's Exsicc. 1827, ex Fr., *Linnæa*, 5, 1830: 527.

*boryanum*, *Stereum* Fr., *Epicrisis*, 1838: 547.

*luteobadidum*, *Stereum*, Fr., *l.c.*

*perlatum*, *Stereum* Berk., *Lond. Jour. Bot.*, 1, 1842: 153.

*sprucei*, *Stereum* Berk. & Curt., *Jour. Linn. Soc.*, 10, 1868: 331.

*leichkardtianum*, *Stereum* (Lev.) Mass., *Jour. Linn. Soc.*, 27, 1890: 175.

*pictum*, *Stereum* Berk., ex Mass., *l.c.*, p. 185.

*australe*, *Stereum* Lloyd, Letter 48, 1913: 10.

Under the cover of *Stereum lobatum* at Kew are the following collections from the region: "Norfolk Island, Robinson, Nos. 5, 90", "Papua, Baridi, C. E. Carr, Nos. 13549, 13884", "Fly River, New Guinea, Bauerlen, No. 60", "Strickland River, New Guinea, Bauerlen", "Astrolabe, New Guinea, Armit", "S.E. New Guinea, Capt. Armit, 1885", "New Guinea, Rev. Chalmers", "Brisbane, Q.", "Endeavour River, Q., No. 207", "Heberon, Q.", "Twofold Bay, Q., Tygrove, White", "Toowoomba, Q., Hartmann, No. 2", "Richmond River, N.S.W., Camara", "Tweed River, N.S.W., Camara, f.80, f.82", "Moonan Brook, N.S.W., Miss H. Carter", "Clarence River, N.S.W., Dr. Beckler", "Berry, N.S.W., F. A. Rodway, No. 14806", "Tarwin, Gippsland, Vic., Mrs. Manton", "Mt. Dromedary, Nos. 29, 38", "Upper Yarra River, Vic., Lucas", "Gippsland, Vic., Webb", "Sealers' Cove, Vic., F.v.M.", "V.D.L., ex Hooker herb.", "V.D.L., Gunn", "V.D.L., Laurence", "Johnny's Creek, Tasmania, No. 172", "V.D.L., Gunn & Laurence", "New Norfolk, Tas.", "N.Z., Nelson, Dr. Sinclair, 1860", "N.Z., Middle Island, Dr. Sinclair", "N.Z., Dr. Lindsay", "N.Z., Colenso, b.11, b.31, b.36, b.260, b.293, b.308" and "N.Z., Wairoa River, Kaipara Harbour, H. Samuel Mossman, 1850, No. 810". Under *Stereum spadicum* Berkeley placed "Tasmania, W. Archer". Cooke filed under *Stereum perlatum* "New Caledonia, Dr. Sarasin, No. 30" and "Port Denison, Q., Fitzalan, 1882". Under *Stereum boryanum* he



placed "Daintree River, Q., Pentzcke, 1882", "North Queensland", "Tweed River, N.S.W., Camara, f.84" and "Richmond River, N.S.W., Camara". Under *Stereum fasciatum* Cooke placed "Trinity Bay, Q., Sayer, No. 42"; under *Stereum gausapatum* "Russell River, Q., Sayer, No. 48". Miss Wakefield filed "Melbourne Botanic Gardens, Vic., W. N. Cheesman, 1914" under *Stereum leichkardtianum*. Cooke placed "Melbourne, Vic., F.v.M." under *Hymenochaete luteobadia* and labelled the collection *Stereum luteobadium*. Under *Stereum pictum* Berkeley filed the type ex "Back River Gully, Tas., No. 321". One collection ex "Richmond River, N.S.W., Camara, f.92" Cooke placed under *Stereum schomburgkii*. Masseur labelled "Airey's Inlet, Vic., Miss Berthon" as *Stereum vellereum* var. *australiense*. Finally, a collection ex "Wairoa River, Kaipara Harbour, N.Z., Samuel Mossman, No. 814" was found to consist of the three species *S. lobatum*, *S. vellereum* and *Polyporus adustus*.

60. LONGIPES. CYPHELLA Cke. & Mass., *Grev.*, 21, 1892: 38.

The type is at Kew, ex "Queensland, Bailey, No. 938".

*lugens*, *Hymenochaete* (Kl.) Bres. = *Hymenochaete semilugens*.

*lugubris*, *Stereum* Cke. = *Stereum hispidulum*.

61. LUTEAURANTIACUM, CORTICIUM Wakef., *Kew Bull. Misc. Inf.*, 1915: 372.

The type is at Kew, ex "Mamaku, N.Z., W. N. Cheesman, 1914".

62. LUTEOBADIA, HYMENOCHAETE (Fr.) Hoehn. & Litsch., *K. Akad. Wiss., Wien, Sitz.*, 116, 1907: 754.

*luteobadia*, *Thelephora* Fr., *Linnaea*, 5, 1830: 526.

*badia*, *Thelephora* Kl., in *Hook. Bot. Misc.*, 2, 1831: 163.

*kunzei*, *Thelephora* Hook., *l.c.*

*luteobadium*, *Stereum* Fr., *Epicrisis*, 1838: 547.

*lactum*, *Stereum* Berk., *Jour. Acad. Nat. Sci. Phil.*, 2, 1853: 279.

*laeta*, *Hymenochaete* Berk., ex Cke., *Grev.*, 8, 1880: 146.

*kunzei*, *Hymenochaete* (Hook.) Mass., *Jour. Linn. Soc.*, 27, 1890: 100.

Of the collections from the region at Kew "Endeavour River, Q.", agrees with the type of *H. kunzei*; "Blomfield River, Q., Bauer" is the same though placed by Cooke under *H. strigosa*; and "Melbourne, F.v.M.", placed by Cooke under *H. luteobadia*, consists of two collections of *Stereum lobatum*.

*luteobadium*, *Stereum* Fr. = *Stereum lobatum pro parte* and *Hymenochaete luteobadia*, *p.p.*

*luteocincta*, *Coniophora* (Berk.) Sacc. The type of *Thelephora luteocincta* Berk., ex "Wangaretta, Vic." consists of several sterile fragments closely adnate on wood. In microstructure they match *Coniophora arida*, consequently the species is best treated as a synonym of the latter.

*mellisii*, *Stereum* Berk., ex Cke. = *Stereum* affine.

membranaceum, *Hydnum* (Bull.) Fr. A collection placed under this cover by Cooke, ex "N.Z., Colenso, b. 152" is of *Merulius nothofagi*.

*meruloides*, *Hydnum* Berk. & Br. The type, ex "Brisbane, Q., Bailey, No. 246" is a deformed specimen of *Hydnum cirrhatum* Pers. ex Fr. A second collection under the cover, ex "Australia", Lloyd labelled on the sheet *Irpea meruloides*, and Miss Wakefield correctly referred it to *Irpea brevis*.

*miniatum*, *Corticium* Cke., *Grev.*, 9, 1880: 2. The type, ex "Condamine River, Q., 1880, F.v.M." is, as Miss Wakefield had noted on the sheet, a specimen of the imperfect stage of a *Hypoxylon*.

*molare*, *Radulum* Fr. A sterile fragment placed under this cover by Cooke, ex "Brisbane, Q., No. 234, on peach tree", does not agree with authentic specimens. On the sheet it had been labelled *R. subceraceum* Berk. & Br. though published as *R. molare* in *Trans. Linn. Soc.*, Ser. II, 2, 1883: 63.

*molle*, *Stereum* (Lev.) Sacc. Three collections referred to the species by Cooke, ex "Daintree River, Q." are of *Stereum involucreum*.

*moselei*, *Stereum* Berk. Under the cover are three collections ex "Airey's Inlet, Vic., Miss Berthon" which Bresadola described under the name of *Stereum floriforme*.

63. MOUGEOTII, HYMENOCHAETE (Fr.) Cke., *Grev.*, 8, 1880: 147.

*mougeotii*, *Thelephora* Fr., *Elench.*, 1, 1828: 188.

Three collections are at Kew from Australia, ex "New Guinea, Tantawanglo, W. Bauerlen, No. 240", "Brisbane, Q., F. Campbell, No. 499" and "Tasmania, W. Archer, Esq."

*micidum*, *Hydnum* Pers. ex Fr. A collection placed under this cover by Cooke, ex "N.Z., Colenso, b.1075" is of *Mycocacia subceracca*.

64. MUELLERI, HYDNUM Berk., *Jour. Linn. Soc.*, 13, 1873: 167.

*glabrescens*, *Hydnum* Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 59.

The type at Kew was ex "Tweed River, N.S.W. Guilfoyle". A second collection under the cover, ex "Toowoomba, Q., Hartmann" possesses the same microstructure but differs in being imbricate.

*muelleri*, *Kneiffia* Berk., *Jour. Linn. Soc.*, 13, 1873: 167. The type ex "Adelaide, S. Aus., Dr. Schomburgk" is probably a collection of *Grandinia farinacea*.

65. MULTIPLEX, CRATERELLUS Cke. & Mass., *Grev.*, 18, 1889: 25.

The type at Kew is from "Tasmania, Derwent River, Rodway, No. 658".

*murinum*, *Corticium* Berk. & Br. Under the cover of the type which is a species of *Coniophora* from Ceylon, are filed two Australian collections, ex "On Eucalyptus, ex Leuchmann, Myc. Univ., No. 1504" and "Berwick, Vic., 1878, F.v.M.". Both are specimens of *Peniophora vinosa*.

66. MUSCICOLUM, ASTEROSTROMA (Berk. & Curt.) Mass., *Jour. Linn. Soc.*, 25, 1889: 155.

*musciicola*, *Hymenochaete* Berk. & Curt., *Jour. Linn. Soc.*, 10, 1868: 334.

Though present in New Zealand, there are no collections at Kew from this region.

67. NEOCALEDONICUM, STEREUM Pat. & Har., *Jour. de Bot.*, 17, 1903: 6.

Two collections from New Caledonia are at Kew, part of the type ex "Mea, New Caledonia" and "Ignambuti, Sarasin, No. 75". The species has been listed as it will probably be found in Queensland.

*nigricans*, *Stereum* Lev. = *Hymenochaete villosa*.

68. NIGRUM, HYDNUM Fr., *Syst. Myc.*, 1, 1821: 404.

Two collections from the region placed under this cover at Kew agree with authentic European specimens. They are ex "Pennant Hills, N.S.W., June 1874, Challenger Expedition" and "Upper Yarra River, Vic., C. Walker". *H. sinclairii* is similar, but differs in the caespitose azonate pilei.

*nitidulum*, *Stereum* Berk. One collection placed under the cover by Cooke, ex "Australia, R. Brown" is of *S. thozetii*. Two others, ex "Endeavour River, Q., Persietz" and "North Queensland", filed here by Cooke, are collections of *S. elegans*.

*niveum*, *Hydnum* Pers. ex Fr. One collection placed under the cover by Cooke, ex "N.Z., Colenso, b. 740" is of an undescribed *Epithele*.

*novae-zealandiae*, *Hydnum* Col. = *Hydnum coralloides*.

*noxia*, *Hymenochaete* Berk., ex Cke., *Grev.*, 8, 1880: 149. The type, ex "Samoa, T. Powell, Jan. 1875" is based on the sterile context of a specimen of *Fomes noxious* Corner.

69. OAKESII, ALEURODISCUS (Berk. & Curt.) Cke., *Grev.*, 3, 1875: 172.

*oakesii*, *Corticium* Berk. & Curt., *Grev.*, 1, 1873: 166.

Three collections from New Zealand, ex "Colenso, b.528, b.590, b.729" agree with the type ex Alabama.

*obliquum*, *Stereum* Mont. & Berk. One collection filed under the cover by Cooke, ex "N.Z., Wairarapa, Dry River, T. Kirk, No. 140" is a torn and rosetted specimen of *Stereum sowerbeii*.

*ochraceoflavus*, *Aleurodiscus* Lloyd = *Aleurodiscus zealandicus*.

70. OCHRACEUM, HYDNUM Pers., ex Fr., *Syst. Myc.*, 1, 1821: 414.

*radicale*, *Corticium* Berk., *Lond. Jour. Bot.*, 4, 1845: 59.

*radicale*, *Stereum* (Berk.) Mass., *Jour. Linn. Soc.*, 27, 1890: 187.

One collection ex "Victoria, Dandenong Ranges, E. McLennan", filed by Miss Wakefield under this cover, agrees with European specimens. A second, now merely a fragment, ex "Swan River, W. Aus., Drummond, N<sup>o</sup>. 162" is the type of *Corticium radicale*.

ochroleucum, *Stereum* Fr. Six collections from the region were placed under this cover by Cooke. "N.Z., Wellington, T. Kirk, No. 261" and "N.Z., Colenso, b.300, under bark of rimu" are sterile species of *Corticium*; "N.Z., Colenso, b.74" is a specimen of a white *Septobasidium* which grows on living *Pseudopanax arboreum*; "N.Z., Colenso, b.948", named *Corticium spuneum* on the sheet, is also a species of *Septobasidium*; "N.Z., Colenso, b.619" is a collection of *Peniophora cinerascens*; and "N.Z., Crow's Nest, Ngaio, T. Kirk" is a fragment of an undescribed *Aleurodiscus*.

71. ODORATUS, CRATERELLUS (Schw.) Fr., *Epicrasis*, 1838: 532.

*odoratus*, *Merulius* Schw., *Nat. Ges., Leipz.*, 1, 1822: 91.

*confluens*, *Craterellus* Berk. & Curt., *Jour. Linn. Soc.*, 9, 1867: 423.

Under the cover of *C. confluens* are placed four collections, ex "Endeavour River, Q.", "Endeavour River, Q.", "Persieh", "Goode Island, Torres Strait, Q., Powell" and "Lilydale, Vic., Mrs. Martin".

72. OLIVACEA, CONIOPHORA (Fr., ex Pers.) Karst., *Bidr. kann. Finl. Nat. Folk.*, 37, 1882: 162.

Though the species is present in New Zealand, there are no collections from the region at Kew. One so named by Cooke, ex "Bunyip, Vic., No. 376" is of *Coniophora arida*.

*olivaceum*, *Hymenochaete* Cke. = *Duportella schomburgkii*.

*pannosa*, *Thelephora* Sow., ex Fr. One collection ex "V.D.L., Mr. Gunn", placed under the cover by Berkeley, was by Cooke correctly referred to *Stereum sowerbeii*.

*pannosum*, *Stereum* Cke. = *Stereum illudens*.

*pannosum*, *Stereum* Cke. & Mass. = *Stereum bicolor*.

73. POPYRINA, PENIOPHORA (Mont.) Cke., *Grev.*, 8, 1879: 20.

*papyrinum*, *Stereum* Mont., in *Hist. Cuba, Pl. Cell.*, 1842: 374.

Three collections from Australia are under the cover of *Stereum papyrinum* at Kew. "Tropical Queensland, Bailey" is of *Peniophora papyrina*; "Wangaretta, Vic." and "V.D.L. Gunn, 382 b" are of *Peniophora vinosa*.

*pedicellata*, *Thelephora* Schw., ex Fr. = *Septobasidium pedicellatum*.

*penetrans*, *Corticium* Cke. & Mass. = *Vararia portentosa*.

74. PERCOME, STEREUM Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 65.

*amaena* (*Stereum*) *Thelephora* Lev., *Ann. Sci. Nat.*, Ser. III, 5, 1846: 149.

*amaenum*, *Stereum* (Lev.) Mass., *Jour. Linn. Soc.*, 27, 1890: 193.

*latum*, *Stereum* Cke., *Grev.*, 20, 1892: 92.

*corrugae*, *Stereum* Lloyd, *Myc. Notes*, No. 57, 1919: 826.

Under *Stereum amaenum* at Kew is filed a collection ex "Stannary Hills, Q., S. L. Baneroft, 1909"; and under *S. percome* are "Dunk Island, Q., W. Cottrell Dormer, Aug. 1927, No. 30" and "Kuranda, Aus., H. F. Dean, No. 21".

Though the earliest specific name for the species is *T. amaena*, the combination *Stereum amaenum* cannot be employed since it was used for an African plant by Kalchbrenner & MacOwan (*Grev.*, 10, 1881: 58).

*pergamenum*, *Stereum* Berk. & Curt. Of the collections from the region placed under this cover by Cooke, "Kumusi River, New Guinea, Fitzgerald, 1895" is of *Stereum affine*; "Port Jackson, N.S.W., Miss Hopham, No. 2" is too imperfect to identify

*perlatum*, *Stereum* Berk. = *Stereum lobatum*.

75. PERSIMILE, ASTEROSTROMA Wakef., *Kew Bull. Misc. Inf.*, 1915: 372.

Two collections are under the type cover, the type ex "N.Z., Rotorua, W. N. Cheesman, 1914" and "Australia, ex C. G. Lloyd, on Eucalyptus bark".

petalodes, *Stereum* Berk. A collection placed under this cover by Cooke, ex "Gippsland, Vic." is a rosetted form of *Stereum elegans*.

*pezatum*, *Hydnum* Mass. = *Grandinia australis*.

*peziculoides*, *Alcuroidiscus* Wakef. = *Alcuroidiscus berggreni*.

*phaeum*, *Stereum* Berk. = *Hymenochaete villosa*.

*pictum*, *Stereum* Berk., ex Mass. = *Stereum lobatum*.

polygonium, *Corticium* (Pers.) Fr. Of the three collections from the region placed under this cover by Cooke "N.Z., Colenso, b.670" and "N.Z., Colenso, b.2082", are of undescribed species of *Alcuroidiscus*; "N.Z., Colenso, 1866, b.447" is of *Peniophora vinosa*.

## 76. PORTENTOSA, VARARIA (Berk. &amp; Curt.) nov. comb.

*portentosum*, *Corticium* Berk. & Curt., *Grev.*, 2, 1873: 3.

*penetrans*, *Corticium* Cke. & Mass., *Grev.*, 19, 1891: 90.

Though the species is common in New Zealand there are no collections from this area in Kew herbarium. The only Australian collection is the type of *Corticium penetrans*, ex "Sorrento, Vic., Mrs. Martin, No. 635".

77. PRINCEPS, STEREUM (Junglh.) Sacc., *Syll. Fung.*, 6, 1888: 570.

*princeps*, *Thelephora* Junglh., *Fl. Crypt. Javae*, Fasc. 1, 1818: 38.

A collection ex "Baridi, Papua, C. E. Carr, No. 13565" agrees with other collections under the cover at Kew.

78. PROLIFICANS, STEREUM Berk., *Jour. Linn. Soc.*, 16, 1877: 41.

*vespilloneum*, *Stereum* Berk., *Jour. Linn. Soc.*, 16, 1877: 44.

*hollandii*, *Stereum* Lloyd, *Syn. Stip. Stereums*, 1913: 30.

Collections from the region at Kew are filed under several covers. Under *S. prolificans* are the type ex "Somerset, Cape York Peninsula, Q., Challenger Expedition", "Russell River, Q., Sayer, No. 49" labelled *S. baileyana* on the sheet, "Brisbane, Q., F. M. Bailey, No. 314" (a duplicate of the last is under the cover of *S. perlatum* in the British Museum of Natural History). Under *S. vespilloneum* are the type ex "Aru Island, Challenger Expedition" and "Melbourne, Vic., G. Le Fevre" which is an empty peridium of *Scleroderma flavidum*. Under *S. hollandii* are the type ex "Okumi, Cross River Expedition, J. H. Holland, No. 40" and "Loyalty Islands, F. Sarasin". Under *Hymenochaete phaea* are "Daintree River, Q." and "Brisbane, Q., No. 314". One collection placed by Cooke under *Stereum prolificans*, ex "Clarence River, N.S.W., F.v.M." and labelled *S. shraderi* Thuem., is of *S. illudens*.

*pteridophila*, *Cyphella* Cke., ex Sacc. A later name used for *Cyphella filicicola*, which was based upon empty egg-cases of a butterfly or moth.

79. PUBERA, PENIOPHORA (Fr.) Sacc., *Syll. Fung.*, 6, 1888: 646.

*pubera*, *Thelephora* Fr., *Elench.*, 1, 1828: 215.

*puberum*, *Corticium* Fr., *Epicrisis*, 1838: 562.

*pubera*, *Hymenochaete* (Fr.) Lev., *Ann. Sci. Nat.*, Ser. III, 5, 1846: 152.

One collection from Australia is in Kew herbarium, named by Miss Wakefield, ex "Katoomba, Blue Mts., N.S.W., W. N. Cheesman, 1914".

pulverulenta, *Coniophora* (Lev.) Mass. A collection from this region filed under this cover by Cooke, ex "Victoria, No. 60, on wall of damp cellar", is of *Merulius lacrymans*.

*purpurea*, *Hymenochaete* Cke. & Morg. = *Peniophora vinosa*.

80. PURPUREUM, STEREUM Pers., ex Fr., *Epicrisis*, 1838: 548.

*purpurea*, *Thelephora* Pers., ex Fr., *Syst. Myc.*, 1, 1821: 440.

Two collections from the region are at Kew, ex "Wellington, N.Z., A. H. Cockayne, Aug. 1914, on willow" and "Adelaide, S. Aus., D. B. Adam, on *Cytisus scoparius*". Under

the cover Berkeley placed a specimen ex "Tasmania, W. Archer Esq." which is of *Stereum rameale*.

*pusillum*, *Stereum* Berk. A specimen so named by Berkeley, ex "V.D.L., Gunn" is now placed correctly under *S. elegans*.

*radians*, *Thelephora* Berk. Both collections placed under the cover by Cooke, ex "Guntawang, N.S.W., Hamilton" and "Mt. Napier, Vic., 1883" are of *Stereum soucebeii*.

81. *RADIATOFISSUM*, *STEREUM* Berk. & Br., *Trans. Linn. Soc.*, Ser. II, 2, 1883: 63.

The type alone is under the cover at Kew, ex "Brisbane, Q., No. 277". On the sheet Bresadola had written "= *Stereum spectabile* Kl. = *Lloydella spectabile* (Kl.) Bres."

*radicale*, *Corticium* Berk. On the type sheet containing the type collection ex "Swan River, W. Aus., Drummond, No. 162" Berkeley had written: "A very distinct species from any with which I am acquainted." Little wonder, since the type is merely a fragment of *Hydnum ochraceum*.

*radicale*, *Stereum* (Berk.) Mass. = *Hydnum ochraceum*.

82. *RADICATA*, *PENIOPHORA* (P. Henn.) Hoehn. & Litsch., *K. Akad. Wiss., Wien, Sitz.*, 117, 1908: 1092.

*radicatum*, *Corticium* P. Henn., in *Engl. Pflanzenwelt Ostaf.*, 1895: 54.

One collection from Australia is at Kew, ex "Ballarat, Vic., W. N. Cheesman, 1914".

83. *RAMEALE*, *STEREUM* (Schw.) Mass., *Jour. Linn. Soc.*, 27, 1890: 187.

*rameale*, *Thelephora* Schw., *Nat. Ges. Leipz., Schrift.* 1, 1822: 106.

*comptactum*, *Stereum* Fr., *Epicrisis*, 1838: 548.

*ramealis*, *Hymenochaete* Berk., *Jour. Linn. Soc.*, 14, 1875: 68.

Collections from the region at Kew correctly named are "South Western Australia, 1881, F.v.M." and "Sugar Loaf Mts., N.S.W., Baron Mueller". Under *Stereum purpureum* Berkeley placed a collection ex "Tasmania, W. Archer Esq.". Under *S. hirsutum* Cooke filed "Mulgrave River, Q., No. 849", "Mt. Lofty, S. Aus., F.v.M.", "Sealers' Cover, Vic., F.v.M., No. 142", "Melbourne, Vic., Le Fevre, No. 208", "New England, N.S.W.", and "Chatham Islands, N.Z., Travers". Under *S. spadiceum* Berkeley placed "Western Point, Vic., F.v.M., June 1853".

84. *REGULARIS*. *THELEPHORA* Schw., *Nat. Ges. Leipz., Schrift.* 1, 1822: 105.

*ravenelii*, *Thelephora* Berk., *Grev.*, 1, 1873: 148.

*hiscens*, *Thelephora* Berk., *l.c.*

A collection ex "Strickland River, New Guinea, Bauerlen, 1885, No. 19", though larger, agrees in microstructure with other specimens under the cover at Kew.

*reticulatum*, *Corticium* Berk. & Br. = *Septobasidium rhabarbarinum*.

*retirugum*, *Stereum* Cke. A collection so named by Cooke, ex "Australia, Kalchbrenner, No. 7" is of *Duportella schomburgkii*.

85. *RHABARBARINA*, *HYMENOCHAETE* (Berk.) Cke., *Grev.*, 8, 1880: 148.

*rhabarbarinum*, *Corticium* Berk., *Fl. N.Z.*, 2, 1855: 184.

Only the type collection is at Kew, ex "New Zealand, Colenso". A specimen placed by Cooke under the cover, ex "N.Z., Colenso, b.391" and by Bresadola referred on the sheet to *H. rheicolor*, is of *H. tenuissima*.

86. *RHABARBARINUM*, *STEREUM* (Berk. & Br.) Wakef., *Kew Bull. Misc. Inf.*, 1915: 370.

*rhabarbarinum*, *Corticium* Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 69.

The type from Ceylon and "Nowra, N.S.W., W. N. Cheesman, 1914" are the only collections under the cover at Kew.

87. *RHODOSPORA*, *VARARIA* (Wakef.) nov. comb.

*rhodospora*, *Asterostromella* Wakef., *Kew Bull. Misc. Inf.*, 1915: 372.

The type of *A. rhodospora*, ex "Blackall Range, Q., W. N. Cheesman, 1914" is a *Vararia* with characteristic dichophyses of the genus.

*roseum*, *Corticium* Pers. ex Fr. Berkeley referred to this species a collection ex "Tasmania, Archer" which, being sterile, cannot now be identified.

rubiginosa, *Hymenochaete* (Dicks) Lev. None of the collections from this region placed under the cover at Kew is of this species. "N.Z., Colenso, b.153", labelled on the sheet *Stereum ferrugineum*, is of *S. illudens*; "Tasmania" is a specimen of *Hymenochaete fuliginosa*; "V.D.L., ex Hooker herb." labelled *Thelephora ferruginea*, "V.D.L., Messrs. Gunn & Laurence" and "V.D.L., ex herb. Hooker, No. 19" are collections of *Hymenochaete villosa*.

88. RUBROPUNCTATUM, CORTICIUM Mass. & Rodw., in Rodway, *Papers and Proc. Roy. Soc. Tas.*, 1898-99, 1900: 98, *nomen nudum*.

The type collection is at Kew, ex "Tasmania, Rodway, No. 561". Although the name was published in a list of Tasmanian fungi compiled by Rodway, the species was not formally described.

89. RUGOSUM, STEREUM Pers. ex Fr., *Epicrisis*, 1838: 552.

*rugosa*, *Thelephora* Pers. ex Fr., *Syst. Myc.*, 1, 1821: 439.

Under the cover at Kew is a collection ex "Tannuda, S. Aus., W. N. Cheesman, 1914" which agrees with authentic European specimens. It was named by Miss Wakefield. Cooke filed under the cover three specimens of *Peniophora cinerascens*, ex "Clarence River, N.S.W., Wilcox".

9. SAMBUCCI, PENIOPHORA (Pers.) Burt, *Ann. Mo. Bot. Gard.*, 12, 1926: 233.

*sera*, *Thelephora* Pers., *Myc. Eur.*, 1, 1822: 151.

*sambuci*, *Thelephora* Pers., *l.c.*, p. 152.

*sambuci*, *Corticium* (Pers.) Fr., *Epicrisis*, 1838: 565.

*serum*, *Corticium* (Pers.) Fr., *Hym. Eur.*, 1874: 659.

Though the species is common in New Zealand there are no collections from the region at Kew. Of those filed under the cover (of *Corticium serum*) "N.Z., Waitaki, No. 260" is a specimen of *Polyporus dichrous*; and "N.Z., Wellington, Travers, No. 375" is of a white *Septobasidium* which grows on living branches of *Pseudopanax arboreum*.

91. SANGUINOLENTUM, STEREUM (A. & Sw.) Fr., *Epicrisis*, 1838: 549.

*sanguinolenta*, *Thelephora* Alb. & Schw., ex Fr., *Syst. Myc.*, 1, 1821: 440.

Four collections from the region are at Kew, namely, "N.Z., Colenso, b.284, b.354", "Domain, Auckland, N.Z., W. N. Cheesman, 1914" and "S. Aus., D. B. Adam".

*schneideri*, *Cyphella* Berk. & Br., *Trans. Linn. Soc.*, Ser. II, 2, 1887: 220. The type collection was from "Queensland, H. Schneider, comm. Bailey, No. 461". No specimens are at Kew, but the description suggests the species was based on a collection of *Solenia candida*.

92. SCHOMBURGKII, DUPORTELLA (Berk.) nov. comb.

*schomburgkii*, *Stereum* Berk., *Jour. Linn. Soc.*, 13, 1873: 168.

*olivaceum*, *Hymenochaete* Cke., *Grev.*, 14, 1885: 11.

*atrocinerea*, *Peniophora* (Kalch.) Mass., *Jour. Linn. Soc.*, 25, 1889: 141.

*atrocinereum*, *Corticium* Kalch., in herb. Kew.

*schomburgkii*, *Hymenochaete* (Berk.) Mass., *Jour. Linn. Soc.*, 27, 1890: 115.

The type collection of *Stereum schomburgkii*, ex "Port Darwin, Aus." consists of two species, one being *Stereum illudens*, as was noted on the sheet by Berkeley. Additional collections from the region under the cover are "Toowoomba, Q., Hartmann", "Port Denison, Q.", "Toowoomba, Q." (type of *Hymenochaete olivaceum*), "Nowra, N.S.W., W. N. Cheesman, 1914", "New England, N.S.W., A. R. Crawford" and "Australia, Kalchbrenner, No. 7". The last Kalchbrenner had labelled *Stereum venapum* and Cooke had filed under *S. retirugum*. Other collections placed under the cover are of three species. "Port Denison, Q., Shann, f.15" is of *Peniophora cinerascens*; "Clarence River, N.S.W., Wilcox", a collection of a sterile *Hymenochaete*; and "Richmond River, N.S.W., Camara, f.92", a specimen of *Stereum lobatum*.

93. SCOPINELLA, ODONTIA (Berk.) Cke., *Grev.*, 20, 1891: 3.

*scopinellum*, *Hydnum* Berk., *Fl. N.Z.*, 2, 1855: 181.

Three collections from the region are at Kew, the type ex "New Zealand, Colenso", "N.Z., Colenso, b.295" and "Moruya, N.S.W., W. N. Cheesman, 1914".

94. SCUTELLARE, CORTICIUM Berk. & Curt., *Grev.*, 2, 1873: 4.

The following collections from the region agree with the type ex South Carolina: "N.Z., 1866, b.323", "N.Z., Colenso, b.386, b.831, b.895" and "N.Z., Wellington, Travers, No. 376". The second was placed by Cooke under *Corticium laeve*, the third under *Grandinia australis* and the last under *Aleurodiscus acerinus*.

*secernibilis*, *Odontia* Berk. = *Odontia fimbriata*.

95. SEMILUGENS, HYMENOCHAETE (Kalch.) Bres., *Ann. Myc.*, 9, 1911: 550.

*semilugens*, *Stereum* Kalch., *Grev.*, 9, 1880: 1.

*lugens*, *Hymenochaete* Bres., in herb. Kew.

The type at Kew is ex "Rockhampton, Q., F.v.M." though on the sheet the locality was given as New South Wales. Bresadola noted on the type sheet: "Not *Stereum pannosum* (to which the collection had been referred by Cooke) but *Hymenochaete lugens* Kl." Both errors in specific name and author were corrected in *Annales Mycologici*.

sericeum, *Stereum* (Schw.) Morg. Under this cover Berkeley placed an insect-damaged specimen of *Stereum vellereum* ex "East Taieri, Otago, N.Z., Nov. 1861, Dr. Lindsay".

*serum*, *Corticium* (Pers.) Fr. = *Peniophora sambuci*.

96. SETIGERA, PENIOPHORA (Fr.) Hoehn. & Litsch., *K. Akad. Wiss., Wien., Sitz.* 115, 1906: 1555.

*setigera*, *Thelephora* Fr., *Elench.*, 1, 1828: 208.

*setigera*, *Kneiffia* Fr., *Epierisis*, 1838: 529.

Of the five collections from the region under this cover at Kew, three are correctly named by Miss Wakefield, namely, "Fullarton, Adelaide, S. Aus., J. B. Cleland", "Black-fellow's Creek, S. Aus., J. B. Cleland", and "National Park, Adelaide, S. Aus., W. N. Cheesman, 1914". The others, "Tasmania, W. Archer" and "N.Z., Colenso, b.120", are sterile specimens of *Corticium*.

*shraderi*, *Stereum*., Thuem. in herb. Kew. A collection, ex "Clarence River, N.S.W., F.v.M.", so labelled by Thuemen, and placed by Cooke under *S. prolificans*, is of *Stereum illudens*.

97. SIMULANS, THELEPHORA (Berk. & Br.) Corner, *Clavaria*, 1950: 724.

*simulans*, *Stereum* Berk. & Br., *Trans. Linn. Soc.*, Ser. II, 2, 1883: 64.

*simulans*, *Lachnocladium* Berk. & Br., *Trans. Linn. Soc.*, Ser. II, 2, 1887: 219.

The type of *Stereum simulans*, ex "Brisbane, Q., F. M. Bailey" is in the herbarium of British Museum of Natural History, part being at Kew. Additional collections under the cover are "Samoa, C. G. Lloyd", "Pennant Hills, Challenger Expedition" and "Q., C. E. Broome".

98. SINCLAIRII, HYDNUM Berk., in *Hook. Hdbk. N.Z. Flora*, 1867: 756.

Endemic to New Zealand, the species is represented at Kew by four collections, the type ex "N.Z., Sinclair, 1860" of five specimens in excellent condition, "Maungaroa, No. 320", "Nelson, Dall" and "York Bay, Wellington, July 1923, E. J. Butler-G.H.C., No. 1217".

99. SOWERBEII, STEREUM Berk., *Fl. N.Z.*, 2, 1855: 182.

*sowerbei*, *Thelephora* Berk., *Ann. Mag. Nat. Hist.*, Ser. III, 15, 1865: 320.

*confusum*, *Stereum* Berk., in herb. Kew.

Collections from the region at Kew are "Moonan Brook, N.S.W., Miss Carter", "Daylesford, N.S.W., R. Wallace, 1880", "Gippsland, Vic., Miss Campbell, 1880", "Mt. Ellery, East Gippsland, Vic., E. Merrah", "V.D.L., Mr. Gunn" (labelled by Berkeley *Thelephora pannosa*), "V.D.L., Gunn" (labelled *T. pannosa* by Berkeley but published as

*S. sowerbeii*), and "New Zealand, Colenso". Two large distorted specimens ex "Guntawang, N.S.W., Hamilton" and "Mt. Napier, Vic., 1883" were filed by Cooke under *Thelephora radians*. Under *Stereum thozetii* Cooke placed "Gippsland, Vic.". Under *S. obliquum* he filed a collection ex "N.Z., Wairarapa, Dry River, T. Kirk, No. 140".

In literature the specific name is often spelled *S. sowerbeyi*.

spadiceum, *Stereum* (Pers.) Fr. Of the two collections under this cover from the region "Tasmania, W. Archer" is of *S. lobatum*, "Western Port, F.v.M., June 1853" is an imperfect specimen of *S. ramcate*.

sparsum, *Corticium* Berk. & Br. Under this cover at Kew is a collection ex "N.Z., T. Kirk, No. 318, on dead mahoe bark" which are specimens of the conidial stage of *Nectria otagensis*.

100. SPARSUS, ALEURODISCUS (Berk.) Hoehn. & Litsch., *K. Akad. Wiss., Wien, Sitz.*, 116, 1907: 809.

sparsum, *Stereum* Berk., *Jour. Linn. Soc.*, 13, 1873: 169.

The type collection, ex "Wangaretta, Vic., Aus.", consisting of eight small and irregular colonies, is the only collection at Kew.

101. SPHAEROSPORUM, CORTICIUM (Maire) Bourd. & Galz., *Hym. Fr.*, 1928: 232.

sphaerosporus, *Hypochnus* Maire, *Bull. Soc. Myc. Fr.*, 21, 1905: 164.

One collection, ex "Australia, S.53" was filed by Berkeley under *Corticium arachnoideum*.

spiniferum, *Stereum* Lloyd = *Stereum illudens*.

spongiosa, *Cladoderris* Fr. = *Cladoderris dendritica*.

sprucei, *Stereum* Berk. & Curt. = *Stereum lobatum*.

spumeum, *Corticium* Berk. & Rav. One collection ex "N.Z., Colenso, b.948" so labelled by Cooke but filed by him under *Stereum ochroleucum* is of *Corticium evolvens*.

stereoides, *Thelephora* Cke. & Mass. = *Stereum hispidulum*.

stipitatum, *Hydnum* Fr. Neither collection from the region placed under this cover at Kew is of this species. "Victoria, Dr. Winter, No. 5" possesses gloecystidia, and "Richmond River, N.S.W." has small obovate spores.

strigosa, *Hymenochaete* Berk. & Br. = *Hymenochaete villosa*.

102. SUBCERACEA, MYCOACIA (Wakef.) nov. comb.

subceracea, *Acia* Wakef., *Trans. Proc. Roy. Soc. S. Aust.*, 1930: 155.

Collections at Kew are the type ex "Mt. Lofty, J. B. Cleland, June 1927", "Mt. Lofty, S. Aus., J. B. Cleland, May 1928", "National Park, S. Aus., J. B. Cleland, Apl. 1924, May 1925" and "N.Z., Colenso, No. 1075" the last filed by Cooke under *Hydnum mucidum*.

103. SUBFASCICULARIA, ODONTIA (Wakef.) nov. comb.

subfascicularia, *Acia* Wakef., *Trans. Proc. Roy. Soc. S. Aust.*, 1930: 155.

The type is at Kew ex "Mt. Lofty, S. Aus., J. B. Cleland, May 1928, W".

subporiferum, *Stereum* Berk. in herb. Kew. The name was given in the herbarium to a specimen ex "Chatham Islands, Travers, No. 7" which on examination was found to be a *Peniophora*.

sulfureum, *Corticium* Fr. Under the cover are two collections from the region, both wrongly named. "Tasmania" is a specimen of *Peniophora filamentosa*, and "b.507" (which is obviously from New Zealand as the label is in Colenso's handwriting) is of *Coniophora arida*.

sulphuratum, *Stereum* Berk. & Rav. Under this cover, which is labelled *S. sulfuratum* Fr., Cooke placed two Australian collections, ex "Clarendon, S. Aus., Tepper, No. 582" and "Port Phillip, Vic., No. 310". Both are of *Stereum vellereum*.

sulphureum, *Stereum* Fr. A collection from Australia so named by Cooke, ex "Toowoomba, Q., Hartmann, 1882" consists of three fragments of an *Aleurodiscus*.

104. SULPHURELLA, CORTICIUM Cke. & Mass., *Rev.*, 20, 1891: 35.

The type at Kew is ex "Oakleigh, Vic., Mrs. Martin, No. 925".



105. SURINAMENSE, STEREUM Lev., *Ann. Sci. Nat.*, Ser. III, 2, 1844: 209.

Though the species is common in New Zealand there are no collections from the region in Kew herbarium.

106. TABACINA, HYMENOCHAETE (Sow.) Lev., *Ann. Sci. Nat.*, Ser. III, 5, 1846: 152.

*tabacina*, *Thelephora* (Sow.) Fr., *Syst. Myc.*, 1, 1821: 437.

*tabacinum*, *Stereum* (Sow.) Fr., *Epicrisis*, 1838: 550.

Only one authentic collection from the region is at Kew, ex "Mamaku, N.Z., W. N. Cheesman, 1914", identified by Miss Wakefield. A second filed under the cover by Cooke, ex "Walcha, New England, N.S.W., Crawford" is of *Hymenochaete villosa*.

107. TABACINA, VELUTICEPS (Cke.) Burt, *Ann. Mo. Bot. Gard.*, 6, 1919: 261.

*tabacinus*, *Aleurodiscus* Cke., *Grev.*, 14, 1885: 11.

The type collection is ex "Moona, Walcha, N.S.W., A. R. Crawford, Feb. 1885". A second collection, filed by Cooke under *Hydnum delicatulum*, is ex "Darling Downs, Q., No. 1095".

*tabacinum*, *Hydnum* Cke. = *Hydnum crinale*.

108. TASMANICA, HYMENOCHAETE Mass., *Jour. Linn. Soc.*, 27, 1890: 105.

Though in his description Masee stated that the type collection was from New Zealand, on the sheet the type specimen is labelled "Tasmania, herb. Berkeley" in his handwriting. Other collections under the cover are ex "National Park, Adelaide, S. Aus., W. N. Cheesman, 1914" and "Tasmania, L. Rodway, No. 688".

109. TENUISSIMA, HYMENOCHAETE Berk., *Jour. Linn. Soc.*, 14, 1875: 67.

*tenuissimum*, *Stereum* Berk., *Lond. Jour. Bot.*, 6, 1847: 510.

Under the cover are three collections from the region, ex "Tweed River, N.S.W., Camara", "Toowoomba, Q., Hartmann" and "N.Z., Colenso, b.391". The last was placed by Cooke under *H. rhabarbarina* and on the sheet referred by Bresadola to *H. rheicolor*. *tephra*, *Peniophora* (Berk. & Curt.) Cke. Two collections from the region under the cover at Kew, ex "Australia, S.43, S.48" are not of this species but may be of *P. vinosa*.

110. TERRESTRIS, THELEPHORA (Ehrlh.) Fr., *Syst. Myc.*, 1, 1821: 431.

*lacinata*, *Thelephora* (Pers.) Fr., *Syst. Myc.*, 1, 1821: 431.

Three collections from the region are at Kew, ex "Port Phillip, Vic., 1886", "Sydney, N.S.W., Miss Scott", placed under *Thelephora intybacea* by Cooke, and "Ashburton, N.Z., W. W. Smith, Nov. 1897" which Masee filed under *Thelephora vaga*.

*terreum*, *Corticium* Berk., *Fl. N.Z.*, 2, 1855: 184. The type collection, ex "N.Z., Ruamahanga, Colenso, on bark of *Knightia excelsa*" is a species of *Septobasidium* commonly on living bark of this host.

111. THOZETII, STEREUM Berk., *Jour. Linn. Soc.*, 18, 1881: 385.

The type, ex "Rockhampton, Q." consists of three specimens in good condition. One other collection, ex "Australia, R. Brown", is filed under *S. nitidulum*. Of the other collections placed under the cover "Endeavour River, Q." and "New Guinea, Armit" are of *Stereum elegans*; "Gippsland, Vic." consists of two species, *S. elegans* and *S. sowerbeii*; and "W. Australia, Thos. Muir" is too imperfect to identify.

112. TOTARA, CYPHELLA G. H. Cunn.

Common on living and dead trunks and branches of *Podocarpus totara* in New Zealand, the species is represented at Kew by one collection ex "Buller Valley, T. Kirk, No. 236" filed under *C. cupulaeformis*. A description is being published elsewhere.

113. TRISTRICULA, DUPORTELLA (Berk. & Br.) Reinking, *Philippine Jour. Sci.*, 17, 1920: 364.

*tristiculum*, *Corticium* Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 71.

*tristiuscula*, *Hymenochaete* (Berk. & Br.) Mass., *Jour. Linn. Soc.*, 27, 1890: 111.

*castanea*, *Hymenochaete* Wakef., *Kew Bull. Misc. Inf.*, 1914: 260.

*velutina*, *Duportella* Pat., *Philippine Jour. Sci.*, 10, 1915: 87.

*velutina*, *Hymenochaete* (Pat.) Lloyd, *Myc. Notes*, No. 63, 1920: 966.

Australian collections which match the type from Ceylon are "Cape Direction, Q., D. Thomson" and "Toowoomba, Q., Hartmann". The latter was placed by Cooke under the cover of *Hymenochaete insularis*.

udum, *Hydnum* Fr. One collection placed under the cover by Berkeley, ex "Tasmania, Archer" is not of this species but being sterile cannot be identified.

*umbrina*, *Hymenochaete* Berk. & Curt. = *Peniophora vinosa*.

114. UMBRINOALUTACEUM, STEREUM Wakef., in Sarasin & Roux, *Nova Caledonia*, B, 1-L, 2, 1920: 101.

The type was from "Gulf of Prony, New Caledonia, Sarasin, No. 195" and the species listed since it will probably be found in Queensland. It is a species of *Peniophora*, close to *P. papyrina*.

*umbrinum*, *Stereum* Fr. = *Peniophora vinosa*, possibly.

*umbrinum*, *Stereum* Berk. & Curt. = *Peniophora vinosa*.

115. UNICOLOR, HYMENOCHAETE Berk. & Curt., *Jour. Linn. Soc.*, 10, 1868: 335.

Two collections from the region are at Kew, ex "N.Z., Colenso", placed by Cooke under the cover of *Corticium laeve*.

*varicolor*, *Stereum* Lloyd = *Stereum hirsutum*.

*vaga*, *Thelephora* Berk., *Fl. N.Z.*, 2, 1855: 182. The type ex "N.Z., Sinclair" is not at Kew. A collection placed under this cover by Masee, ex "N.Z., Ashburton, W. W. Smith" is of the common pine mycorrhizal species *Thelephora terrestris*.

116. VELLEREUM, STEREUM Berk., *Fl. N.Z.*, 2, 1855: 183.

Collections from the region at Kew are the type ex "N.Z., Bay of Islands, J. D. Hooker", "N.Z., Colenso", "Middle Island, N.Z., Dr. Sinclair", "York Bay, Wellington, N.Z., E. J. Butler, July, 1923", "Campbell Island, N.Z., J. B. Mayne, March 1908, No. 6", "Mamaku and Wairoa, N.Z., W. N. Cheesman, 1914", "Wairoa River, Kaipara Harbour, Samuel Mossman, No. 813, 1850" (a mixture of *S. vellereum*, *S. lobatum* and *Polyporus adustus*), "N.Z., Colenso, b.49, b.75, b.255, b.290, b.346, b.392", "Waitaki, N.Z.", "East Taieri, Otago, N.Z., Dr. Lindsay, Nov. 1861" (filed by Berkeley under *S. sericeum*), "V.D.L., herb. Hooker, No. 20" (placed by Berkeley under *S. hirsutum*), "Tasmania, W. Archer" (a mixture of three species, one being *S. vellereum*), "Fitzroy Falls, N.S.W., F. A. Rodway, Nov. 1930", "Swan River, W. Aus., No. 159" (placed by Berkeley under *S. hirsutum*), "Near Melbourne, Vic.", "Port Phillip, Vic., No. 310" and "Clarendon, S. Aus., Tepper, No. 582". The last three were placed by Cooke under *S. sulfuratum*.

117. VELUTINA, PENIOPHORA (DC.) Cke., *Grav.*, 8, 1879: 21.

*velutina*, *Thelephora* DC., ex Fr., *Elench.*, 1, 1828: 203.

*velutina*, *Hymenochaete* (DC) Lev., *Ann. Sci. Nat.*, Ser. III, 5, 1846: 152.

The only authentic collection from the region at Kew is ex "N.Z., Rotorua, W. N. Cheesman, 1914", so identified by Miss Wakefield. A second placed under the cover, ex "New Zealand", labelled by Berkeley *Thelephora vaga*, is a *Peniophora* I was unable to identify.

118. VERMICULARIS, PENIOPHORA Wakef., *Kew Bull. Misc. Inf.*, 1915: 371.

The type at Kew, ex "N.Z., Rotorua, W. N. Cheesman, 1914" was collected on petioles of a tree fern.

*vespilloneum*, *Stereum* Berk. = *Stereum prolificans*.

119. VILLOSA, CYPHELLA (Pers.) Karst., *Bidr. kann. Finl. Nat. Folk.*, 25, 1876: 325.

Three collections from the region are at Kew, ex "Centennial Park, N.S.W., E. Cheel, No. 21" placed by Masee under *Cyphella australiensis*, "N.Z., T. Kirk, on Antirrhinum stems" and "Melbourne, Vic., No. 376", both filed by Cooke under *C. curreyi*.

120. VILLOSA, HYMENOCHAETE (Lev.) Bres., *Ann. Myc.*, 8, 1910: 588.*villosum*, *Stereum* Lev., *Ann. Sci. Nat.*, Ser. III, 2, 1844: 212.*nigricans*, *Stereum* Lev., *l.c.**phaeum*, *Stereum* Berk., *Fl. N.Z.*, 2, 1855: 183.*strigosa*, *Hymenochaete* Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 68.*phaea*, *Hymenochaete* (Berk.) Cke., *Grev.*, 8, 1880: 146.

Collections listed match part of the type of *Stereum villosum* from Java at Kew. Under *H. villosa* is "Moruya, N.S.W., W. N. Cheesman, 1914"; under *H. phaea* are the type of *Stereum phaeum* ex "Bay of Islands, N.Z., J. D. Hooker", "N.Z., Dr. Sinclair", "N.Z., Colenso", "N.Z., Waimea, No. 338", "Condamine River, Q., F.v.M., 1880", "Mt. Dryander, Q., Shann", "Tweed River, N.S.W., Camara, No. 85"; under *H. rubiginosa*, labelled *H. ferruginea* on the sheet, are "V.D.L., ex Hooker herb.", "V.D.L., Messrs. Gunn & Laurence" and "V.D.L., Hooker herb. No. 19"; under *H. strigosa* is "Brisbane, Q., C. E. Broome". Two collections of *Stereum prolificans*, ex "Daintree River, Q." and "Brisbane, Q., No. 314" are filed under the cover. Under *H. tabacina* Cooke placed a collection of the species ex "Walcha, New England, N.S.W., Crawford".

121. VINOSA, PENIOPHORA (Berk.) Mass., *Jour. Linn. Soc.*, 25, 1889: 145.*vinosa*, *Thelephora* Berk., *Hook. Lond. Jour. Bot.*, 4, 1845: 60.*crassa*, *Thelephora* Lev., in *Gaud. Voy. Bonite*, Bot. 1, 1846: 190.*? umbrinum*, *Stereum* Fr., *Pl. Preiss*, 2, 1847: 137.*umbrinum*, *Stereum* Berk. & Curt., *Grev.*, 1, 1873: 164.*murinum*, *Corticium* Berk. & Br., *Jour. Linn. Soc.*, 14, 1875: 70.*vinosa* (*Veluticeps*) *Hymenochaete* Cke., *Grev.*, 8, 1880: 149.*crassa*, *Hymenochaete* (Lev.) Berk., ex Cke., *Grev.*, *l.c.*, p. 148.*umbrina*, *Hymenochaete* Berk. & Curt., ex Cke., *l.c.**multispinulosa*, *Hymenochaete* Peck, *Bot. Gaz.*, 7, 1882: 54.*scabriseta*, *Hymenochaete* Cke., ex Rav., *Fung. Am.*, 1882: 717.*purpurea*, *Hymenochaete* Cke. & Morg., *Grev.*, 11, 1883: 107.*intermedia*, *Peniophora* Mass., *Jour. Linn. Soc.*, 25, 1889: 143.*kalchbrenneri*, *Hymenochaete* Mass., *Jour. Linn. Soc.*, 27, 1890: 116.*murinum*, *Coniophora* (Berk. & Br.) Mass., *l.c.*

The following collections from the region are at Kew. Under *Stereum umbrinum* is "Sydney, N.S.W., P. Bochmer"; under *Hymenochaete umbrina* "N.Z., Wairoa, E. A. Hodgson, No. 40"; under *H. purpurea* are "Brisbane, Q., F. Bailey, Aug. 1912", "Brisbane, Q., W. N. Cheesman, 1914", "Norfolk Island, Robinson", and "Melbourne, Vic., F. Reader, No. 22"; under *H. crassa* is "Clarence River, N.S.W., Wilcox". Types of species and synonyms at Kew are, type of *Thelephora vinosa* ex "Swan River, W. Aus., Nos. 160, 172"; of *Hymenochaete kalchbrenneri* "Australia, Kalchbrenner, No. 8" (under the cover were also placed "N.Z., Colenso, b.521, b.570"); of *Corticium murinum* "Berwick, Vic., 1878, F.v.M." (under the cover was also placed, "Victoria, Leuchmann"). Under *Corticium polygonium* Cooke filed "N.Z., Colenso, 1866, b.447"; and Berkeley placed under *Peniophora papyrina* "V.D.L., Gunn, 382 b" and "Wangaretta, Vic."

122. VIRIDE, CONIOPHORA (Berk.) Sacc., *Syll. Fung.*, 6, 1888: 649.*viride*, *Corticium* Berk., *Fl. N.Z.*, 2, 1855: 184.*viride* (*Coniophora*) *Corticium* (Berk.) Cke., *Grev.*, 8, 1880: 89.

The only collection at Kew is the type ex "New Zealand, Colenso".

*viridis*, *Thelephora* Berk., *Fl. Tas.*, 2, 1860: 258. The type ex "Tasmania, W. Archer, Esq." is now a resupinate fragment of what is probably a *Tomentella*. On the type sheet had been glued part of the type of *Coniophora viride*.

*wellingtonii*, *Hydnum* Lloyd = *Hydnum crocidens*.

*zealandicum*, *Radulum* Berk., in herb. Kew. The type was based on a fragment of *Irpelex brevis*, ex "N.Z., Bay of Islands".

## 123. ZEALANDICUS, ALEURODISCUS (Cke. &amp; Phil.) nov. comb.

*zealandica*, *Cyphella* Cke. & Phil., *Grev.*, 8, 1879: 57.

*ochraceoflavus*, *Aleurodiscus* Lloyd, *Myc. Notes*, No. 70, 1923: 1228.

The type, ex "N.Z., Wintqn, Dr. S. Berggren, No. 230" is a species of *Aleurodiscus* not uncommon on twigs of *Leptospermum* spp. in New Zealand, which was later named *A. ochraceoflavus* by Lloyd. Under the cover of the latter at Kew are part of the type ex "York Bay, N.Z., G.H.C." and "York Bay, N.Z., July 1923, E. J. Butler-G.H.C., Nos. 1214, 1221".

124. ZONATUM, HYDNUM (Batsch.) Fr., *Epicrisis*, 1838: 509.

One collection from Australia is at Kew, ex "Melbourne, Vic., Berggren, No. 366".

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## THE EFFECT OF COLCHICINE ON THE SPINDLE OF ROOT TIP CELLS.

By MARY M. HINDMARSH, Linnean Macleay Fellow in Botany,

(Plate xi; one Text-figure.)

[Read 26th November, 1952.]

*Synopsis.*

In dividing cells of onion root-tips the spindle can be observed after acid fixation.

0.1% colchicine destroys the spindles in all stages of mitosis and prevents spindle formation in cells beginning division during treatment. The spindle appears to be responsible for organizing the cell division process and all the chromosome abnormalities produced by colchicine can be related to the destruction of the spindle.

## INTRODUCTION.

Most of the work on cytological effects of colchicine has been carried out using tissue fixed and stained for observing the chromosomes rather than the spindle. The abnormal chromosome arrangements observed in colchicine-treated cells have been explained by postulating an effect on the spindle mechanism, and it is generally agreed that colchicine suppresses spindle formation. Only recently have attempts been made to demonstrate this action of colchicine and in 1951 Gaulden and Carlson, with the phase contrast microscope, examined the effect of colchicine on spindles in living animal cells in culture. They confirmed the earlier deductions that colchicine prevents spindle formation in cells which begin division during treatment, but in addition observed that spindles already formed in metaphase, anaphase and telophase cells were suppressed.

This paper describes the effects of colchicine on the spindle in meristematic plant cells and attempts some discussion of earlier interpretations of the cytological action of colchicine.

Unfortunately the technique employed by Gaulden and Carlson cannot be used for plant cells because of difficulties in obtaining single living plant cells suitable for such experiments. In living animal cells the spindle was identified as a clear area which was not penetrated by mitochondria. After certain types of fixation the spindle can be observed in plant cells and appears to consist of numerous fine fibres. Although these visible fibres are probably the result of acid fixation, they provide a useful indication of the presence of a normal spindle structure. By using plant tissue in which the spindle fibres are clearly visible in untreated cells, as basis of comparison, it should be possible to reconstruct the effects of colchicine on the spindle by examining many cells of a tissue, fixed at known intervals of time after treatment. This was attempted first using paraffin sections of root tips, but this method proved to be slow and tedious and was abandoned. Later it was found that spindles in smears of unstained cells could be observed with the phase contrast microscope after certain types of fixation, and this method was used to study the effect of colchicine on the spindle.

## METHODS.

Onion bulb roots about 3 cm. long were treated by immersing in 0.1% ( $2.5 \times 10^{-4}$ M) colchicine for periods up to 24 hours at 22°C. Roots were removed and the tips fixed for examination every five minutes during the first hour, then at hourly intervals to 12 hours and at 24 hours. Bulbs were transferred to tap water after various times of treatment up to 24 hours and roots were removed at intervals to determine the cytological changes occurring during recovery. Bulbs with roots in tap water were used as controls.

Roots were fixed in a weak chrom-acetic fixative of: Chromic acid (1%) 25 c.c., acetic acid (1%) 10 c.c., water 65 c.c. After fixing for more than 24 hours, roots were macerated in N.HCl at 60°C. for 10 minutes and squashed in 45% acetic acid. These

unstained smear preparations were examined with a phase contrast microscope. Control and treated roots were photographed under exactly the same conditions.

The rate of penetration of colchicine into the cells is important, as the cells in the outer layers of the root will be exposed to the threshold concentration for spindle inhibition before the cells in the centre. Consequently, variability is encountered between different cells from the same root, and this is especially marked in treatments of one hour or less. The actual concentration of colchicine in any cell at any one time cannot be estimated and, in the absence of data on rates of penetration of colchicine into roots, it is difficult to compare concentration effects with those for single animal cells. Problems of diffusion and penetration are serious difficulties encountered when whole tissues are used for this type of investigation.

## RESULTS.

### (a) *The spindle in normal roots.*

In all preparations of untreated roots, normal dividing cells with clearly visible spindles at metaphase, anaphase and telophase were observed (Plate xi, A, B).

Small groups of spindle fibres were seen in some late prophase cells, but in most cells earlier than metaphase there was no indication of spindle formation. The spindle first became apparent on either side of the nucleus at the ends of the cell about the time the membrane disappeared.

Cell plates were found in various stages of formation. When the chromosomes began to lose their distinctness, cell plates appeared as a row of dark spots in the centre of the cell. These spots joined together to form a plate which extended towards the sides of the cell, frequently pushing the spindle material to the side walls and leaving a clear area in the centre.

At metaphase, the spindle was a typical double cone which increased in length during anaphase and at telophase was a narrow cylindrical structure separating the two new nuclei, which were then at the ends of the cell. The spindle regained its original cone shape as the cell plate formed across the cell (Darlington, 1937).

At telophase the spindle appeared to be quite separate from the reforming daughter nuclei, and there was a clear area without fibres at each end of the spindle next to each telophase nucleus.

### (b) *Treatment with 0.1% colchicine.*

No abnormalities were observed in the cells of roots treated for 5-10 minutes. After 15 minutes' treatment, most of the cells were unaffected and normal cells with well-developed spindles were numerous. In the affected cells, abnormalities occurred in the usual regular arrangement of the chromosomes at anaphase and telophase, though these cells had visible spindles. In some telophase cells, where no spindle could be observed, the two daughter nuclei which normally move to either end of the cell were closer together towards the centre.

After 30 minutes' treatment there were few anaphase and telophase stages. A few of these had spindles, but in most, the spindles had disappeared from the cells. In some abnormal anaphase stages, no spindle was visible but the chromosomes were separated into two groups which were closer together and lacked the regular V-shape and uniform arrangement of normal anaphase chromosomes. Late telophase stages without spindles or cell plates, binucleate cells and dumbbell-shaped interphase nuclei were observed (Plate xi, E-H). No normal metaphase cells were found after 30 minutes' treatment. Metaphase chromosomes were short and thick and scattered at random in the cytoplasm but no spindles were seen in these cells. Prophase was also affected as prophase chromosomes were shorter and thicker than normal.

Blocked metaphases, and prophases with thick chromosomes, were found in the cells of all roots treated longer than 30 minutes, but no spindles (Plate xi, C, D). Binucleate cells, dumbbell-shaped interphase nuclei, abnormal metaphase, telophase without spindles but with chromosome groups close together in the cell were observed up to 60 minutes (Plate xi, G). Division of the centromeres to give a tetraploid chromosome number

was not found in any cell during the first hour of treatment. However, colchicine treatment for longer than one hour produced the well-known sequence of events where polyploid cells are the result of chromosome division without chromosome separation.

This continued succession of prophase, metaphase and then interphase, without any visible spindles, demonstrates that colchicine prevents spindle formation and the result is blocked metaphase with the complete absence of anaphase and telophase.

These results also indicate that the immediate effect of colchicine on dividing cells is on spindles already formed in metaphase, anaphase and telophase. The "untidiness" noticed in anaphase and metaphase after 15 minutes is probably the first indication of a vanishing spindle. This is supported later by the occurrence of anaphase and telophase without spindles but with chromosome groups close together in the cells.

Dumbbell-shaped interphase nuclei probably result from the destruction of anaphase and very early telophase spindles and binucleate cells result from telophase cells where the nuclear membrane is formed or forming when colchicine enters the cell.

The hyaline globule observed by Gaulden and Carlson in animal cells when the spindle disappeared, was not seen in any cells of treated root tips. The fixative used in these experiments was extremely acid and it is possible that the globule could have been formed and either destroyed, or masked by the granulation of the cytoplasm.

#### (c) Recovery after treatment for one hour.

The effects of colchicine persisted for at least 72 hours in cells of roots transferred to water after treatment, but there was a gradual return to the normal cell division process during that time. In the first hour in water, the centromeres of blocked metaphase cells divided forming tetraploid cells with daughter chromosomes lying parallel in the cytoplasm. Some irregular dumbbell-shaped nuclei were seen in early prophase but there were no anaphase or telophase stages and no spindle formation. Ten to fifteen hours later the cells looked very much the same as at one hour, and no cells had passed metaphase which was still "blocked".

After about 19 hours of recovery, however, some cells showed spindles, but most of these were in abnormal cells with multipolar spindles, as described by Levan (1938). These cells would have been unbalanced and would probably have degenerated.

In cells of roots in water for 23 hours, spindles were clearly visible in tetraploid (Pl. xi, M) and diploid cells at metaphase, anaphase and telophase, all of which appeared to be perfectly normal. Cell wall formation was observed in all roots where spindles were formed again. Some prophase cells appeared to be quite normal but prophase with thickened chromosomes persisted to about 19 hours' recovery (Plate xi, J).

These recovery results show that colchicine does no permanent damage to the spindle mechanism which is restored to treated cells when the colchicine is removed, but they do suggest that recovery occurs more slowly than inhibition. The significance of this point will be discussed later.

#### DISCUSSION.

The results described in this paper confirm the observations of Levan and others that colchicine prevents spindle formation in plant cells. In addition, the results show that colchicine destroys spindles already formed at metaphase, anaphase and telophase. This latter observation has not been reported previously for plant cells, although Gaulden and Carlson (1951) showed a similar result for animal cells.

Cells treated before metaphase, which is the earliest stage obviously organized by the spindle, did not form a normal metaphase plate. The complete absence of a spindle resulted in a blocked metaphase. Centromere division in these cells was followed by the formation of a tetraploid interphase nucleus, as anaphase separation did not occur. These effects indicate the usual sequence of events in colchicine treated material.

When the metaphase spindle was destroyed, the chromosomes clumped together in the cell. These probably form a typical blocked metaphase later, but that would be difficult to ascertain in a multicellular tissue in which blocked metaphase cells produced from suppression of the pre-metaphase spindle are numerous.



The results of spindle suppression in cells at later stages than metaphase are visible abnormalities in the interphase nuclei. When anaphase cells were treated, the two chromosome groups moved towards the centre of the cell and were finally incorporated in one large, irregular, frequently dumbbell-shaped nucleus. Sometimes one or more chromosomes become separated from the chromosome group and form micronuclei. Early telophase stages blocked by colchicine produced the same result as spindle destruction at anaphase. If the membranes of the daughter nuclei were initiated before the spindle disappeared, that is if late telophase was treated, the result was a binucleate cell but the two nuclei usually occupied the centre of the cell.

Effects on pre-metaphase stages were more conspicuous in colchicine treated material than those on later stages, because the absence of a spindle does not prevent new divisions. In colchicine cells continue to come into prophase and pass through blocked metaphase to interphase, but all anaphase and telophase stages soon disappear from treated material and are not replaced. The duration of the cell division stages has been worked out for pea roots at 20°C. (Brown, 1950) where it is about 5 and 13 minutes for anaphase and telophase respectively. Barber (1939) measured the rate of division in *Tradescantia* staminal hairs and found that anaphase took 25 minutes and telophase 4-7 minutes at 25°C. In both plants the total time for anaphase and telophase is half an hour or less. As we have shown, 0.1% colchicine affects the spindles of all dividing cells in a root tip in one hour, so that abnormal cells produced by the destruction of spindles in anaphase and telophase cells would not be found after 1½ hours' treatment. Probably this is why earlier observations on colchicine treated plant cells have not shown that stages later than metaphase could be affected. Abnormal interphase nuclei persist, but these are easily overlooked among the recurring blocked metaphase cells. Levan (1938) examined root tips 7-30 minutes after the beginning of treatment and observed anaphase chromosomes which remained in two groups and were later included in one large nucleus. This can be explained by the removal of an anaphase spindle.

Barber and Callan (1943) have suggested the abnormalities induced in dividing cells of newt can be explained as the inactivation by colchicine of the centromere or the centrosome or both. They postulate inactivation of the centromere only to give "exploded" metaphase, of centrosome only to give "star" metaphase and of both centromere and centrosome to give complete spindle suppression resulting in "prophase"—metaphase and "ball" metaphase. Gaulden and Carlson have shown that "star" metaphase is formed during the destruction of fully formed spindles by high concentrations. Abnormalities grouped as "unorientated" metaphase by Barber and Callan could be the result of lack of spindle formation. This would explain why Barber and Callan found mainly unorientated metaphases in colchicine treated material as "star" metaphases would be produced only as long as anaphase and telophase were being affected and would quickly be replaced by unorientated metaphase as colchicine prevents spindle formation in new cells coming into division. It is possible that centrosomes or centromeres or both are responsible for the organization of the spindle, and it is also possible that colchicine inactivates these cell centres, but it does not seem necessary to postulate degrees of effect on these centres to produce the different abnormalities.

Recovery experiments show clearly that the ability of a cell to form a spindle is not destroyed. After colchicine is removed, spindles reappear and function properly in colchicine induced tetraploids. During colchicine treatment for short periods chromosomes undergo a division cycle without a spindle, so that in recovered cells the spindle lags one division behind the chromosomes.

Spindle suppression is seen in all dividing cells one hour from the beginning of treatment, but spindles are not reformed for about 16 to 20 hours after colchicine is removed. There are a number of possible explanations of this time lag.

(1) Washing in water is not efficient enough and a very low concentration of colchicine might maintain induced abnormalities in the cells.

(2) Colchicine may be adsorbed on to sensitive centres of the cell, perhaps the centromeres, and not readily removed by washing but slowly utilized in the cell.