Hydnaceae of New Zealand

Part I.—The Pileate Genera *Beenakia, Dentinum, Hericium, Hydnum, Phellodon* and *Steccherinum*

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Abstract

GENERAL characters of members of the family are covered in a preliminary discussion which concludes with a key to genera present in New Zealand. The second section covers detailed descriptions of pileate genera and species so far collected in the Dominion—namely, *Dentinum* Gray (1 sp.), *Phellodon* Karst. (1 sp.), *Hydnum* L. ex Gray (1 sp.), *Beenakia* Reid (1 sp.), *Steccherinum* Gray (4 spp) and *Hericium* Pers ex Gray (1 sp.).

Dentinum crocidens (Cke) G. H. Cunn extends to Australia, *Phellodon sinclairii* (Berk.) G. H. Cunn. is confined to New Zealand, *Hydnum* is represented by one undescribed species, *Beenakia dacostae* Reid occurs in Victoria and New Zealand, *Steccherinum ochraceum* (Pers.) Gray has a world-wide distribution, *S. rawakense* (Pers.) Banker has been recorded from North and South America, East and West Indies, and Australasia, two other species of *Steccherinum* are undescribed and *Hericium coralloides* (Scop.) Gray has been found in Europe, North America and New Zealand. Detailed descriptions are drawn from herbarium specimens and accompanied by notes on habitat, distribution and features of diagnostic aid. Several species are illustrated with photographs and line drawings of transverse sections and spores.

INTRODUCTION

ONE of the classical families of the Basidiomycetes established by Fries, the Hydnaceae was erected to contain species in which the hymenium is borne on spines. Later workers have limited the family to homobasidiomycetes, containing species with one-celled basidia produced in a definite palisade hymenium and bearing two or four spores on apical sterigmata. Thus defined the family is a small one, containing not more than 250 species.

Early workers defined genera by the type of fructification, that is, whether it was stipitate, sessile, or resupinate, its colour, texture, size, colour and shape of the spines. As such features were found to be inadequate the modern tendency has been to supplement or supplant some of these particulars with details of microfeatures. Little agreement has yet been reached as to the limits of certain genera, and consequently the classification adopted herein is based on personal assessment of generic features proposed by recent workers.

TECHNIQUE

Descriptions and illustrations are original, and have been drawn from examination of specimens in the herbarium of the Plant Diseases Division, identifications having been based mainly on collections in the herbarium of the Royal Botanic Gardens at Kew, which were examined in detail in 1951.

Microfeatures have been described from sections cut to 10–15μ from selected herbarium material. Sections were mounted in a solution of 50% lactic acid in distilled water to which had been added 0·1% aniline blue. They were heated in

2–3 drops of this solution until bubbles began to appear, cooled, a coverslip applied, and examined. Sections were also mounted in Melzer's reagent (0·5 gm iodine, 1·5 gm potassium iodide, 20 gm chloral hydrate, 20 ml water) to ascertain if spores or tissues were amyloid, indicated by their staining blue. Features of value in generic and specific delimitation are discussed below.

HYMENOPHORE. Pilei of *Dentinum, Hydnum* and *Phellodon* are carried upon apices of central and/or excentric stems; of *Beenakia* on stems which are inserted laterally. They are usually orbicular with subulate spines pendent from the ventral surface. Pilei of *Hericium* and *Steccherinum* are sessile and laterally attached. In *Steccherinum* pilei are usually applanate, flabelliform or conchate and grow horizontally from the substratum with spines pendent from their ventral surfaces. *Hericium* is composed of several long and rounded stems which grow horizontally from a pulvinate base. Each stem bears numerous lateral or ventral branches from the sides and lower part of which spines develop.

Most species present in New Zealand possess resupinate fructifications. The hymenophore is usually effused and adnate upon the substratum, with a well developed context supporting the hymenial layer and spines. Though usually said to be ventral, the hymenial layer may be dorsal, perpendicular or ventral, depending upon the position in which plants are growing upon the substratum.

Spines may be long and aculeate or subulate with acuminate apices as in most pileate species, reduced to fine warts or granules in all species of *Grandinia* and many species of *Odontia,* or irregular in shape and size, as in *Radulum.* In *Mucronella* spines arise either separately, crowded in groups, or arranged in tufts and develop from a tenuous subiculum sometimes reduced to a few repent hyphae. Spines consist of a central axis of usually parallel hyphae from which the hymenium develops. In many species of *Odontia* the axis may be occupied mainly by cystidia.

HYPHAL SYSTEMS. As no systematic attempt has been made hitherto to ascertain hyphal systems present in the Hydnaceae, attention was paid to this feature in all New Zealand collections, as well as material examined in Kew herbarium. Many genera, especially those containing stipitate species, are too poorly represented to permit of definite conclusions being drawn as to their value as generic differential aids. Of the species to be described in this series only five possess dimitic hyphal systems, composed of skeletal and generative hyphae. These are confined to four species of *Steccherinum* and one *Radulum.* All others possess monomitic hyphal systems—that is, they are composed of generative hyphae alone. Eleven of the 53 species present in New Zealand are without clamp connexions.

HYMENIAL LAYER AND INCLUSIONS

Basidia, Spores, Paraphyses and Paraphysate Hyphae. The hymenial layer is composed of a palisade of basidia and paraphyses, sometimes associated with paraphysate hyphae. Basidia are unicellular, usually subclavate, and carry at their apices, on short sterigmata, 2–4 spores. They are seldom noteworthy, since striking differences in shape and size, present in species of certain genera of the Thelephoraceae, are absent. Paraphyses are commonly subclavate, usually slightly shorter and narrower than the basidia, and like them are seldom noteworthy.

Spores afford useful diagnostic characters. Those of the resupinate genera are usually smooth, and hyaline, though verruculose in a few species. In pileate species spores show more diversity, and by many modern authors have been employed for generic segregation. Coloured brown in *Beenakia* and *Hydnum,* hyaline in *Dentinum* and *Phellodon,* they are verruculose or echinulate in *Beenakia* and *Phellodon,* and tuberculate in *Hydnum.* In shape they may be globose, subglobose, oval, elliptical, obovate, suballantoid or allantoid.

Paraphysate hyphae are not uncommon in a number of resupinate species, and sometimes afford useful diagnostic aids. Modified apices of context hyphae which project above the hymenial layer, they are commonly filiform, in a few species subulate or capitate with expanded apices.

ANCILLARY ORGANS. Members of the family do not display the diversity of ancillary organs present in certain genera of the Thelephoraceae. Only cystidia, gloeocystidia, vesicles and conducting hyphae have been observed.

Cystidia. Present in all species of *Odontia* and several species of *Steccherinum,* cystidia are of several types. Those resembling the pedicellate cystidia of *Peniophora* are present in *Odontia fimbriata* and *O. hydnoides,* being fusiform with walls clothed in coarse crystals and pedicels naked. Cystidia of *O. hydnoides* are accompanied by septocystidia, large 2—4 septate organs with walls thickened, crystal coated, which project from the apices of spines for about half their length. Cystidia of *Odontia arguta* are delicate, spathulate, and arise in large numbers from walls of context hyphae with a few projecting above the hymenial surface.

Cylindrical cystidia are present in several species of *Odontia* and *Steccherinum,* being crowded in axes of spines and projecting from their apices. They bear crystals, as in *Odontia lyndoniae* and *Steccherinum ochraceum;* or walls may be naked and cystidia project above spine apices as in *Odontia barba-jovis* and related species.

In the penicillate section of *Odontia* spines bear fascicles at their apices, composed of bundles of 10–50 or more hyphae. Hyphae on the exterior of the fascicles are usually coated with crystals; sometimes axes of spines are formed mainly from crystal-coated hyphae, or hyphae ensheathed in fused crystals. Or crystals may be produced in such quantities that the axes of spines become compacted into cylinders of fused crystals and hyphae as in *Odontia subfascicularia.* In this section fascicles often appear between spines, arising from the hymenial surface and usually bearing crystals upon some or all of the hyphae.

Vesicles. Present in a few species of *Odontia, Sarcodontia* and *Grandinia,* vesicles afford useful diagnostic aids. They are not readily seen unless adequate sections are suitably stained. In *Odontia bicolor* they are pyriform, 16—26μ diameter, and most possess double walls, as if small vesicles were growing within larger ones. In one undescribed species of *Grandinia* and one of *Sarcodontia* vesicles are delicate though abundant. In these, inflated apices do not exceed 1 5μ diameter, and are carried on brief pedicels not exceeding a length of 5μ and thickness of 0·5μ.

Gloeocystidia. Rare in species of the family, gloeocystidia have been noted only in one Australian species of *Radulum* and two New Zealand species of *Odontia.* In *O. scobinella* they are rare and scattered, flexuous-moniliform and confined to the context; in the other, undescribed, *Odontia,* they are abundant, clavate, project from the hymenium, and stain deeply.

Conducting Hyphae. Present in stems and spines of *Hericium coralloides* and *Steccherinum fistulatum,* these organs are derived from long narrow hyphae containing refractive contents which stain readily. Those of *Hericium coralloides* have been described by some authors as gloeocystidia, but are obviously conducting hyphae similar to those present in *Stereum sanguinolentum.*

HABITAT. Most species of the family are wood-inhabiting, the few which exhibit host preferences being discussed under each. The centrally stipitate species grow upon the ground, or in humus on the forest floor. *Phellodon sinclairii,* for example, is found only in humus under species of *Nothofagus*; and *Dentinum crocidens* prefers humus under scrub on the edge of forest clearings or scrubland. *Beenakia dacostae* in New Zealand grows upon decaying pendent stipes of tree ferns, whereas in the type locality plants were taken from decayed wood debris under logs.

Hydnaceae (Fries) Killermann, in Die Natuerlichen Pflanzenfamilien, *6*, 158, 1928.

Hydnei Fries, Syst. orbis Veget., *1*, 80, 1825.

Hymenophore pileate or resupinate, annual, biennial or perennial. Pilei stipitate, or sessile and laterally attached, bearing spines on the ventral surface; resupinate species effused and usually adnate, when spines are borne on the distal surface. Context composed of hyaline or brown hyphae sometimes arranged in strata; hyphal system monomitic or dimitic; generative hyphae with or without clamp connexions. Hymenial layer extending over spines and plane surfaces between, composed of a palisade of basidia and paraphyses, alone or associated with cystidia, gloeocystidia, conducting hyphae or paraphysate hyphae. Basidia usually subclavate, bearing apically 2–4 spores on sterigmata. Spores one-celled, walls smooth or roughened, hyaline or coloured.

Key to Genera

Plants pileate.	
Pilei carried at apices of central or excentric stems; plants growing upon the ground or in humus.	
Spores hyaline, smooth	1. *Dentinum* Gray
Spores hyaline, verruculose-echinulate	2. *Phellodon* Karst.
Spores brown, tuberculate	3. *Hydnum* L. emend. Gray
Pilei carried at apices of lateral stems; growing on pendent stipes of tree ferns; spores pip-shaped, tinted brown, delicately verruculose	4. *Beenakia* Reid
Pilei applanate, effused-reflexed or umbonate, attached by a broad base; growing on wood; spores hyaline and smooth	5. *Steccherinum* Gray
Pilei composed of several branching stems arising from a pulvinate base; growing on wood; spores hyaline and smooth	6. *Hericium* Pers ex Gray
Plants resupinate; growing on wood; spores hyaline, verruculose or smooth.	
Spines arising from a well developed context.	
Cystidia present	7. *Odontia* Pers. ex Gray
Cystidia absent.	
Spines well developed, usually subulate and terete	8. *Sarcodontia* Schulz
Spines irregular, aggregated into dentoid tufts or brief lamellar processes	9. *Radulum* Fr.
Spines reduced to granules or small hemispheric dome-shaped verrucae	10. *Grandinia* Fr.
Spines arising from a delicate subiculum, scattered or aggregated into clusters	11. *Mucronella* Fr.

Several additional genera have been erected, such as *Asterodon* Pat., *Auriscalpium* Gray, *Gloiodon* Karst. and *Pseudohydnum* Rick. They have been excluded from the key since they have not yet been found in Australasia. *Caldesiella* Sacc. and *Hydnochaete* Bres. are better treated as members of the Thelephoraceae, closely related to *Tomentella* and *Hymenochaete* respectively. *Irpex* is regarded as a member of the Polyporaceae.

1. **Dentinum** Gray, Natural Arrangement of British Plants, *1*, 650, 1821.

Tyrodon Karst., Rev. Myc., *3*, 19, 1881.

Hypothele Paul., ex Banker, Torreya, *4*, 113, 1904.

Hymenophore terrestrial, with orbicular pilei carried upon centrally inserted stems. Spines ventral, decurrent, subulate, terete. Context composed of parallel hyphae closely arranged, tending to collapse when dry; hyphal system monomitic; generative hyphae hyaline, with or without clamp connexions. Spores globose or subglobose, walls hyaline, smooth.

Type Species: *Dentinum repandum* (L. ex Fr.) Gray.

Distribution: World-wide.

Confusion exists in literature as to the name to be used for the genus. Usually plants are placed under *Hydnum* L. ex Fr.; but Fries (1821, 397) did not indicate a type species, and included under the genus all extant species of the Hydnaceae then known. Gray, in a work published subsequent to Fries' *Systema Mycologicum*, and therefore valid under the International Rules of Botanical Nomenclature, established several genera within the family. Among these was *Dentinum*, of which he recognized

two species, *D. repandum* (L. ex Fr.) Gray being selected as the type species by Miller (1933, 298). As *D. repandum* is a well known European plant, there can be no confusion as to the generic limits of *Dentinum*. Under *Hydnum* Gray placed *H imbricatum* L. ex Fr. alone It therefore becomes the type species of that genus, and limits use of the name to species with centrally stipitate pilei, subglobose spores with brown, coarsely tuberculate walls.

As delimited herein, there are probably not more than a dozen valid species of *Dentinum*, only one so far being collected in Australia and New Zealand.

1 **Dentinum crocidens** (Cooke) nov. comb. Text-fig. 1.

Hydnum crocidens Cke., Grev., *19*, 45, 1890.
H wellingtonii Lloyd, Myc. Notes, *69*, 1200, 1923.

Hymenophore annual, pileate, carnose, scattered or gregarious, fragile. Pilei with central sometimes excentric stems, orbicular, 1–3 5 cm diameter; pileus surface at first shining white, drying tan, chamois or fawn, even, polished, glabrous, rugulose when dry; margin acute, incurved, even, sometimes fringed with spines, concolorous. Spines decurrent, or not, 1–4 mm long, 0.25–0.5 mm diameter, subulate, terete, ferruginous, fragile, crowded to the margins. Stems 2–3.5 cm long, 2–4 mm diameter, fawn, sulcate, hollow, pruinose, arising from a bulbous mycelial base. Context 0 25–0 5 mm thick, ferruginous, composed of parallel hyphae densely arranged, collapsing; generative hyphae 4–10μ diameter, commonly 6–8μ, walls 0.25μ thick, hyaline, branched, septate, without clamp connexions. Hymenial layer to 40μ deep, a dense palisade of basidia and paraphyses. Basidia subclavate, 16–28 x 5–6.5μ, 2–4-spored; sterigmata erect, slender, to 4μ long. Paraphyses subclavate, 12–22 x 5–6μ. Spores globose or subglobose, 5.5–7.5μ diameter, walls smooth, hyaline, 0.1μ thick, collapsing.

TYPE LOCALITY: Port Phillip, Victoria.

DISTRIBUTION: Australia, New Zealand.

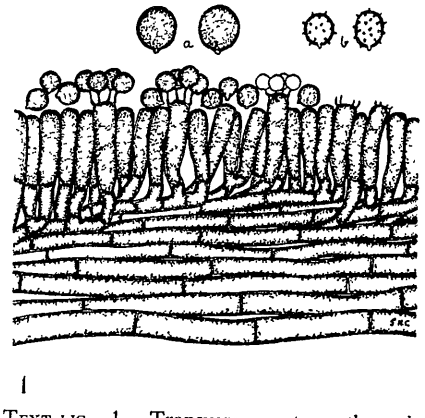
HABITAT: Solitary or in small groups in humus under scrub.

Auckland: Purewa Bush, July 1931, M. Hodgkins; Titirangi, 100ft, September 1931, M. Hodgkins, Cuttygrass Road, Waitakeres, 900ft, September 1944, J M. Dingley, Little Barrier Island, October 1945, J. M. Dingley; Anawhata Road, Waitakeres, 900ft, August 1947, August 1948, J. M. Dingley; Swanson, 500ft, September 1952, S. D. Baker; Upper Piha Valley, Waitakeres, 900ft, August, 1953, J. M Dingley.

Wellington: Mt. Waiopehu, Tararuas, 2,500ft, October 1919, E. H. Atkinson-G. H. C , York Bay, August 1922, E. H. Atkinson; Whakapapa, Mt. Ruapehu, 3,000ft, October 1949, J. M. Dingley, Mt. Holdsworth, Tararuas, 3,500ft, September 1952, G H. C.

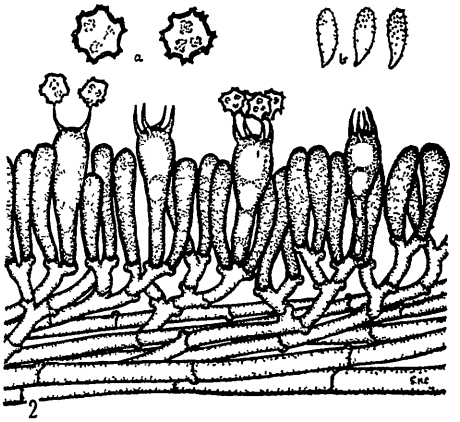
Otago. Ross Creek Reservoir, August 1933, H. K. Dalrymple.

Collections match the type of *Hydnum crocidens* in Kew herbarium, ex "Port Phillip, Vic., C. French, August 1890". The species resembles *D. repandum* (L. ex



1

TEXT-FIG 1.—Transverse section through the hymenium of *Dentinum crocidens*, × 500. *a*. Spores × 1,000. *Original.*
TEXT-FIG 1b.—Spores of *Phellodon sinclairii*, × 1,000. *Original.*



2

TEXT-FIG 2.—Transverse section through the hymenium of *Hydnum carbonarium*, × 500. *a* Spores × 1,000. *Original.*
TEXT-FIG 2b.—Spores of *Beenakia dacostae*, × 1,000. *Original.*

Fr.) Gray in many particulars, differing in that plants are smaller, of different colour when fresh, and context hyphae are without clamp connexions. Part of a collection from York Bay was forwarded to C. G. Lloyd, who named it *Hydnum wellingtonii* and published a description which is faulty in most features. For Lloyd described pilei as being spathulate with a lateral stem, teeth hollow, spores 10μ diameter and suggested they were brown. Colour of growing plants is white, with ferruginous spines, and the surface of the pileus is shining and slightly viscid. In his description Cooke stated that spores were 4–5μ diameter; but examination of the type showed them to be the same dimensions as New Zealand collections, with the same delicate collapsing walls.

2. **Phellodon** Karsten, Meddelanden af Societas pro Fauna et Flora Fennica, *5*, 41, 1880; *6*, 15, 1881.

Calodon Quel., in Cke. & Quel., Clav. Hymen., 196, 1878, pro parte.

Hymenophore terrestrial, annual, with orbicular or flabelliform pilei carried upon definite stems. Spines ventral, decurrent, subulate, terete. Context composed of parallel hyphae densely arranged; hyphal system monomitic; generative hyphae tinted brown, or with walls containing dark pigment granules, septate, without clamp connexions Spores globose or subglobose, walls hyaline, verruculose-echinulate.

TYPE SPECIES: *Phellodon niger* (Fr.) Karst.

DISTRIBUTION: Europe, Great Britain, North America, Australia, New Zealand.

Karsten (1880, 41) erected *Phellodon* for plants with hyaline spores and white spines, and *Hydnellum* for those with brown spores and spines turning brown at maturity to cover species included by Cooke & Quelet (1878, 196) under their section Hydnum § Lignosi. Under this section Cooke & Quelet had placed *Calodon* Quel., but without a validating description. Karsten later (1881, 20) recognized *Calodon* in place of his earlier published *Hydnellum,* thus validating the former.

As I have interpreted these genera, *Calodon* in the sense of Cooke & Quelet is in part a synonym of *Phellodon* and *Hydnum,* and *Hydnellum* a synonym of *Hydnum.*

Species usually possess a fibrous-tough context with dark coloured context and globose or sub-globose spores with hyaline walls beset with sharp-pointed verrucae or echinulae. Plants are commonly aromatic, most of these present in North America possessing, according to Coker & Beers (1951, vii), an odour of fenugreek, melilot or slippery elm. About 20 species are known, the genus being represented in New Zealand by *P. sinclairii* and in Australia by *P. niger.*

1. **Phellodon sinclairii** (Berkeley) nov. comb. Pl. 40, fig. 1; Text-fig. 1b.

Hydnum sinclairii Berk., Hdbk. N.Z. Fl., 756, 1867.

Hymenophore annual, coriaceous, pileate Pilei stipitate, flabelliform with excentric stems, or campanulate with central stems, usually aggregated into groups of 3–5 with free stems but fused margins, sometimes forming rosettes, less frequently solitary, 2–5 cm tall, 1–5 cm radius. Pileus surface black, glabrous, radiately sulcate; margin incurved, thin, lobed or complicate Hymenial surface black, tinted olivaceous, with a broad sterile border. Stems 0.5–2 cm x 1–5 mm, concolorous, flattened or terete, solid, glabrous save towards the base where sometimes tomentose, arising from a common mycelial mass. Spines decurrent, 0.5–2 mm long, subulate, terete, crowded, black with an olivaceous tinge Context 0.5–1 5 mm thick, black, shining, composed of parallel hyphae firmly compacted; generative hyphae 3.5–4.5μ diameter, walls 0 2μ thick, coloured with black pigment granules, sparsely branched, septate, without clamp connexions. Hymenial layer to 30μ deep, a dense palisade of basidia and paraphyses. Basidia subclavate, 18–22 x 5–6μ, 2–4-spored; sterigmata erect, slender, to 4μ long. Paraphyses subclavate, 16–20 x 5–6μ. Spores globose, 4–5μ diameter (with spines 5–6μ), walls moderately verruculose, (spines 0.5μ long), hyaline, 0.1μ thick.

TYPE LOCALITY: Maungatua, New Zealand.

DISTRIBUTION: New Zealand.

HABITAT: In humus on the floor of *Nothofagus* forests.

Wellington: York Bay, 400ft, August 1922, E. H Atkinson; same locality, 500ft, July 1923, E. J. Butler-G. H. C.; Mt. Ruapehu, 3,000ft, March 1955, B. J. Hooton.

Nelson: Staircase Creek, Reefton, 2,000ft, November 1952, S D. Baker; Murchison, 500ft, April 1956, P. J. Brook; Lake Rotoiti, 2,000ft, April 1956, S. D. & P. J. Brook.

Westland. Ahaura, April 1955, J. Hardcastle.

Otago: Homer Saddle, Hollyford Valley, January 1950, J. M. Dingley; Alton Valley, Tuatapere, 600ft, February 1954, J. M. Dingley; Black Gully, Tapanui, April 1957, S. D. and P. J. Brook.

Plants commonly grow in crowded groups with stems free but margins fused to form rosettes, when pilei are flabelliform with excentric or lateral stems. Solitary pilei are usually campanulate with central stems. The entire plant is black when dry, colour being produced from black pigment granules embedded in walls of hyphae. Purple when they first emerge from the humus under beech trees, plants rapidly change to fuscous, then black. When fertile the hymenial surface assumes an olivaceous tinge, when sterile it also is black. Spores are globose with hyaline and finely verruculose walls, spines being about 0·5μ long. Even after long keeping in the herbarium, plants possess a strong odour of aniseed. Collections match the type in Kew herbarium, which consists of five specimens in excellent condition, collected by Dr. Sinclair at Maungatua in 1860.

3. **Hydnum** Linnaeus ex Gray, Natural Arrangement of British Plants, *1*, 650, 1821.

Sarcodon Quel., in Cke. & Quel., Clav. Hymen., 195, 1878.
Calodon Quel., in Cke. & Quel., Clav. Hymen., 196, 1878, pro parte.
Hydnellum Karst., Medd. Soc. Faun. Fl. Fenn., *5*, 41, 1880.

Hymenophore terrestrial, annual, with orbicular, flabelliform or irregular pilei carried upon well developed central or excentric stems. Spines ventral, decurrent, subulate or somewhat irregular, terete or laterally flattened. Context composed of parallel hyphae loosely arranged save near the hymenial layer; hyphal system monomitic; generative hyphae tinted brown, septate, with or without clamp connexions. Spores globose or subglobose, walls tinted brown, coarsely tuberculate.

TYPE SPECIES: *Hydnum imbricatum* L. ex Fr.

DISTRIBUTION: World-wide.

Separated from other terrestrial genera with stems by the spores, walls of which are tuberculate and coloured some shade of brown. Thus defined the genus includes *Calodon* Quel. (pro parte), *Hydnellum* Karst. and *Sarcodon* Quel., which various authors have attempted to maintain by differences in structure of the context, that is whether they are "fleshy" or "fibrous", features which cannot be maintained when many species are examined.

Gray was the first to divide the heterogenous genus *Hydnum* sensu Fries, and under *Hydnum* L. ex Gray placed but one species, *H. imbricatum*. This therefore becomes the type species. Most workers who have used the name *Hydnum* in a restricted sense have applied it to all stipitate species, or to stipitate species with hyaline context and globose smooth spores, features of *Dentinum* as defined herein. But one undescribed species has so far been collected in New Zealand, although some 35 have been recognized in the Northern Hemisphere.

*1. **Hydnum carbonarium** sp. nov. Pl. 40, fig. 2; Text-fig. 2, 2a.

Hymenophorum terrestre, carbonaceum, fragile. Pilei stirpibus mediis, orbiculati, 2–3 cm diam., superficies nigra, nitida. Stirpes aequae, planae, 2–2·5 × 0·8–1.2 cm. Spinae subulatae, teretes, 1–3 mm longae. Contextus niger, brunnearum hypharum generatoriarum 5–8μ diam., nodulosarum Basidia clavata, 36–45 x 8–12μ, 2–4-sporis globosis vel late ellipticis, 8–10 x 7–9μ, parietibus crasse inaequaliter tuberculatis, sinuatis, pallide ferrugineis.

Hymenophore terrestrial, annual, pileate, carbonous, brittle when dry. Pilei centrally stipitate, orbicular, 2–3 cm diameter; pileus surface black, even, polished; margin inturned, thin, even, concolorous; hymenial surface black, rough with spines Stem equal, flattened, 2–2.5 x 0·8–1·2 cm, glabrous, black. Spines subulate, terete, crowded, 1–3 x 0·1–0.15 mm, black, fragile. Context 0.2–0.5 mm thick, black, shining, composed of parallel hyphae rather loosely arranged embedding masses of black gelatinous granules, generative hyphae 4–8μ diameter, walls 0·2μ thick, tinted brown, branched freely, septate, sometimes inflated between

* Latin descriptions have been prepared by Miss Beryl Hooton, Librarian, Plant Diseases Division.

septa, with clamp connexions. Hymenial layer to 50μ deep, a dense palisade of basidia and paraphyses. Basidia clavate, 36–45 x 8–12μ, 2–4-spored; sterigmata arcuate, stout, to 8μ long. Paraphyses clavate, 16–22 x 4–6μ. Spores globose or broadly elliptical, 7–9μ diameter, or 8–10 x 7–9μ, walls coarsely irregularly tuberculate, sinuate, pallid ferruginous, 0.2μ thick

DISTRIBUTION: New Zealand.

HABITAT: Solitary in humus under *Dacrydium cupressinum.*

Otago: Half Moon Bay, Stewart Island, February 1954, J. M. Dingley, *type collection,* P.D.D. herbarium, No. 17707.

Plants appear as if constructed from charcoal, being carbonous and fragile. Colour is derived from masses of black mucilage granules embedded among hyphae of the tissues, hyphae being lightly tinted brown. Spores are either globose or broadly elliptical, with brown walls which are coarsely irregularly tuberculate and sinuate. In colour and general appearance the species resembles *Phellodon niger* (Fr.) Karst.; it differs mainly in the spore characters, those of *P. niger* resembling spores of *P. sinclairii.* Plants possess a faint odour of aniseed, scarcely noticeable save when the herbarium package is first opened.

4. **Beenakia** Reid, Kew Bulletin of Miscellaneous Information, 635, 1955.

Hymenophore lignicolous, annual, with orbicular or flabelliform pilei attached by an excentric or lateral stem. Spines ventral, decurrent, subulate, terete Context composed of parallel hyphae closely arranged; hyphal system monomitic, generative hyphae hyaline, septate, with clamp connexions. Spores lacrimiform, walls tinted brown, finely verruculose.

TYPE SPECIES: *Beenakia dacostae* Reid.

DISTRIBUTION: Australia, New Zealand.

Beenakia may be recognized by the fragile pilei attached by lateral stems, lacrimiform spores with walls delicately verruculose and tinted brown, and unusual habitat. Its nearest relative is *Auriscalpium* Gray, spores of which, although broadly lacrimiform or obovate with prominent apiculi, and verruculose, are hyaline.

1. **Beenakia dacostae** Reid, Kew Bulletin of Miscellaneous Information, 635, 1955. Text-fig. 2b.

Hymenophore annual, stipitate, membranous. Pilei orbicular, or irregularly flabelliform. 0.5–1.5 cm diameter; surface slightly convex, white when fresh, drying tan or ferruginous, even, rugulose when dry, margin entire or coarsely lobed, slightly incurved, even; spines aculeate, 0.5–2.5 mm long, with naked acuminate apices, ferruginous, crowded, decurrent, cartilaginous Stem inserted laterally, either towards the centre of the pileus or at its margin, smooth, 0.2–2 cm long, 0.25–1 mm diameter, white, tan when dry. Context white, 0.2–1 mm thick, composed of flexuous mainly parallel hyphae, collapsed when dry; generative hyphae 6–8μ diameter in the context, 3–4.5μ in spines, walls 0.2μ thick, hyaline, naked, branched, sparsely septate, with clamp connexions. Hymenial layer to 50μ deep, a dense palisade of basidia and paraphyses Basidia subclavate, 18–32 x 5–6.5μ, 4-spored; sterigmata erect, slender, to 4μ long. Paraphyses subclavate, 16–25 x 4.5–5μ. Spores narrowly lacrimiform, with rounded apices and long apiculate bases, some allantoid, 7–9 x 2.5–3μ, walls delicately verruculose, tinted brown, 0.2μ thick, often adhering in fours, nonamyloid.

TYPE LOCALITY: Victoria, Australia.

DISTRIBUTION: Australia, New Zealand.

HABITAT: Scattered on pendent dead stipes of tree ferns.

Cyathea dealbata (Forst. f.) Swartz

Auckland: Waiomo Valley, Thames, June 1950, J M Dingley; Titirangi, Waitakeres, 800ft, June 1953, J M. Dingley; Anawhata Road, Waitakeres, 900ft, May 1954, J M Dingley; Kauaeranga Valley, Thames, August 1954, S D. Baker, Lake Rotoehu, 1.200ft, June 1957, G. H. C.

Wellington: Pohangina Reserve, 250ft, August 1954, G. H. C.

Cyathea medullaris (Forst. f.) Swartz

Auckland: Clevedon, August 1949, J. M Dingley, Lake Rotoehu, 1,200ft, June 1957, G. H. C.

Wellington: Weraroa, 50ft, May 1923, J. C. Neill-G. H. C.

Hemitelia smithii Hook. f. & Baker

Auckland· Anawhata Road, Waitakeres, 900ft, June 1946, J. M. Dingley.

Pilei are small, not exceeding 1.5 cm across, attached laterally by a brief stem, spines are cartilaginous and ferruginous, and spores are lacrimiform, verruculose and tinted brown. Australian collections seen have the stem arising from the ventral centre of the pileus and turned laterally; in New Zealand collections stems are laterally attached to edges of pilei. Spores are narrowly lacrimiform with rounded apices and long acuminate bases, often with oblique apiculi; walls are covered with delicate verruculae which are larger and more numerous towards the apices. Spores often adhere in fours.

According to Mr. J. H. Willis, of the National Herbarium, Victoria, specimens were obtained from dry powdery wood debris beneath old eucalypt logs; New Zealand collections on the other hand were taken from dead pendent stipes of tree ferns Despite these minor differences collections from both regions possess exactly the same microfeatures.

5. **Steccherinum** Gray, Natural Arrangement of British Plants, *1*, 651, 1821.

Pleurodon Quel., in Cke & Quel., Clav. Hymen., 198, 1898, pro parte.
Creolophus Karst, Medd. Soc. Faun. Fl. Fenn, *5*, 27, 1880.
Climacodon Karst., Rev. Myc, *3*, 20, 1881.
Leptodon Quel., Ench. Fung., 191, 1886.
Mycoleptodon Pat., Essai Tax. Hymen., 116, 1900.

Hymenophore lignicolous, pileate, coriaceous. Pilei applanate, conchate, or flabelliform, sometimes effused-reflexed or resupinate, attached by a lateral broad base. Spines ventral, subulate, terete. Context composed of parallel hyphae radiately arranged; hyphal system dimitic, generative hyphae hyaline, with or without clamp connexions. Cystidia present in some species, cylindrical, walls coated with hyaline crystals. Conducting hyphae present in some species, hyaline, with refractive oily contents. Spores elliptical, oval, obovate or suballantoid, walls smooth, hyaline.

TYPE SPECIES: *Steccherinum ochraceum* (Pers.) Gray

DISTRIBUTION: World-wide.

About a dozen species of *Steccherinum* are known. Members of the genus may be recognized by the shape and structure of pilei, hyaline smooth spores, habitat, and dimitic hyphal system. Pilei grow laterally from their wood hosts, are applanate or flabelliform when attached by a broad lateral base; or as frequently effused-reflexed with broad resupinate bases and narrowly reflexed pileate margins. Fructifications of the common *S. ochraceum* may be effused-reflexed, the usual condition, conchate when attached by a narrow base, umbonate-sessile with plane free margins, or often resupinate. Several species bear cylindrical cystidia which project from margins and apices of spines and are coated with fine hyaline crystals. In *S. rawakense* cystidia are reduced to terminal ends of skeletal hyphae which may project slightly and are naked or sometimes bear a few scattered crystals. *S. fistulatum* contains numerous conducting hyphae which are present in context and spines; filled with oily contents, they traverse axes of spines, turn at a right angle and penetrate the hymenial layer, many projecting slightly. *S. resupinatum* is commonly resupinate, but a few specimens are effused-reflexed with narrow pileate margins arising from broad resupinate bases.

KEY TO SPECIES

Cystidia present.
- Cystidia long-cylindrical, partly or wholly ensheathed in crystals.
  - Fructifications commonly effused-reflexed, conchate, or umbonate-sessile with free margins; spores oval, 3.5–4 x 2.5–3μ . . . 1 *S. ochraceum* (Pers.) Gray
  - Fructifications resupinate with some of the margins narrowly reflexed; spores suballantoid, 3.5–4 x 1.5–2μ . . . . . 2 *S. resupinatum* G. H. Cunn.

Cystidia reduced to slightly projecting ends of skeletal hyphae, naked or rarely bearing a few crystals; pilei flabelliform, reniform or applanate; spores 3.5–4 x 2–2.5μ	3. *S. rawakense* (Pers.) Banker
Cystidia absent; conducting hyphae present; pilei effused-reflexed or applanate; spores oval, 2–2.5 x 1.5–2μ	4. *S. fistulatum* G. H. Cunn.

1. **Steccherinum ochraceum** (Persoon) Gray, Natural Arrangement of British Plants, *1,* 651, 1821. Pl. 41, fig. 2; Text-fig. 3.

Hydnum ochraceum Pers. (Syn. Meth. Fung., 559, 1801) ex Fries, Syst. Myc., *1,* 414, 1821.
Hydnum rhois Schw., Nat. Ges. Leipzig, *1,* 103, 1822.
Hydnum pudorinum Fr., Elench., *1,* 133, 1828.
Hydnum flabelliforme Berk., Lond. Jour. Bot., *4,* 306, 1845
Hydnum plumarium Berk. & Curt., Grev., *1,* 97, 1873.
Hydnum conchiforme Sacc., Syll. Fung., *6,* 458, 1888.
Mycoleptodon ochraceum (Pers.) Pat., Essai Tax. Hymen., 116, 1900.

Hymenophore annual, pileate, membranous. Pilei effused-reflexed with broad resupinate bases, 1–5 cm wide, 5–15 mm radius, conchate and attached by a narrow umbo when 5–20 mm across, often imbricate, or umbonate-sessile with free margins, sometimes resupinate, Pileus surface alutaceous or ochraceous, finely tomentose, irregularly concentrically zoned, either sulcate or with bands of brown hairs, or both; margin entire, thinning out, concolorous or lighter. Hymenial surface cream to ochre with darker spines, not creviced. Spines crowded, subulate, terete or laterally flattened, apices acute, ochre, alutaceous or pallid vinaceous, 0 2–2 5 mm long. Context isabelline, 0.25–1 mm thick, of interwined mainly parallel hyphae, cortex absent; skeletal hyphae 4–6μ diameter, walls 1.5–2μ thick, hyaline, naked, sparsely branched, aseptate; generative hyphae 2 5–3μ diameter, walls 0 2μ thick, branched, septate, with clamp connexions Hymenial layer to 25μ deep, a dense palisade of basidia, paraphyses and cystidia. Basidia subclavate, 16–22 x 4.5–5μ, 2–4-spored; sterigmata erect, slender, to 4μ long. Paraphyses subclavate or fusiform, 12–18 x 4–4.5μ. Cystidia developed from slightly inflated skeletal hyphae, cylindrical, 60–250 x 7–9μ, clothed with fine crystals, sometimes partly naked, crowded in spines and projecting at an angle from their sides Spores oval or obovate, 3.5–4 x 2.5–3μ, walls smooth, hyaline, 0.1μ thick.

TYPE LOCALITY: Europe.

DISTRIBUTION: World-wide.

HABITAT: Scattered or crowded on bark and decorticated wood of branches and trunks.

Acacia dealbata Link

Canterbury: Christchurch, May 1923, W. K. Dallas.

Albizzia lophantha Benth.

Auckland: Mt. Albert, 250ft, June 1946, E. E. Chamberlain; Oratia, May 1953, D. W McKenzie; Campbell's Bay, May 1953, E. E. Chamberlain.

Beilschmiedia tawa (A. Cunn.) Hook. f. & Benth.

Auckland: Moumoukai Valley, Hunua Range, 900ft, July 1947, J. M Dingley; Lake Rotoehu, 1,200ft, June 1957, G. H. C.
Wellington: Pohangina Reserve, 250ft, August 1954, G. H. C.

Cupressus macrocarpa Hartw.

Auckland: Tauranga, 50ft, May 1954, J. D. Atkinson.

Dacrydium cupressinum Sol.

Westland: The Forks, Okarito, April 1955, J. M. Dingley
Otago: Catlins, April 1957, S. D. & P. J. Brook.

Dysoxylum spectabile (Forst. f.) Hook. f.

Auckland: Te Mochau, Coromandel Peninsula, January 1944, J M. Dingley; Waikaretu, 500ft, May 1956, Mrs. E. E. Chamberlain; Little Barrier Island, June 1956, F. J. Newhook.

Griselinia littoralis Raoul

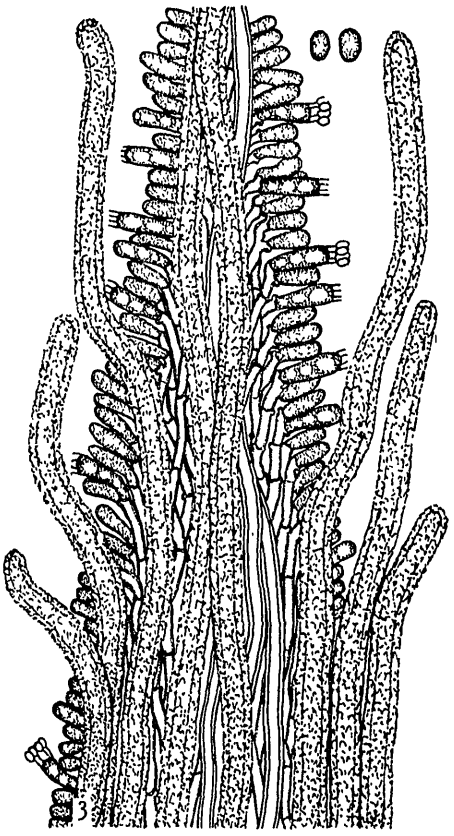
Canterbury: Peel Forest, April 1957, S. D & P. J. Brook

Knightia excelsa R. Br.

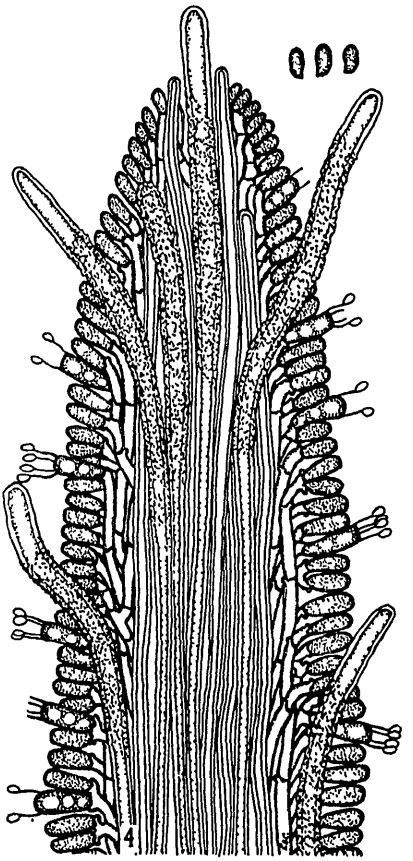
Auckland: Mt. Pihanga, 2,000ft, October 1949, J M. Dingley

Leptospermum ericoides A. Rich.

Auckland: Cornwallis, 50ft, January 1954, J. D. Atkinson.



TEXT-FIG. 3 —Transverse section through the hymenium of *Steccherinum ochraceum*, × 500; spores × 1,000



TEXT-FIG. 4.—Transverse section through the hymenium of *Steccherinum resupinatum*, × 500 Spores × 1,000. *Original*

Leptospermum scoparium Forst.
Auckland: Parahaki, Whangarei, May 1949, J. M. Dingley.
Otago: Lake Wakatipu, January 1937, Mrs. M. Moore.

Melicope ternata Forst.
Auckland: Kauaeranga Valley, Thames, June 1950, J. M. Dingley.

Melicytus ramiflorus Forst.
Wellington. Bruce's Reserve, Hunterville, 400ft, December 1946, G H C

Muehlenbeckia australis (Forst. f.) Meissn.
Auckland· Waitomo, 200ft, August 1946, G H. C.

Nothofagus fusca (Hook. f.) Oerst.
Nelson: Murchison, 500ft, April 1956, P. J. Brook.

Nothofagus menziesii (Hook. f.) Oerst.
Otago: Woodlaw State Forest, November 1946. G B Rawlings, Doubtful Sound, February 1948, J. M. Dingley.

Olearia ilicifolia Hook. f.
Westland: Douglas Rock, Copland Valley, 3,500ft, February 1947, G. H. C.

Olearia rani (A Cunn) Ckn.
Auckland: Upper Piha Valley, 900ft, August 1953, J M Dingley

Pinus radiata Don
Auckland: Papatoetoe, May 1948, G Dingley; Campbell's Bay, July 1953, Mrs. E E Chamberlain.

Prunus domestica L.

Auckland: Henderson, January 1947, W. D. Reid.

Pseudowintera colorata (Raoul) Dandy

Otago: Lake Wilkie, Catlins, April 1957, S. D. & P J. Brook

Rhopalostylis sapida (Sol.) Wendl. & Drude

Auckland: Upper Piha Valley, 900ft, April 1948, J. M. Dingley; Swanson, 500ft, April 1948, J. M. Dingley; Huia, 1,000ft, July 1953, J. M. Dingley.

Salix fragilis L.

Auckland: Purewa, September 1948, D W. McKenzie; Lake Whangapa, Rangiriri, April 1949, J. M. Dingley.

Weinmannia sylvicola Sol.

Auckland: Waipoua Kauri Forest, September 1949, J. M. Dingley.

Separated by the pileate, alutaceous or ochre hymenophore, cylindrical crystal-coated cystidia and small spores. Pilei are commonly effused-reflexed, narrow reflexed portions arising from upper margins of resupinate areas; frequently they are conchate and attached by a small umbo, or not uncommonly sessile-umbonate with free margins. Sometimes plants are resupinate with free plane margins. The pileus surface may be plane or more often convex; it is usually vaguely zoned with raised and depressed concentric lines, or hairs may be arranged in zones of different colour. Cystidia are striking, resembling those of *Poria eupora*. Long-cylindrical, mostly coated with hyaline crystals, they arise as modified skeletal hyphae crowded in spines and projecting from their apices and sides. Sometimes naked cystidia with thick walls appear among the hymenial tissues.

? **Steccherinum resupinatum** sp. nov Pl 41, fig. 1; Text-fig. 4.

Hymenophorum lignicoloratum, membranaceum, effusum, resupinatum, subinde marginibus anguste reflexis pileii modo Superficies hymenii cremea deinde alutacea non rimosa Spinae rufido-brunneae vel alutaceae 0 2–0 6 mm longae. Contextus hypharum skeletalium, plurimum parallelarum, hyalinarum, 3–3 5μ diam., generatoriarum 3–3.5μ diam , nodulosarum Basidia subclavata, 12–16 x 4.5–5μ. Cystidia in spinis, cylindricalia, 60–90 x 8–10μ, crystallis crassis tecta, eminentia. Sporae suballantoides, 3.5–4 x 1 5–2μ, parietibus levibus, hyalinis.

Hymenophore annual, membranous, loosely attached, effused forming irregular areas 3–9 x 1–3 cm, with several outlying islands; pilei represented by scanty, narrow, reflexed margins: hymenial surface cream, soon alutaceous, rough with reddish-brown or concolorous spines, not creviced; margin thinning out, fibrillose, white, adnate or sometimes incurved and occasionally erect Spines reddish-brown or concolorous, crowded, some aggregated into groups of 2–4, subulate, flaccid, 0 2–0.6 mm long, apices acute or sometimes penicillate. Context white, 150–230μ thick, of mainly parallel hyphae more densely arranged beneath the substratum; skeletal hyphae 3–4.5μ diameter, walls 0.75–1.5μ thick, hyaline, aseptate, sparsely branched; generative hyphae 3–3.5μ diameter, walls 0.2μ thick, hyaline, branched, septate, with clamp connexions. Hymenial layer to 50μ deep, a dense palisade of basidia and paraphyses. Basidia subclavate, 12–16 x 4 5–5μ, 4-spored; sterigmata erect, slender, to 3μ long. Paraphyses subclavate, 10–14 x 4–4.5μ. Cystidia confined to spines, most projecting apically, some laterally, long-cylindrical, 50–90 x 6–10μ, crystal-coated save on exposed apices. Spores suballantoid, laterally apiculate, 3 5–4 x 1.5–2μ, walls smooth, hyaline, 0.1μ thick.

DISTRIBUTION: New Zealand.

HABITAT: Effused on bark and decorticated wood of dead branches.

Coprosma australis (A. Rich.) Robinson.

Auckland: Mamaku Forest, 1,800ft, September, 1954, G H C, *type collection*, P D D herbarium, No. 17708.

Elaeagnus parvifolia Royle

Auckland: Anawhata Road, Waitakeres, 900ft, April 1948, J M. Dingley

Muehlenbeckia australis (Forst. f.) Meissn.

Otago: Taieri Mouth, 200ft, May 1952, G. T. S Baylis.

Podocarpus spicatus R. Br.

Otago: Hollyford Valley, January 1950, J M. Dingley.

Schefflera digitata Forst.

Westland: Weheka, 600ft, November 1946, J M. Dingley.

Otago: Doubtful Sound, February 1948, J. M. Dingley.

Separated from other species of the genus by the usually resupinate fructifications, long cystidia confined to the spines, and small suballantoid spores. Cystidia are formed from enlarged skeletal hyphae; they may be abundant or somewhat scantily developed, and are confined to the spines, projecting from their apices and walls. In the interior they are coated with hyaline crystals save towards the base, whereas projecting portions are naked or naked at their apices. Spores are small, suballantoid with lateral apiculi, and scantily produced.

This is an anomalous species since most fructifications are resupinate with adnate or loosely attached margins. A few have the margins upturned and free, margins then representing rudimentary pilei, a condition not uncommon in many collections of *S ochraceum*. The hyphal system is dimitic, and as no species of *Odontia* possesses skeletal hyphae, whereas all species of *Steccherinum* examined are dimitic, the plant has been referred to the latter genus.

3. **Steccherinum rawakense** (Persoon) Banker, Mycologia. *4*, 312, 1912. Pl. 42, fig. 1; Text-fig. 5.

Hydnum rawakense Pers., in Freycinet Bot du voyage aut du monde, 175, 1826
H. reniforme Berk. & Curt., Jour. Linn. Soc., *10*, 325, 1869
H glabrescens Berk & Rav., Grev., *1*, 97, 1873.
H muelleri Berk , Jour. Linn. Soc., *13*, 167, 1873.
H guaraniticum Speg , Anal Soc. Ci Argent., *17*, 74, 1884.
H basiasperatum Henn , Hedw., 36, 199, 1897.
Steccherinum morgani Banker, Mem. Torrey Bot. Club, 12, 127, 1906.

Hymenophore annual, coriaceous, pileate. Pilei flabelliform or reniform when attached by a narrow basal umbo, sometimes applanate, often imbricate, 1.5–5 cm long, 1.5–3 cm radius Pileus surface bay, ferruginous or reddish-brown, concentrically sulcate and zoned with gray and brown bands of hairs, tomentose with imbricate adpressed hairs. Margin thin, plane entire, or rarely lobed, lighter in colour. Hymenial surface ochre, ferruginous or chestnut brown, rough with spines save for a broad sterile border, not creviced; Spines subulate, sometimes flattened or angular, 0.25–2.5 mm long, crowded, apices acute. Context wood colour 0 5–1 5 mm thick, composed of densely arranged mainly parallel hyphae compacted and tinted at the abhymenial surface; skeletal hyphae 4–7μ diameter, walls 0.5–1.5μ thick, hyaline, sparsely branched, aseptate; generative hyphae 3–4μ diameter, walls 0.5μ thick, hyaline, branched, septate, without clamp connexions. Hymenial layer to 25μ deep, a dense palisade of basidia, paraphyses and rudimentary cystidia. Basidia subclavate, 10–14 x 3.5–4μ, 2–4-spored; sterigmata erect, slender, to 3μ long Paraphyses subclavate, 8–12 x 3.5–4μ. Cystidia composed of terminal ends of skeletal hyphae penetrating the subhymenium, some projecting to 25μ, scattered, a few bearing crystals at apices, most naked. Spores elliptical, 3 5–4 x 2–2.5μ, walls smooth, hyaline, 0.1μ thick.

TYPE LOCALITY: Sarawak, Borneo.

DISTRIBUTION: East and West Indies, North and South America, Cook Islands, Fiji, New Guinea, Australia, New Zealand.

HABITAT: Solitary or imbricate on bark of dead trunks and branches.

Corynocarpus laevigata Forst.

Auckland: Upper Piha Valley, 900ft, September 1949, J. M Dingley.

Pteridium esculentum (Col.) Ckn.

Auckland: Waikaretu, 500ft, May 1953, Mrs. E. E. Chamberlain.

Unknown Host

Auckland· Waipoua Kauri Forest, December 1951, M. E. Lancaster.

Differentiated by the coriaceous, flabelliform or reniform, often imbricate pilei, rudimentary cystidia, small elliptical spores and absence of clamp connexions in the generative hyphae. Pilei are coriaceous, commonly flabelliform, and attached by a definite base from which 2–3 pilei may arise. The surface is clothed with downpressed scanty hairs arranged in several concentric colour zones. Cystidia are rudimentary, consisting of terminal ends of skeletal hyphae which penetrate the hymenium, a few projecting slightly. They are scattered and more or less fortuitous, a few only bearing scattered crystals, most being naked. A rudimentary cortex is present, indicated by compact intertwined hyphae tinted yellow. The context resembles that of many

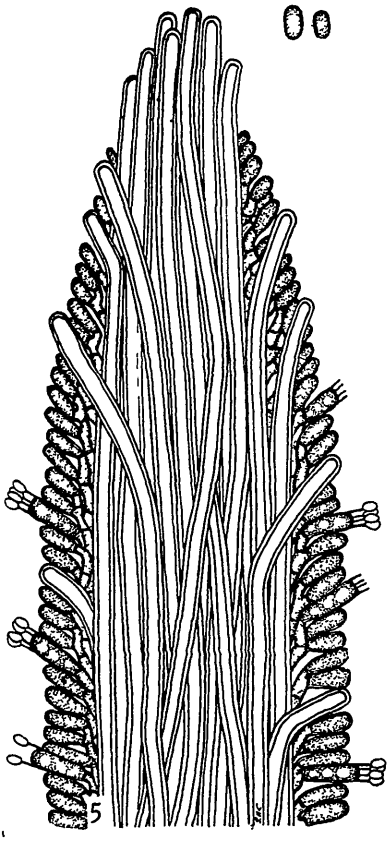
species of *Stereum* or *Hymenochaete,* for an intermediate layer is wanting, hyphae are mainly parallel and consist chiefly of skeletal hyphae.

Banker (1912, 312) stated that no type was found in Persoon's herbarium at Leyden, but that he found a solitary plant in the National Herbarium, Paris, ex Sarawak, C. Gaudichaud, which he regarded probably as being the type. Upon this the species concept has been based.

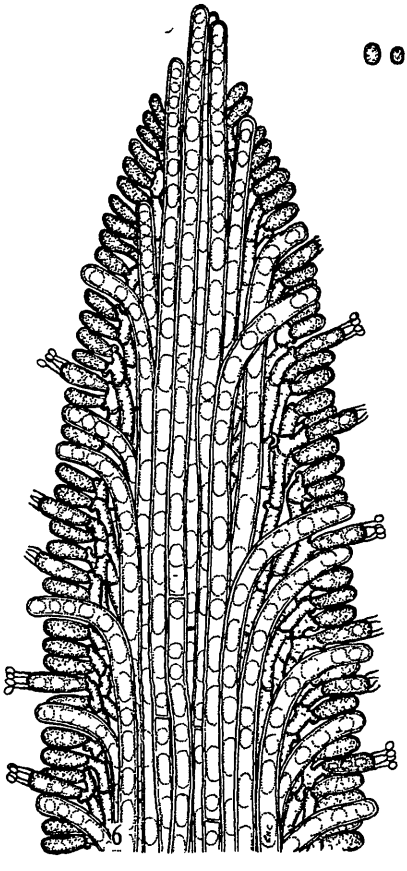
4. **Steccherinum fistulatum** sp nov. Text-fig. 6.

Hymenophorum lignicoloratum, membranaceum. Pilei effuso-reflexi; superficies straminea vel pallide alutacea, tomentosa, concentraliter sulcata et ordinibus pilorum varie brunneorum cincta, radiatim rugulosa. Contextus hypharum skeletalium plurimum parallelarum, hyalinarum, 5–8μ diam , generatoriarum 3–5μ diam., nodulosarum Basidia subclavata, 10–16 x 3 5–4μ. Hyphae lactiferae, in spinis traversae, ad 50μ eminentes, 5–8μ diam. Sporae ovales vel obovatae, 2–2.5 x 1.5–2μ, parietibus levibus, hyalinis

Hymenophore annual, membranous, pileate Pilei effused-reflexed, with broad resupinate bases, 12–25 mm long, 8–12 mm radius, or applanate when imbricate, 5–30 mm wide, 5–10 mm radius; pileus surface straw colour or pallid tan, finely tomentose, concentrically sulcate and zoned with bands of hairs of different shades of brown, radiately rugulose; margin thinning out, plane, entire, somewhat complicate, concolorous Hymenial surface straw colour, rough with spines, not creviced. Spines subulate, terete, crowded, 0.5–2.5 mm long. Context white or straw colour, 0 2–0 5 mm thick, composed of intertwined mainly parallel hyphae; skeletal hyphae 5–8μ diameter, walls 0.2μ thick, hyaline, staining, sparsely septate, sparsely branched; generative hyphae 3–4.5μ diameter, walls 0.5–1μ thick, hyaline, staining, branched, septate, with clamp



TEXT-FIG. 5.—Transverse section through the hymenium of *Steccherinum rawakense,* × 500; spores × 1,000.



TEXT-FIG. 6 —Transverse section through the hymenium of *Steccherinum fistulatum,* × 500; spores × 1,000. *Original.*

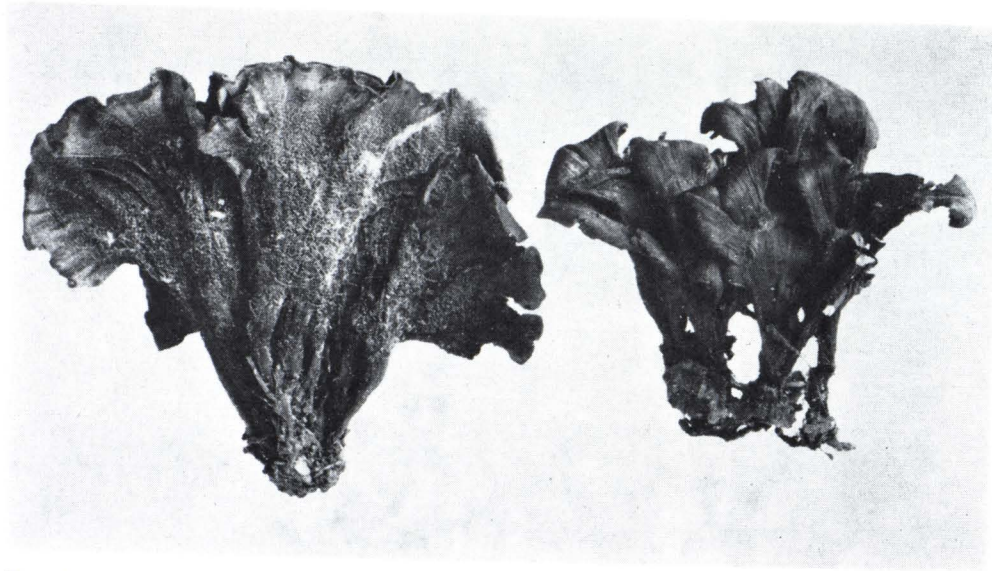


FIG. 1.—*Phellodon sinclairii*, showing hymenial and dorsal surfaces, × 1.

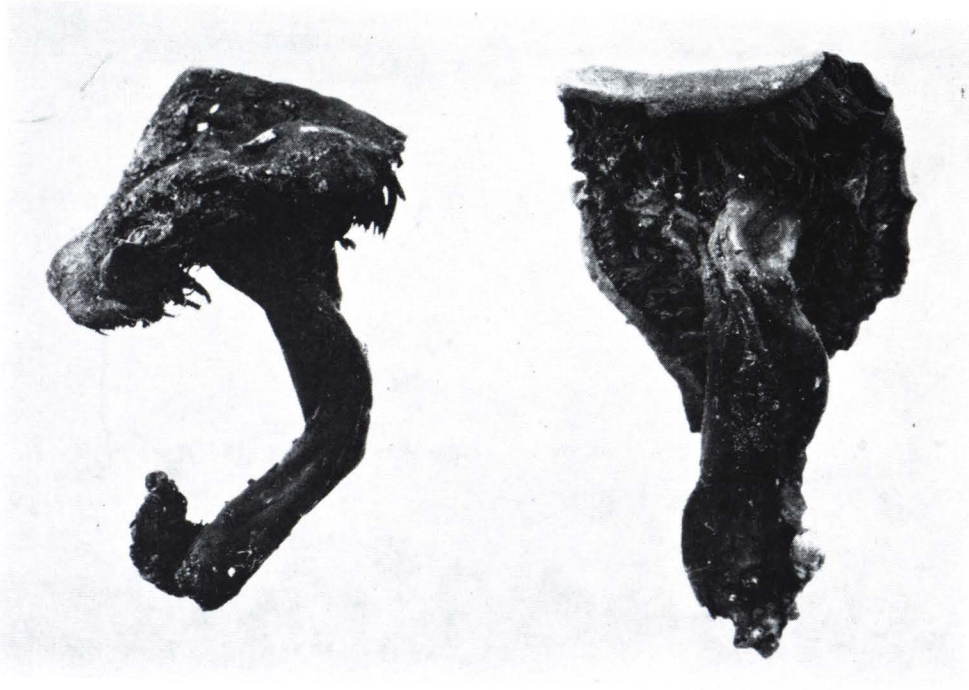


FIG. 2.—*Hydnum carbonarium*, × 2.

Photographs S. A. Rumsey.

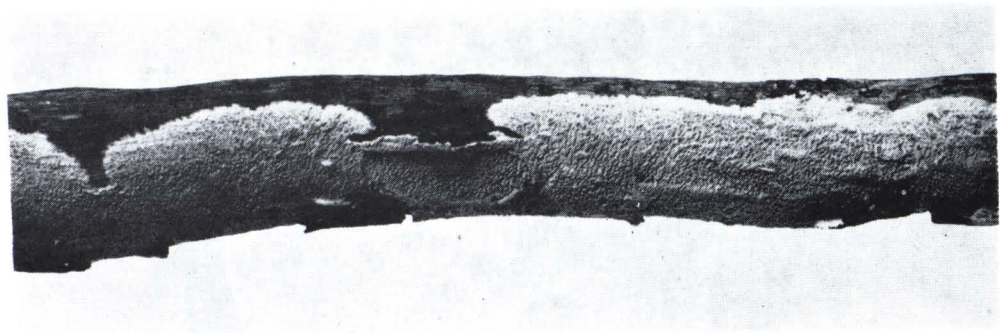


FIG. 1.—*Steccherinum resupinatum*, × 1.

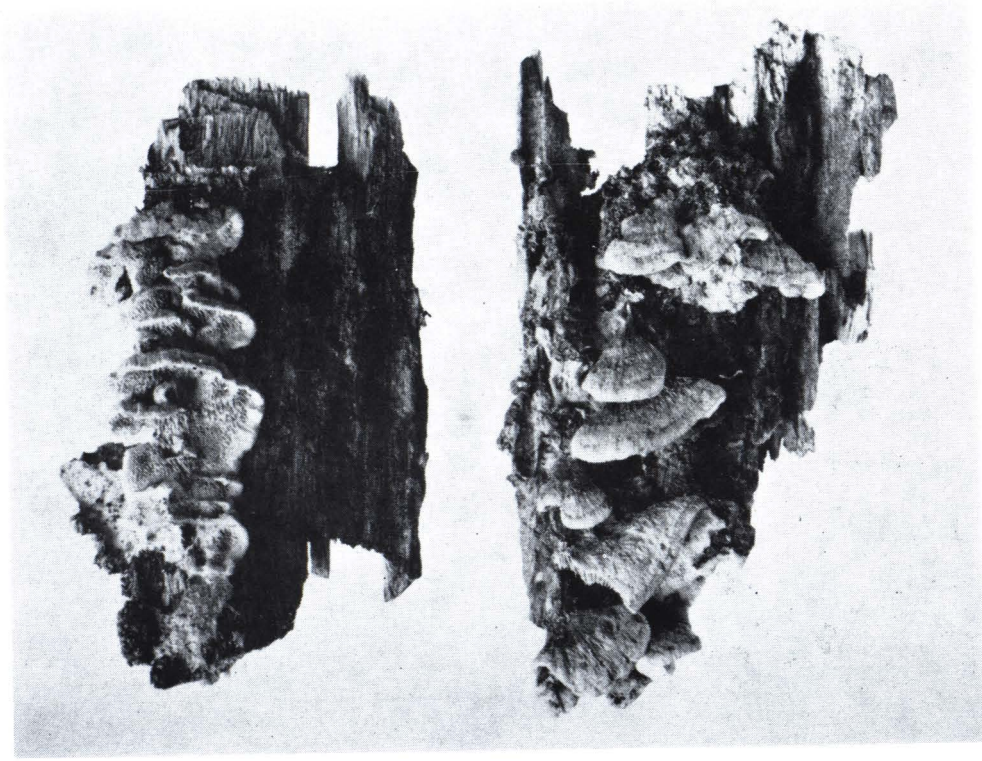


FIG. 2.—*Steccherinum ochraceum*, × 1.

Photographs S. A. Rumsey.

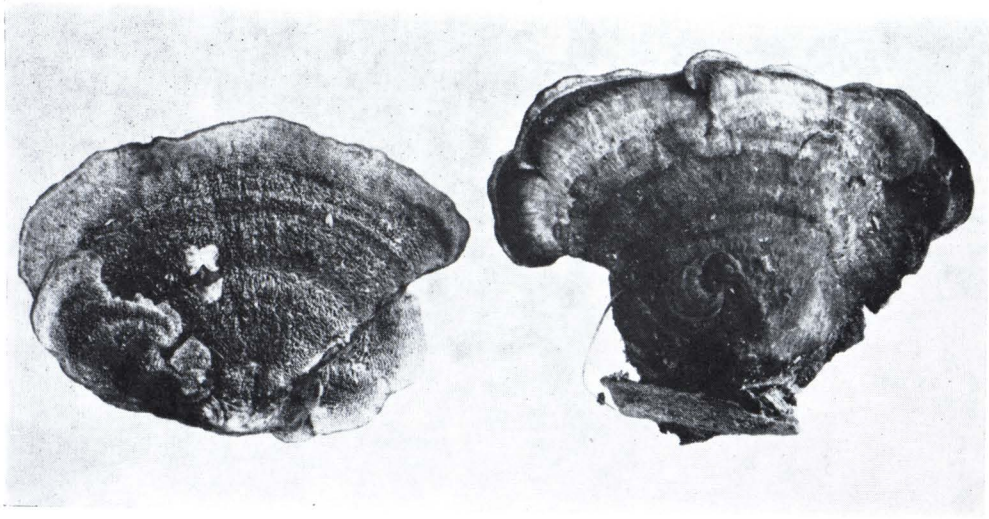


FIG. 1.—*Steccherinum rawakense*, × 1. Showing hymenial and pileate surfaces.

FIG. 2.—*Hericium coralloides*, × 1. A branch from a compound fructification.

Photographs S. A. Rumsey.

connexions. Hymenial layer to 35μ deep, a dense palisade of basidia, paraphyses and conducting hyphae Basidia subclavate, 10–16 x 3 5–4μ, 4-spored; sterigmata slender, erect, to 3μ long Paraphyses subclavate, 8–12 x 3–3 5μ. Conducting hyphae arising in the context, traversing spines and forming the bulk of the axial tissues, cylindrical, 5–8μ diameter, projecting slightly at spine apices, turning at right angles and projecting for 50μ from the hymenial layer of the spines, naked, filled with refractive oily contents Spores oval or obovate, 2–2.5 x 1 5–2μ, walls smooth, hyaline, 0.1μ thick.

DISTRIBUTION: Queensland, New Zealand

HABITAT: Usually imbricate on bark of dead stems and stumps.

Beilschmiedia tawa (A. Cunn.) Hook f. & Benth.

Wellington· Weraroa, 50ft, July 1919, G H C.

Casuarina sp.

North Queensland· Stony Creek, June 1955. W Pont, No 886, *type collection,* P D D. herbarium, No. 17709.

Leptospermum ericoides A Rich

Auckland: Parahaki, Whangarei, June 1948, J M Dingley.

Litsaea calicaris (Sol) Benth & Hook. f

Auckland Woodhill, 100ft, July 1953, J M Dingley.

An unusual feature which enables the species to be recognized readily is the presence of conducting hyphae, containing refractive contents and oil drops, a feature not noted in any other species of *Steccherinum.* A second is the small size of the spores, which do not exceed 2 5μ in length, and are difficult to see unless thin sections are prepared and adequately stained Surface features resemble those of *S ochraceum,* and in fact one collection was so named by C G Lloyd. Skeletal hyphae are thin-walled and form the conducting hyphae; walls of the generative hyphae are relatively thick in hyphae of the context (though thin-walled in the sub-hymenium) the converse of what is usually found in species with a dimitic hyphal system Hyphae stain deeply in aniline blue

6 **Hericium** Persoon ex Gray, Natural Arrangement of British Plants, *1,* 652, 1821

(*Hericium* Pers , Comment de fungis clavaef , 23, 1797).
Medusina Chev , Fl gen env Paris, 278, 1826.
Dryodon Quel , in Cke & Quel , Clav Hymen , 198, 1878
Friesites Karst , Medd Soc Faun Fl Fenn , *5,* 27, 1880.
Manina Scop , ex Banker, Mycologia, *4,* 275, 1912

Hymenophore lignicolous, annual, pileate, coriaceous Pilei composed of several lateral branches arising from a pulvinate base and bearing many lateral branchlets which in turn may be branched Spines arising from lateral and ventral surfaces of branches and branchlets subulate, terete Context composed of parallel hyaline hyphae; hyphal system monomitic, generative hyphae hyaline, with clamp connexions. Conducting hyphae with scanty septa filled with refractive oily contents Spores globose or subglobose, walls smooth, hyaline, amyloid

TYPE SPECIES *Hericium coralloides* (Scop.) Gray.

DISTRIBUTION· Europe, Great Britain, North America, New Zealand

A small genus containing two, or possibly three species, *Hericium* may be recognized readily by the structure of the fructification In one species this consists of several coriaceous stout branches growing laterally from a common base attached to wood Branches bear several lateral branchlets which in turn may be branched until the whole forms a complex mass roughly oval in shape and attaining a length of 25 cm Branches and branchlets taper gradually from base to apex, and upon them arise the pendent spines. *H. ramaceus* (Fr) Pers is more simple in form; for spines arise directly from a pendent base, attain a length of 1–4 cm, but do not become branched Noteworthy are the long conducting hyphae which extend through context and spines of *H coralloides* and penetrate the hymenial layer. They are conspicuous on account of their small diameter and refractive oily contents.

1 **Hericium coralloides** (Scopoli) Gray, Natural Arrangement of British Plants *1,* 652, 1821. Plate 42, fig. 2

Hydnum coralloides Scop (Fl Carn . *2,* 472, 1772) ex Fries, Syst Myc., *1,* 408, 1821
Medusina coralloides (Scop) Chev , Fl Gen env Paris, *1,* 279, 1826

Dryodon coralloides (Scop.) Quel., in Cke., Clav Hymen., 198, 1878.
Friesites coralloides (Scop.) Karst., Medd. Soc. Faun. Fl. Fenn., *5*, 27, 1880.
Manina coralloides (Scop) Banker, Mycologia, *4*, 276, 1912.
Hydnum novae-zealandiae Colenso, Trans. N.Z. Inst, *21*, 79, 1888

Hymenophore annual, pileate, coriaceous. Pilei composed of several main branches growing laterally from a common pulvinate base attached to the ligneous substratum, branches 5–25 mm diameter at the base, tapering gradually to apices, bearing numerous lateral and ventral branches, in turn branched, the whole forming orbicular, oval or irregular coralloid masses 5–25 x 2–10 cm, white when fresh, drying tan or reddish-brown. Spines aculeate, terete, 1–10 mm long, crowded, decreasing in length from base to apex of branches, confined to their lateral and ventral surfaces, concolorous Context variable; in branches composed of parallel hyphae, 18–25μ diameter with walls 5–8μ thick, hyaline, naked, branched, septate, with irregular clamp connexions; in spines parallel, 4–6μ diameter, walls 0 2μ thick, hyaline, naked, sparsely branched, septate, with clamp connexions. Hymenial layer confined to spines, to 25μ deep, a close palisade of basidia, paraphyses and ends of conducting hyphae. Basidia subclavate, 18–25 x 4–5μ, 2–4-spored, sterigmata slender, erect, to 3μ long Paraphyses subclavate, many cylindrical, 16–20 x 3–4μ Conducting hyphae traversing branches and spines and penetrating the hymenial layer, scarcely projecting, 5–8μ diameter, filled with refractive oily contents. Spores globose or subglobose, 3 5–5μ diameter, walls smooth, hyaline, 0 25μ thick, amyloid.

TYPE LOCALITY: Europe.

DISTRIBUTION: Europe, Great Britain, North America, New Zealand.

HABITAT: Solitary on fallen or erect trunks of dead trees

Beilschmiedia tawa (A Cunn.) Hook. f & Benth.

Auckland· Pukekohe, December 1921, C A Barnes.
Wellington· Weraroa, 50ft, July 1919, W D Reid, Lake Papaetonga, 50ft, March 1925, J C Neill

Metrosideros robusta A. Cunn.

Auckland· Waikaretu, 500ft, May 1956, E E. Chamberlain.

Nothofagus menziesii (Hook f.) Oerst.

Hawke's Bay: Poronui, 2,000ft, June 1953, J. M. Dingley.

Weinmannia racemosa L.f.

Otago: Horseshoe Bay, Stewart Island, February 1954, J. M. Dingley.

Unknown Hosts

Auckland: Whakarewarewa, June 1949, P. M Ambler, Huia, May 1957, K Woods
Wellington: Tiritea, June 1933, G G. Taylor, Manawatu Gorge, 500ft, June 1934, E E Chamberlain, Mt Bruce, Tararuas, February 1945, V. D Zotov

On account of the colour and intricately branched form, plants may be recognized readily by their resemblance to certain white forms of coral. Each plant is compound, and the whole may assume oval or elliptical shapes extending to 25 x 10 cm In addition to basidiospores, conidia also are formed, sometimes on sides of branches, as frequently near apices of spines, and resemble basidiospores in size and shape They arise from short lateral hyphal branches.

In Europe for nearly two centuries the species has been known as *Hydnum coralloides* According to Fries (1821, 409) it had also by earlier writers been named *H. abietinum* Schrad , *H. crispum* Scop , *H laciniatum* Leers, *H muscoides* Schum. and *H. ramosum* Bull. In the United States it has been labelled *Hericium laciniatum* (Leers) Banker (Banker, 1906, 114) a treatment followed by Miller (1935, 366, 367) and Coker & Beers (1951, 15) and a second species with larger spores treated as *H coralloides* As types of both are unknown, and in Europe the name *coralloides* is applied to the species described above, such treatment is unwarranted To avoid confusion, the form with larger spores should be renamed, or treated as a variety of *H. coralloides* Part of the type of *Hydnum novae-zealandiae* Col. is in Kew herbarium, ex " Dannevirke, W Colenso, 1888 " Examination showed it to be a specimen of *Hericium coralloides.*

EXCLUDED SPECIES

membranaceum, Hydnum (Bull) Fr A collection in Kew herbarium, filed under this cover, ex " N Z , Colenso, n 152 " proved on examination to be based on specimens of *Merulius nothofagi* G. H Cunn

tabacinum, Hydnum Cke, Grev., *14*, 129, 1886. The type, ex "N.Z., Colenso, b. 150" proved to be based on a collection of *Caldesiella ferruginosa* Sacc.

wellingtonii, Hydnum Lloyd = *Dentinum crocidens* (Cke.) G. H. Cunn.

zeylandicum, Radulum Berk., in herb. Kew. Under this cover in Kew herbarium is filed a collection so named by Berkeley, ex "Bay of Islands, N.Z." It is a specimen of *Irpex brevis* Berk.

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