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## Fungi from the Mamane-Naio vegetation zone of Hawai`i

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Robert L. Gilbertson<sup>1</sup>, Dennis E. Desjardin<sup>2</sup>, Jack D. Rogers<sup>3</sup> and Don E. Hemmes<sup>4</sup>

<sup>1</sup>Department of Plant Pathology, University of Arizona, Tucson, AZ 85721, USA

<sup>2</sup>Department of Biology, San Francisco State University, San Francisco, CA 94132, USA

<sup>3</sup>Department of Plant Pathology, Washington State University, Pullman, WA 99164, USA

<sup>4</sup>Department of Biology, University of Hawai`i at Hilo, Hilo, HI 96720, USA

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A survey of higher fungi in the mamane-naio vegetation zone on the slopes of Mauna Kea on the island of Hawai`i yielded 71 species of ascomycetes and basidiomycetes. Eight xylariaceous ascomycetes are reported. Fifteen species of gasteromycetes are reported. Of these *Battarrea phalloides*, *Disciseda anomala*, *D. verrucosa*, *Geastrum campestre*, *G. fornicatum*, *Tulostoma fimbriata* var. *campestre*, and *T. involucreatum* are new reports from the Hawaiian Islands. Forty-eight species of wood-rotting basidiomycetes are reported. *Brevicellicium vulcanense*, *Crustoderma gigacystidium*, *Henningsomyces separatus*, *Hyphoderma sphaeropedunculatum*, *Hyphoderma naiophila*, *Hyphodermella maunakeaensis*, *Phanerochaete crescentispora*, *Radulomyces kama`aina*, and *Radulomyces poni* are described as new. Thirty other species of wood-rotting basidiomycetes are new reports from the Hawaiian Islands.

**Key words:** Gasteromycetes, Hawaiian fungi, wood-rotting Basidiomycetes, *Xylariaceae*.

### Introduction

The mamane-naio vegetation zone encircles Mauna Kea on Hawai`i, the Big Island, at an elevation of 1800-2900 meters. Mamane, *Sophora chrysophylla* (Salisb.) Seem. is endemic to the Hawaiian Islands, whereas naio, *Myoporum sandwicense* A. Gray, is also found on Mangaia in the Cook Islands and is considered indigenous to Hawai`i. The two trees are codominant on the shoulders of Mauna Kea and form scattered thickets with canopies 2-10 m high. A few other native shrubs, grasses, herbs, and ferns occur in this community, especially near the tree canopies where they receive fog drip. Cattle, feral animals, and game birds have aided in the introduction and spread of alien grasses and herbs in the area (Wagner *et al.*, 1990). This relatively small native ecosystem is highly susceptible to disruption due to its limited size and human competition for land resources in Hawai`i (Juvik and Juvik, 1984).

This subalpine forest is dry most of the year with an annual rainfall of 380-1000 mm, most of which falls between October and March. Clouds usually form during the afternoon so that fog drip is an important moisture supplement. This unique vegetation zone is one of several native vegetation communities in Hawai'i that is being surveyed by mycologists for the first time. Several locations within the mamane-naio vegetation zone, some on the windward side of the mountain, others on the leeward side, have been monitored on a monthly basis since January 1996. Each location was searched in a random fashion with searches concentrated in the shade of closed canopies. Most lignicolous fungi were found on fallen trunks and branches of naio, which predominate in the shady areas under thicket canopies.

Groups of fungi reported in this paper are xylariaceous ascomycetes, gasteromycetes and wood-rotting basidiomycetes. Three letter initials are used to refer to authors of this paper. All of the collections cited were made on the island of Hawai'i. Botanical and common names of trees listed as substrates (Table 1) are based on Little and Skolmen (1989). Dates of collection are given in the sequence month, day, year. For example 4/2/99 is April 2, 1999.

**Table 1.** Botanical and common names of trees listed as substrates (based on Little and Skolmen, 1989)

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<i>Acacia koa</i> A. Gray; koa
<i>Acacia mearnsii</i> DeWild.; black wattle acacia
<i>Eugenia jambos</i> L.; 'ōhi'a like or rose apple
<i>Cupressus macrocarpa</i> Hartw. Monterey cypress
<i>Eucalyptus globulus</i> Labill.; Tasmanian blue gum
<i>Hibiscus tiliaceus</i> L.; hau
<i>Dodonaea viscosa</i> Jacq.; hopbush, dodonaea
<i>Metrosideros polymorpha</i> Gaud.; 'ōhi'a lehua
<i>Myoporum sandwicense</i> A. Gray; naio
<i>Prosopis pallida</i> (Humb. and Bonpl. ex Willd.) H.B.K.; kiawe or mesquite
<i>Sophora chrysophylla</i> (Salisb.) Seem.; mamane
<i>Trema orientalis</i> (L.) Blume; gunpowder tree or charcoal tree

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#### **Annotated List of Xylariaceous Ascomycetes**

All of the specimens of xylariaceous ascomycetes cited below are deposited in the Mycological Herbarium of Washington State University (WSU).

***Hypoxyton aeneum* Nitschke var. *aureoluteum* L.E. Petrini and J.D. Rogers.**

*Specimen examined:* Mauna Kea, on naio, sine anno, DEH 1626 (Herb. JDR).

This is close to *Nemania aenea* Nitschke and will be raised to species status in the near future (Alfred Granmo, pers. comm.). The type location for this fungus is Central Europe and it is surprising to find it in Hawai'i. It seems morphologically identical to European material, but grows faster in culture, covering a 9 cm diam. Petri plate in 14 days vs. 4-5 cm in 35 days for European isolates (Petrini and Rogers, 1986). This is probably evidence of long separation from continental populations or, indeed, random genetic drift.

***Hypoxylon begae*** Y.-M. Ju and J.D. Rogers.

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio, 2 April 1999, DEH 1810 (Herb. JDR).

In addition to the collection cited here, several collections of old, depauperate stromata probably represent this species (all herb. JDR). This species has been known only from the type from an unspecified location in Hawai'i (Ju and Rogers, 1996). The collection cited here differs from the type in having orange pigment extractable in KOH from young, immature stromata. Overmature stromata that have become black lack an extractable pigment. It has been cultured from ascospores and cultural morphology is as follows:

Colonies on 2% oatmeal agar covering plate in ca. 7 days, white to greyish with sectors underlain with black, appressed to lanose. Reverse and agar becoming brownish. Sporulating regions developing at various parts of plate after 28 days. Conidiogenous structure *Nodulisporium*. Conidia hyaline to brownish, obovoid to ellipsoid, smooth, (4.5-)7-8(-9) × (2.5-)3.5-5.5 μm.

***Hypoxylon crocopeplum*** Berk. and M.A. Curtis.

*Specimens examined:* Pu'u Huluhulu, Saddle Rd, at junction with Mauna Loa Rd, on dead attached naio branches, 22 November 1998, RLG 22293, 22295; slope of Mauna Kea, Saddle Rd, on naio, 22 November 1998, JDR, two collections; Pu'u Huluhulu, Saddle Rd at junction of Mauna Loa Rd, 22 November 1998, on naio, JDR (all Herb. JDR).

This fungus is common in the subtropics and tropics. It intergrades with some other taxa from which it is separable primarily on anamorphic and cultural features (Ju and Rogers, 1986). One collection cited above (from Pu'u Huluhulu) has ascospores averaging larger than usual [(15.5-)17.5-19 × 8-9(-9.5) μm vs. (9-)9.5-15 × 4-7(7.5) μm] and might represent an undescribed taxon.

***Hypoxylon dieckmannii*** Theiss.

*Specimen examined:* Pu'u La'au, Mauna Kea, on naio, 22 November 1998, JDR (Herb. JDR).

This collection represents the first report of this small-spored *Hypoxylon* from the Hawaiian Islands. It is known from Mexico, South America and Louisiana in the continental U.S. (Ju and Rogers, 1996).

***Hypoxylon fendleri* Berk. ex Cooke.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio, 18 November 1997, DEH 1594; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, JDR (all Herb. JDR).

This is the first report of *H. fendleri* from the Hawaiian Islands. It differs somewhat from typical material in having slightly larger ascospores, 11.5-13.5 × 5-6 µm vs. (8-)9-12 × 4-5.5 µm (Ju and Rogers, 1996). This species is widely distributed in Africa, Asia, and South America.

***Hypoxylon haematostroma* Mont.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio, 22 November 1998, JDR, two collections (Herb. JDR).

These two collections from this location fit the concept of the species well, except that perithecia are only slightly elongated.

***Hypoxylon cf. rubiginosum* (Pers.: Fr.) Fr.**

*Specimen examined:* slope of Mauna Kea, on naio, sine anno, DEH 1623, (Herb. JDR).

Ascospores of this collection are a bit large for *H. rubiginosum* (12-)13.5(-15) × 6 µm vs. (8-)9-12 × 4.5-5.5, better fitting those of *H. crocopeplum* (Ju and Rogers, 1996). Cultures, however, are like those of *H. rubiginosum* (Ju and Rogers, 1996). The status of this collection is thus unclear.

***Hypoxylon submonticulosum* Y.-M Ju and J.D. Rogers.**

*Specimens examined:* Mauna Kea, on naio, 18 November 1997, DEH 1624; Mauna Kea, on naio, 18 November 1997, DEH 1628; Pu'u La'au, Mauna Kea, on naio, 18 November 1997, DEH 1600; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, JDR, two collections (all Herb. JDR).

This species seems common in the mamane-naio habitat. It is widespread in mainland USA (Ju and Rogers, 1996). *Hypoxylon monticulosum* Mont. is the tropical counterpart of *H. submonticulosum* and has been collected from other habitats in the Hawaiian Islands. Care must be exercised in assessing pigments extractable in KOH in this species. Stromata that have become blackened yield no pigment in KOH, whereas those that are reddish yield a dilute to intense purple pigment (Ju and Rogers, 1996). The *Nodulisporium* anamorph is often conspicuously associated with the teleomorph as tan synnemata.

**Key to species of *Hypoxylon* from Mamane-Naio habitat**

1. Stromata blackish, 5 mm thick, not showing pigment in 10% KOH; ascospores 13.5-15 × 5-6 µm, with short germ slit on concave side of spore; perispore indehiscent in KOH.....  
.....*Hypoxylon aeneum* var. *aureoluteum* (a *Nemania*)
1. Stromata usually coloured, but often becoming black at maturity, often releasing coloured pigment in 10% KOH; ascospores with germ slit on convex side; perispore dehiscent or indehiscent in KOH..... 2



2. Stromata 4-8 mm thick, releasing isabelline to orange pigment in KOH; ascospores 19-23.5 × 12.5-14.5(-15) μm; perispore indehiscent in KOH ..... *Hypoxyton begae*  
2. Stromata seldom exceeding 3 mm thick ..... 3
3. Stromata 0.6-1 mm thick, releasing greyish sepia pigment in KOH or without pigment; ascospores 7.5 × 3.5-4.5 μm; perispore indehiscent in KOH ..... *Hypoxyton dieckmannii*  
3. Stromata various; ascospores longer ..... 4
4. Stromata 1.5-3 mm thick, releasing orange pigment in KOH; ascospores 14.5-19 × 7.5-9 μm; perispore dehiscent in KOH ..... *Hypoxyton haematostroma*  
4. Stromata various in thickness and pigment released in KOH; ascospores seldom exceeding 13.5 μm in length ..... 5
5. Stromata 0.5-0.7 mm thick, not releasing pigment in KOH when stroma has blackened, but releasing purple pigment in KOH when stroma is reddish; ascospores 10.5-13.5 × (4.5)5-6 μm; perispore usually dehiscent in KOH ..... *Hypoxyton submonticulosum*  
5. Stromata various in thickness; orange pigment released in KOH ..... 6
6. Stromata 0.5-2.5 mm thick; ascospores 10-13.5(-16) × 6(-7) μm; perispore dehiscent in KOH ...  
..... *Hypoxyton crocopeplum*  
(Note: A collection much like this species, but with larger ascospores, was made. See remarks in description of this species.)  
6. Stromatal thickness and/or ascospores different ..... 7
7. Stromata 0.5-0.8 mm thick; ascospores 11.5-13.5 × 5-6 μm; perispore dehiscent in KOH .....  
..... *Hypoxyton fendleri*  
7. Stromata 0.5-1.5 mm thick; ascospores (12-)13.5(-15) × 6 μm; perispore dehiscent in KOH .....  
..... *Hypoxyton cf. rubiginosum*

*Note:* Separation of closely related *Hypoxyton* species usually requires culturing. See Ju and Rogers, 1996.

#### Annotated List of Gasteromycetes

All of the specimens of gasteromycetes cited below are deposited in the Mycological Herbarium of San Francisco State University (SFSU).

#### *Battarrea phalloides* (Dicks.: Pers.) Pers.

*Specimens examined:* Pu'u La'au, Mauna Kea, 7500 ft elev., in soil under mamane and naio, 10 September 1996, DEH 1227; Pu'u La'au, Mauna Kea, in soil under mamane, 21 October 1997, DEH 1268.

The volva of young specimens was rubbery and pliant, although no obvious gelatinous tissue was observed. The species has been collected also at lower elevation along the coast of Hawai'i and O'ahu. Not previously reported from the Hawaiian Islands.

***Disciseda anomala* (Cooke and Masee) G. Cunn.**

*Specimens examined:* Pu'u La'au, Mauna Kea, in soil under mamane, 24 September 1996, DEH 1259; Pu'u La'au, Mauna Kea, scattered in fine soil, 26 August 1997, DEH 1519; Pu'u La'au, Mauna Kea, scattered in loose soil, 23 September 1997, DEH 1532; Pu'u La'au, Mauna Kea, in loose soil under mamane and naio, 21 October 1997, DEH 1563; Pu'u La'au, Mauna Kea, scattered in soil, 12 October 1998, DEH 1735.

Not previously reported from the Hawaiian Islands.

***Disciseda verrucosa* G. Cunn.**

*Specimens examined:* near Mauna Kea State Park off Saddle Rd., scattered in soil under mamane, 17 January 1997, DEH 1384; Pu'u La'au, Mauna Kea, scattered in soil around cluster of mamane and naio, 22 March 1977, DEH 1481.

Not previously reported from the Hawaiian Islands.

**Key to species of *Disciseda* from Mamane-Naio Habitat**

1. Spores 4.5-5.7  $\mu\text{m}$  diam. (without ornamentation), covered with short, obtuse, straight spines up to 0.6  $\mu\text{m}$  long; endoperidium with an erect, tubular stoma; gleba reddish-brown .....

..... *D. anomala*

1. Spores 6.5-9  $\mu\text{m}$  diam. (without ornamentation), covered with long, acute, often curved spines up to 1.3  $\mu\text{m}$  long; endoperidium with a flat to mammosed stoma; gleba olivaceous brown .....

..... *D. verrucosa*

***Geastrum campestre* Morgan.**

*Specimens examined:* Pu'u La'au, Mauna Kea, scattered on soil, 24 September 1996, DEH 1258; Pu'u La'au, Mauna Kea, scattered in soil in the open near dead mamane stump, 27 August 1997, DEH 1517; Pu'u La'au cabin, Mauna Kea, scattered in soil near edge of mamane-naio scrub, 23 September 1997, DEH 1534; Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1604; Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1605; Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1796.

*Geastrum campestre* is one of two hygroscopic species from mamane-naio habitat, along with *G. corallinum*. The sulcate to plicate peristome in combination with hygroscopic arms are diagnostic. Not previously reported from the Hawaiian Islands.

***Geastrum corallinum* (Batsch) Hollos.**

*Specimens examined:* Pu'u La'au, Mauna Kea, scattered in soil near edge of mamane-naio scrub, 23 September 1997, DEH 1535, 1536; Pu'u La'au, Mauna Kea, scattered in loose soil, 21 October 1997, DEH 1565, 1566.

The mamane-naio specimens are typically smaller than those reported from Europe and North America, with an endoperidium averaging 5-13 mm diam. Reported from O'ahu by Smith and Ponce de Leon (1982) as *Geastrum recolligens* (With.) Desv.

***Geastrum fornicatum* (Huds.) Hook.**

*Specimens examined:* Saddle Rd, on Kona side of Mauna Kea access road, scattered in soil under mamane and naio, 30 January 1996, DEH 1029; Pu'u La'au, Mauna Kea, scattered in soil, 24 September 1996, DEH 1260; Saddle Rd near Mauna Kea State Park, scattered in soil, 17 January 1996, DEH 1271; Pu'u La'au, Mauna Kea, scattered in leafy debris, 23 November 1998, DEH 1754; Pu'u La'au, Mauna Kea, clustered to scattered in soil, 2 January 1999, DEH 1795.

This is the only species with fornicate basidiomes from mamane-naio habitat. Not previously reported from the Hawaiian Islands.

***Geastrum minimum* Schwein.**

*Specimens examined:* Saddle Rd. on Kona side of Mauna Kea access road, 6000 ft. elev., scattered in soil among cypress tussocks in mamane-naio grasslands, 30 January 1996, DEH 1028; Pu'u La'au, Mauna Kea, scattered in leafy debris, 21 October 1997, DEH 1568; Pu'u La'au, Mauna Kea, scattered in leafy debris of naio, 23 November 1998, DEH 1753.

The fimbriate peristome, non-hygroscopic rays, and stalked, tiny (5-10 mm diam.) endoperidium are diagnostic. Reported from Hawai'i and O'ahu by Smith and Ponce de Leon (1982).

***Geastrum saccatum* Fr.**

*Specimens examined:* Pu'u La'au Cabin, Mauna Kea, scattered in soil under mamane and naio, 26 August 1997, DEH 1518; Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1569.

The fimbriate peristome, non-hygroscopic rays, and the sessile and saccate endoperidium are diagnostic. Reported from O'ahu by Smith and Ponce de Leon (1982).

***Geastrum xerophilum* (Long) P. Ponce de Leon.**

*Specimens examined:* Saddle Rd, on Kona side of Mauna Kea access road, 6000 ft. elev., scattered in soil under mamane and naio, 30 January 1996, DEH 1030; Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1567.

*Geastrum xerophilum* is one of two species from mamane-naio habitat with a sulcate peristome, along with *G. campestre*. The former differs in forming non-hygroscopic rays. Reported from O'ahu by Smith and Ponce de Leon (1982).

***Myriostoma coliforme* (With.: Pers.) Corda.**

*Specimens examined:* Kilohana, Mauna Kea, scattered on soil, 2 July 1996, DEH 1144; Pu'u La'au, Mauna Kea, scattered on soil under naio, 24 September 1996, DEH 1255; Saddle Rd near Mauna Kea State Park, scattered in soil under mamane and naio, sine anno, DEH 1382; Pu'u La'au Cabin, Mauna Kea, scattered in powdery soil in shade of mamane and naio, 26 August 1997, DEH 1516; Saddle Rd at 31 mile marker, Mauna Kea, scattered in soil, 20 August 1996, B.A. Perry 059.

Known also from lowland leeward arid habitats. Reported from Hawai'i by Burt (1923) and Smith and Ponce de Leon (1982).

**Key to Earth Stars from Mamane-Naio Habitat**

- 1. Endoperidium opening by numerous pores (multistomatous).....*Myriostoma coliforme*
- 1. Endoperidium opening by a single apical pore (unistomatous)..... 2
  
- 2. Peristome sulcate..... 3
- 2. Peristome fimbriate ..... 4
  
- 3. Rays hygroscopic, thick, stiff; spores lacking a large guttule.....*Geastrum campestre*
- 3. Rays not hygroscopic, straight to slightly involute, thin, flexible; spores with a single large guttule.....*Geastrum xerophilum*
  
- 4. Exoperidium fornicate.....*Geastrum fornicatum*
- 4. Exoperidium not fornicate..... 5
  
- 5. Endoperidium stalked.....*Geastrum minimum*
- 5. Endoperidium sessile..... 6
  
- 6. Rays strongly hygroscopic; endoperidium 5-13 mm diam.....*Geastrum corallinum*
- 6. Rays not hygroscopic, strongly revolute; endoperidium 12-20 mm diam. ....*Geastrum saccatum*

***Tulostoma beccarianum* Bres. apud Petri.**

*Specimen examined:* Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1573.

Among the *Tulostoma* species in mamane-naio, this one is distinctive in forming small, purplish-grey endoperidia with a tubular pore that is usually covered with adherent soil particles.

***Tulostoma fimbriata* var. *campestre* (Morgan) Moreno.**

*Specimen examined:* Hale Pohaku Visitor's Center, Mauna Kea, 9000 ft. elev., gregarious to scattered, buried in sandy soil under mamane, 20 August 1996, DEH 6538; same location, scattered in sandy soil, 12 May 1999, DEH 1825.

Not previously reported from the Hawaiian Islands.

***Tulostoma involucreatum* Long.**

*Specimens examined:* Pu'u La'au, Mauna Kea, scattered in soil, 21 October 1997, DEH 1571, 1572; same location, scattered in naio leaf mulch, 23 November 1998, DEH 1757.

This species has also been collected in Hawai'i along the coast in sandy areas. Not previously reported from the Hawaiian Islands.



Two additional, undetermined species of *Tulostoma* have been collected in mamane-naio habitat, as follows:

***Tulostoma* sp. 1.**

*Specimen examined:* near Mauna Kea State Park off Saddle Rd, scattered in soil, 17 January 1996, DEH 1383.

*Exoperidium* very thin and friable, pale rusty brown to pale brown, soon evanescent. *Endoperidium* 5-10 mm diam. smooth to finely verrucose, glabrous, off-white to pale cream coloured; pore circular, short-tubular. *Stipe* 10-30 × 1.5-2 mm, striate, cream coloured at apex, pale tawny at base. *Spores* 3.8-4.8 µm diam. globose, coarsely verrucose.

***Tulostoma* sp. 2.**

*Specimen examined:* Pu'u La'au, Mauna Kea, scattered in soil, 23 November 1998, DEH 1758.

*Exoperidium* membranous, persistent at base of endoperidium, cream coloured, adhering soil up to 1 mm thick. *Endoperidium* 5-8 mm diam. smooth, glabrous or finely felted, white; pore circular, tall-tubular. *Stipe* 10-30 × 2 mm, striate to lacerate, white. *Spores* 5-7 µm diam. globose, echinulate with numerous narrow, obtuse, conic spines.

**Key to species of *Tulostoma* from Mamane-Naio habitat**

- |   |  |
|---|--|
| 1. Pore fimbriate and often torn in age .....   | <i>Tulostoma fimbriata</i> var. <i>campestre</i> |
| 1. Pore smooth and tubular .....  | 2  |
| 2. Endoperidium 10-20 mm diam .....   | <i>Tulostoma involucreatum</i>                   |
| 2. Endoperidium 5-10 mm diam .....  | 3  |
| 3. Endoperidium pale purplish grey, often covered with adherent soil particles; spores 4.5-6 µm diam. coarsely warted ..... | <i>Tulostoma beccarianum</i>                     |
| 3. Endoperidium white; spores not as above .....  | 4  |
| 4. Spores 3.8-4.8 µm diam. coarsely verrucose; exoperidium pale rusty brown to pale brown, soon evanescent .....            | <i>Tulostoma</i> sp. 1                           |
| 4. Spores 5-7 µm diam. echinulate; exoperidium cream coloured, persistent at base of endoperidium and adhering soil .....   | <i>Tulostoma</i> sp. 2                           |

**Annotated list of wood-rotting Basidiomycetes**

All of the specimens of wood-rotting basidiomycetes cited below, with the exception of the agarics, are deposited in the University of Arizona Mycological Herbarium (ARIZ). The agarics are deposited in the Mycological Herbarium of San Francisco State University (SFSU).

***Antrodia sinuosa* (Fr.) P. Karst.**

Specimens examined: Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22345, 22356.

Common in Hawai'i on numerous substrates. Reported from Hawai'i on 'ōhi'a lehua by Gilbertson and Adaskaveg (1993). Associated with a brown rot.

***Asterostroma cervicolor* (Berk. and M.A. Curtis) Masee.**

Specimens examined: Pu'u La'au, Mauna Kea, on naio branches, 18 November 1997, DEH 1593; Mauna Kea, on naio, 2 December 1998, DEH 1767, 1771; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22309, 22314.

Characterised by amyloid, sparsely tuberculate spores and subicular asterohyphidia with long, rarely branched main rays. Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Basidiodendron eyrei* (Wakef.) Luck-Allen.**

Specimens examined: Mauna Kea, on naio, 2 December 1998, DEH 1773; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22334.

Characterised by smooth, globose to subglobose basidiospores up to 6 µm diam. Associated with a white rot. Reported from Hawai'i by Wells (1959).

***Brevicellicium vulcanense* Gilb. and Hemmes, sp. nov.**

(Fig. 1)

*Fructificatio* annua, resupinata, tenuis, fragilis; superficies hymenii albo-cinerea, grandinioidae cum aculei minutae; systema hypharum monomiticum; *hyphae* fibulatae, 2-5 µm diam; cystidia nulla; basidia doliiformis, 10-14 × 5-7 µm; *basidiosporae* subglobosae, hyalinae, laeves vel subtiliter aspera, non-amyloidae, 3-4 × 3-3.5 µm; putrido alba.

**Holotype:** border between Parker Ranch and Pohakaloa military training area, Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, 16 December 1997, D.E. Hemmes 1640, in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

*Etymology:* of volcanic regions.

*Basidiomes* resupinate, thin, fragile and easily separated, effused up to 12 cm; hymenial surface greyish white, grandinioid with clusters of minute tubercles or aculei 250-375 µm long, separated by smooth areas; margin abrupt to thinning out and farinaceous; subiculum very thin, arachnoid; *hyphal system* monomitic; *hyphae* hyaline, thin-walled, with clamps, 2-5 µm diam; *cystidia* absent; tubercles with a core of crystalline material consisting of large spherical clusters up to 26 µm diam. of radiating coarse crystals, this core covered by a thin subhymenial layer and hymenium; *basidia* short and barrel-shaped, 4-sterigmate, 10-14 × 5-7 µm, with an obscure basal clamp; *basidiospores* subglobose with some slightly flattened faces, smooth or perhaps very finely ornamented, hyaline, negative in Melzer's reagent, 3-4 × 3-3.5 µm. Associated with a white rot.

*Specimens examined:* Pu`u La`au, Mauna Kea, on naio branch, 18 November 1997, DEH 1574; Parker PTA, Mauna Kea, Hawai`i, on fallen naio branches, 16 December 1997, DEH 1636, 1640; Pu`u La`au, Mauna Kea, on naio, 22 November 1998, RLG 22317, 22318, 22321, 22332.

Diagnostic characters are the small, stout terminal basidia, small globose to subglobose spores, lack of cystidia, the minute tubercles with a core of crystalline material, and the greyish hymenial surface. *Brevicellicium olivascens* (Bres.) Larss. and Hjortst. is similar but has larger spores and sphaerocysts.

***Ceriporia excelsa* (S. Lundell) Parmasto.**

*Specimen examined:* Pu`u La`au, Mauna Kea, on naio branches, 18 November 1997, DEH 1582.

Associated with a white rot. Characterised by wide, mostly simple-septate hyphae with occasional double or multiple clamps and small, oblong spores. Reported from Hawai`i by Gilbertson and Adaskaveg (1993) on `ōhi`a lehua.

***Coniophora kauaiensis* Gilb. and Hemmes.**

*Specimens examined:* Mauna Kea, on naio, 2 December 1998, DEH 1791; Pu`u Lu`au, Mauna Kea, on naio, 22 November 1998, RLG 22316, 22338.

Associated with a brown rot. Described from Hawai`i (Gilbertson and Hemmes, 1997b) on koa, black wattle acacia, and Monterey cypress.

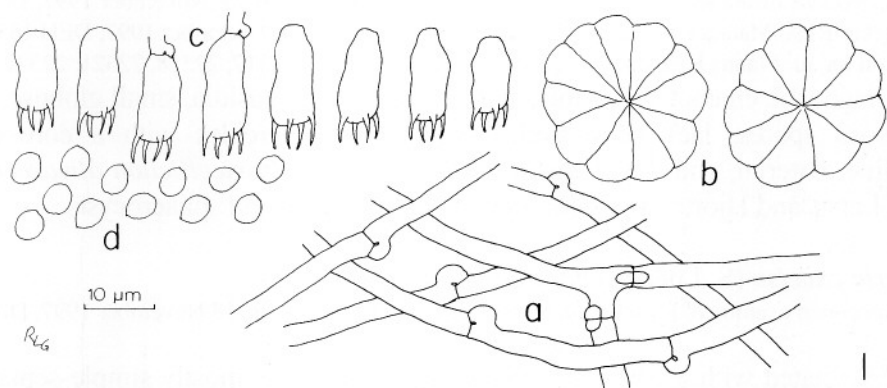
***Coprinus radians* (Desm.) Fr.**

*Specimens examined:* Pu`u La`au, Mauna Kea, solitary on fallen naio branches, 30 January 1996, DEH 1026; windward side of Mauna Kea between Parker Ranch and military installation, solitary on fallen naio branches, 2 December 1998, DEH 1765 (both SFSU).

Associated rot uncertain. *Coprinus radians* is characterised by a universal veil of dark brown conical tufts formed from chains of globose to fusoid, thick-walled, brown, roughened-incrusting cells 16-40 µm diam. elongate phaseoliform spores (8.3-) 9-11.5 (-12.2) × 4.5-5.5 (-6) µm, broadly clavate to globose cheilocystidia 16-40 µm diam. voluminous pleurocystidia 32-60 µm diam. and basidiomes associated with a dark brownish orange, rhizomorph-like *Ozonium* stage. Not previously reported from the Hawaiian Islands.

***Crustoderma gigacystidium* Gilb. and Hemmes, sp. nov. (Fig. 2)**

*Fructificatio* annua, resupinata; superficies hymenii laeves, pallido-bubalina, pilosa; systema hypharum monomiticum; *hyphae* fibulatae, 2.5-6 µm diam; cystidia anguste clavata, tenuitunicata, non-incrustatae, 80-150 × 8-15 µm; *basidiosporae* cylindricae, hyalinae, tenuitunicatae, laeves, non-amyloidae, 7-9 × 2.5-3 µm.



**Fig. 1.** *Brevicellicium vulcanense* (DEH 1640). **a**, subicular hyphae; **b**, spherical crystalline masses; **c**, basidia; **d**, basidiospores.

**Holotype:** Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, 2 December 1998, D.E. Hemmes 1787, in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

*Etymology:* with large cystidia.

*Basidiomes* resupinate, discontinuously effused over cracked bark surface up to 9 cm; hymenial surface cream buff, smooth, semi-pilose and minutely cystidiate under 30x lens; margin abrupt and fertile to the edge to narrowly fimbriate to arachnoid; *hyphal system* monomitic; hyphae hyaline, thin-walled, with clamps at all septa, often branching out of clamps, 2.5-6 µm in diam; *cystidia* frequent, narrowly clavate, slightly to markedly widened at the apex, thin-walled, not incrustated, 80-150 × 8-15 µm, projecting up to 120 µm, with a basal clamp; *basidia* clavate, 4-sterigmate, 20-27 × 5-6 µm, with a basal clamp; *basidiospores* cylindric-fusoid, tapering to the base, hyaline, smooth, thin-walled, negative in Melzer's reagent, 7-9 × 2.5-3 µm. Bark only with no associated rot present with this collection.

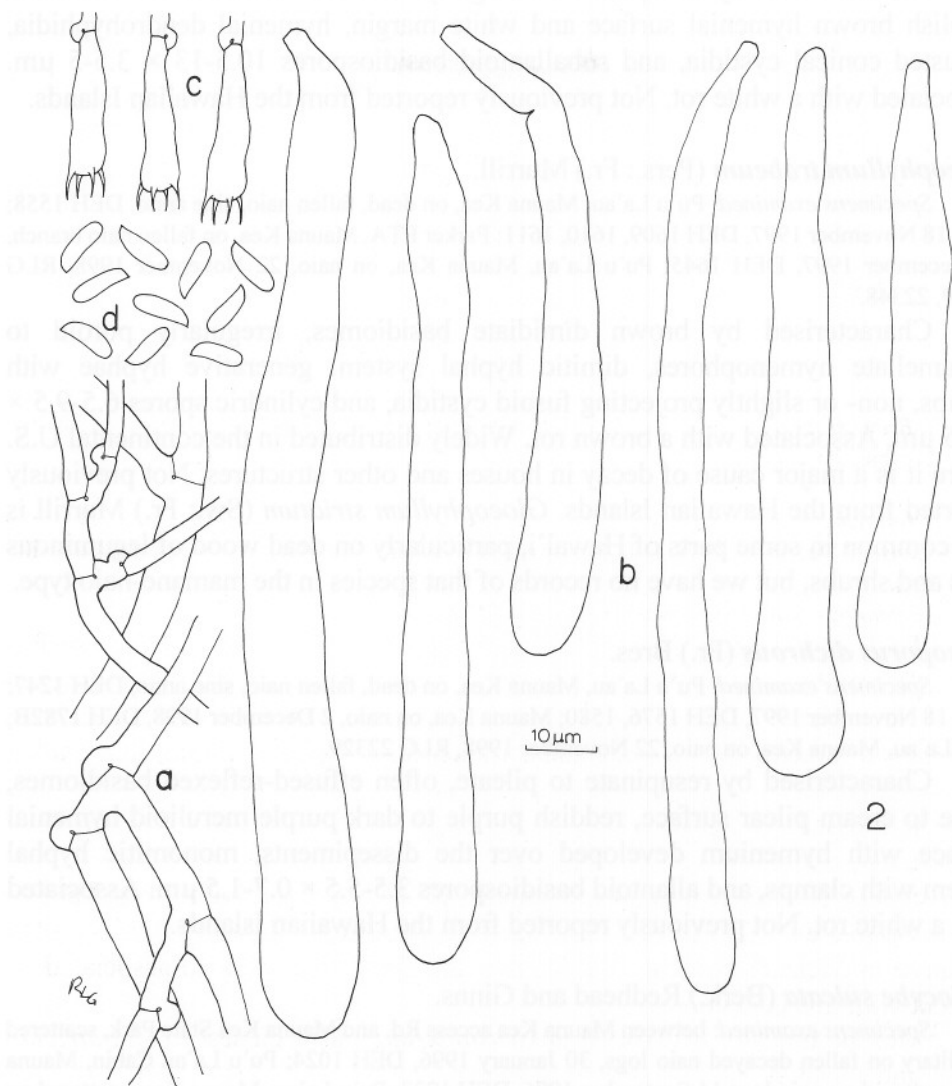
Morphologically it fits well in *Crustoderma* and is closest to *C. patricium* (G. Cunn.) Nakasone but that species has cylindric spores 11-16 × 5-6 µm (Nakasone, 1984).

***Cyphellopsis anomala* (Pers.: Fr.) Donk.**

*Specimen examined:* Pu'u La'au, Mauna Kea, on dead, fallen naio, 23 September 1997, DEH 1539.

Characterised by individual, closely crowded, dull brown tubes, dimittic hyphal system, generative hyphae with clamps, and ellipsoid spores 7.5-11 × 3-4 µm. Associated with a white rot. Not previously reported from the Hawaiian Islands.





**Fig. 2.** *Crustoderma gigacystidium* (DEH 1787). **a**, subicular hyphae; **b**, cystidia; **c**, basidia; **d**, basidiospores.

***Dendrophora albobadia*** (Schwein.: Fr.) Chamuris.

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead naio branch, 21 October 1997, DEH 1562; *ibid.*, 18 November 1997, DEH 1608; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22328, 22336.

Characterised by resupinate to slightly reflexed basidiomes with dark purplish brown hymenial surface and white margin, hymenial dendrohyphidia, incrustated conical cystidia, and suballantoid basidiospores  $10.5-13 \times 3.5-5 \mu\text{m}$ . Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Gloeophyllum trabeum* (Pers.: Fr.) Murrill.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead, fallen naio, sine anno, DEH 1558; *ibid.*, 18 November 1997, DEH 1609, 1610, 1611; Parker PTA, Mauna Kea, on fallen naio branch, 16 December 1997, DEH 1645; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22339, 22348.

Characterised by brown dimidiate basidiomes, irregularly poroid to sublamellate hymenophores, dimitic hyphal system, generative hyphae with clamps, non- or slightly projecting fusoid cystidia, and cylindric spores  $6.5-9.5 \times 3-4.5 \mu\text{m}$ . Associated with a brown rot. Widely distributed in the continental U.S. where it is a major cause of decay in houses and other structures. Not previously reported from the Hawaiian Islands. *Gloeophyllum striatum* (Sw.: Fr.) Murrill is also common in some parts of Hawai'i, particularly on dead wood of leguminous trees and shrubs, but we have no records of that species in the mamane-naio type.

***Gloeoporus dichrous* (Fr.) Bres.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead, fallen naio, sine anno, DEH 1247; *ibid.*, 18 November 1997, DEH 1576, 1580; Mauna Kea, on naio, 2 December 1998, DEH 1782B; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22329.

Characterised by resupinate to pileate, often effused-reflexed basidiomes, white to cream pilear surface, reddish purple to dark purple merulioid hymenial surface with hymenium developed over the dissepiments, monomitic hyphal system with clamps, and allantoid basidiospores  $3.5-5.5 \times 0.7-1.5 \mu\text{m}$ . Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Heliocybe sulcata* (Berk.) Redhead and Ginns.**

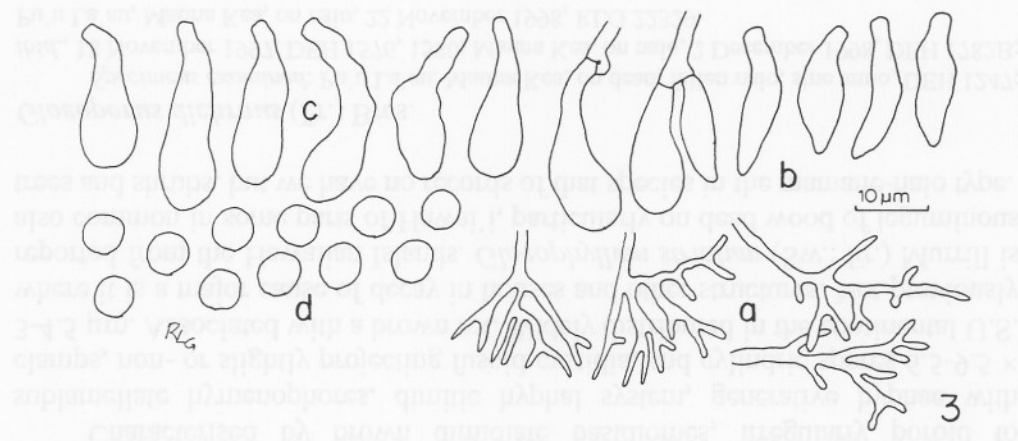
*Specimens examined:* between Mauna Kea access Rd. and Mauna Kea State Park, scattered to solitary on fallen decayed naio logs, 30 January 1996, DEH 1024; Pu'u La'au Cabin, Mauna Kea, scattered on naio logs, 11 September 1996, DEH 1233; Pu'u La'au, Mauna Kea, scattered on logs and fallen branches of naio, 24 September 1996, DEH 1262; Saddle Rd near Mauna Kea State Park, scattered on fallen naio branches, 17 January 1997, DEH 1385; Saddle Rd at border of mamane-naio scrub and Parker Ranch, Mauna Kea, scattered on fallen naio branches, 22 March 1997, DEH 1479; Pu'u La'au, Mauna Kea, scattered on fallen naio branches, 23 September 1997, DEH 1541; Pu'u La'au, Mauna Kea, scattered on fallen naio branches, 12 December 1998, DEH 1734.

Associated with a brown rot. *Heliocybe sulcata* is the most commonly collected agaric from mamane-naio habitat. Not previously reported from the Hawaiian Islands.

***Henningsomyces candidus* (Pers.) Kuntze** (Fig. 3)

*Specimens examined:* Mauna Kea, on naio, 2 December 1998, DEH 1774; Pu'u Ulu, Saddle Rd at junction with Mauna Loa Rd, on naio, 22 November 1998, RLG 22311, 22322, 22342, 22349.

Associated with a white rot. Not previously reported from the Hawaiian Islands. Apparently rather common in the mamane-naio zone. The tubular basidiomes of this taxon are typically crowded and often in close contact. The dissepiments and outer surfaces of the tubes are covered by abundant finely branched dendrohyphidia. See remarks under the following species for morphological differences between *H. candidus* and *H. separatus*.



**Fig. 3.** *Henningsomyces candidus* (RLG 22311). **a**, dendrohyphidia from outer surface; **b**, cystidioles; **c**, basidia; **d**, basidiospores.

***Henningsomyces separatus* Gilb. and Hemmes, sp. nov.** (Fig. 4)

*Fructificatio* cupulatae, alba, late separata; subiculum nulla; superficies exterior tomentosa, cum hyphae crassitunicatae, nonseptatae, incrustatae, 2.5-3 µm diam; *cystidia* nulla, *cystidiolae* adsunt, fusoidae; basidia clavatae, 2-4 sterigmatibus, 20-29 × 7-9 µm; *basidiosporae* globosae vel subglobosae, hyalinae, laeves, tenuitunicatae, non-amyloidae, 5.5-7.5 × 5.5-6 µm.

**Holotype:** Pu'u La'au, Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, 18 November 1997, D.E. Hemmes 1575B, in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

*Etymology:* from the widely separated habit.

*Basidiomes* small white single tubes, widely separated with no common subiculum; outer surface tomentose; hyphae on outer surface thick-walled, incrustated over the apical portion, non-septate, 2.5-3 µm diam; dendrohyphidia absent; cystidia absent, *cystidioles* fusoid, thin-walled, 15-20 × 3-4.5 µm; *basidia* broadly clavate, 2-4 sterigmate, 20-29 × 7-9 µm, basal septation difficult to discern but apparently with obscure clamps; *basidiospores* globose to subglobose,

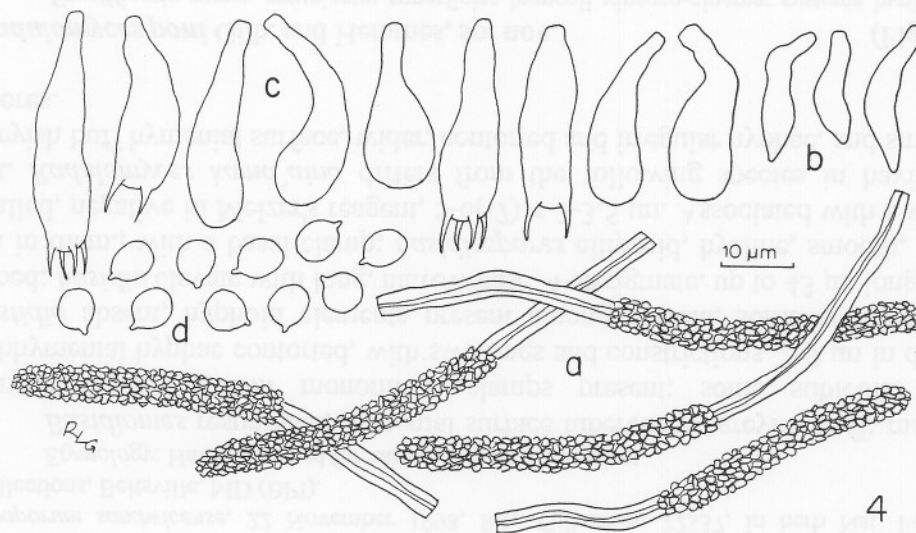


Fig. 4. *Henningsomyces separatus* (DEH 1575B). a, incrustated hyphae from outer surface; b, cystidioles; c, basidia; d, basidiospores.

hyaline, smooth, negative in Melzer's reagent,  $5.5-7.5 \times 5.5-6$ . Associated with a white rot. *Henningsomyces candidus*, well represented in the mamane-naio zone, differs in having closely packed individual tubes and dendrohyphidia on the tube walls and around the tube opening. It does not have the thick-walled, apically incrustated hyphae so conspicuous on the outer surface of basidiomes of *H. separatus*.

***Heterochaete shearii* (Burt) Burt.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead naio branch, 21 October 1997, DEH 1553, on dead, fallen mamane branch, DEH 1560; Mauna Kea, on dead fallen naio, 2 December 1998, DEH 1783, 1789.

Characterised by resupinate basidiomes, cream coloured hymenial surface with projecting sterile fascicles, 2-celled vertically septate basidia, and allantoid basidiospores  $13-15.5 \times 5-6 \mu\text{m}$ . Associated with a white rot. Not previously reported from the Hawaiian Islands.



***Hohenbuehelia atrocaerulea* var. *grisea* (Peck) Thorn and G.L. Barron.**

*Specimens examined*: Pu'u La'au, Mauna Kea, scattered on underside of fallen naio branches, 30 December 1998, DEH 1807; Pu'u La'au, Mauna Kea, scattered to clustered on fallen naio branches, 2 January 1999, DEH 1816.

Associated with a white rot. This species is characterised by dimidiate to reniform basidiomes with glabrous to tomentose, dark grey to nearly black pilei 10-15 mm broad. It is similar to *H. approximans* (Peck) Singer, reported from Hawai'i from a similar arid habitat (on *Prosopis pallida*) by Gilbertson and Adaskaveg (1993), but the latter species differs in forming smaller and much paler basidiomes. Not previously reported from the Hawaiian Islands.

***Hyphoderma naiophila* Gilb. and Hemmes, sp. nov. (Fig. 5)**

*Fructificatio* annua, resupinata; superficies hymenii cremeo-bubalina vel vinaceo-bubalina, laeves vel tuberculata; systema hypharum monomiticum; *hyphae* fibulatae, 2-3  $\mu\text{m}$  diam; *cystidia* triformis, aliqua cylindrica, usque ad 110  $\mu\text{m}$  longa, 8-11  $\mu\text{m}$  diam. basaliter crassitunicatae, tunica usque ad 4  $\mu\text{m}$  crassa, apices tenuitunicatae, cytoplasma refractivus; aliqua cylindrica, tenuitunicatae, 30-75  $\times$  7-8.5  $\mu\text{m}$ , cytoplasma refractivus, aliqua conica, incrustata, crassitunicatae, 35-40  $\times$  9-12  $\mu\text{m}$ ; *basidiosporae* cylindricae, hyalinae, laeves, non-amyloidae, 8-9  $\times$  2.5-3.5  $\mu\text{m}$ ; putrido alba.

*Holotype*: Pu'u La'au, Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, 2 December 1998, D.E. Hemmes 1585, in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

*Etymology*: naio loving.

*Basidiomes* resupinate, annual; hymenial surface cream to pale buff or pale vinaceous, smooth to shallowly tuberculate; *hyphal system* monomitic, hyphae hyaline, thin-walled, with clamps, narrow, 2-3  $\mu\text{m}$  diam; *cystidia* of 3 types, imbedded or hymenial; some cylindric or with irregular swellings and constrictions, thick-walled at the base, wall up to 4  $\mu\text{m}$  thick, narrowing gradually to a thin-walled apex, up to 110  $\mu\text{m}$  long, 8-11  $\mu\text{m}$  diam. at widest point, contents of lumen staining brightly in phloxine and refractive in Melzer's reagent; some cystidia thin-walled, cylindric, 30-75  $\times$  7-8.5  $\mu\text{m}$ , staining brightly in phloxine and refractive in Melzer's reagent, apex rounded or mammillate; other cystidia bluntly conical, thick-walled, coarsely incrustated over apical half or more, 35-40  $\times$  9-12  $\mu\text{m}$ ; also occasional thin-walled hyphal elements with secondary septa; *basidia* clavate, 4-sterigmate, when mature 25-36  $\times$  6-8  $\mu\text{m}$ , with a basal clamp; *basidiospores* cylindric, slightly curved, hyaline, smooth, thin-walled, negative in Melzer's reagent, 8-9  $\times$  2.5-3.5  $\mu\text{m}$ . Associated with a white rot.

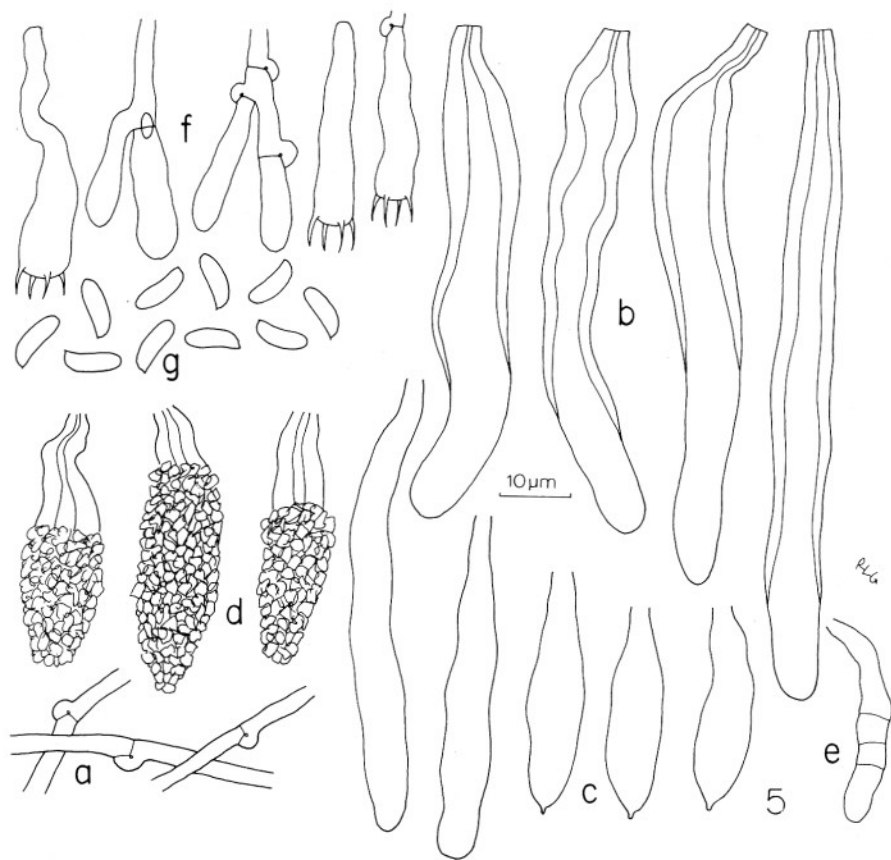
*Specimens examined*: Pu'u La'au, Mauna Kea, on naio branches, 18 November 1997, DEH 1585; Mauna Kea, on naio, 2 December 1998, DEH 1769, 12/2/98.

The three types of cystidia are a distinctive character for this taxon.

***Hyphoderma pallidum* (Bres.) Donk.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio branches, 18 November 1997, DEH 1584.

Characterised by thin resupinate basidiomes, pale buff hymenial surface speckled with golden brown amorphous globules, thin-walled fusiform cystidia projecting up to 30  $\mu\text{m}$ , and allantoid basidiospores  $8\text{-}9 \times 3.5\text{-}4 \mu\text{m}$ . Associated with a white rot. Not previously reported from the Hawaiian Islands.



**Fig. 5.** *Hyphoderma naiophila* (DEH 1769). **a**, subicular hyphae; **b**, thick-walled cystidia; **c**, thin-walled cystidia, some mucronate; **d**, thick-walled, incrustated cystidia; **e**, septate hyphal element; **f**, basidia; **g**, basidiospores.

***Hyphoderma praetermissum* (P. Karst.) J. Erikss. and Strid.**

*Specimens examined:* Mauna Kea Rd., on dead, fallen mamane, 22 August 1991, RLG 17457; Parker PTA, Mauna Kea, on fallen naio branch, 16 December 1997, DEH 1643; Pu'u Huluhulu, Mauna Loa Rd., on naio, 22 November 1998, RLG 22291, 22292, 22296, 22305; Pu'u

La`au, Mauna Kea, on naio, 22 November 1998, RLG 22319, 22354, 22355; Mauna Kea, on naio, 2 December 1998, DEH 1772, 1780.

Associated with a white rot. Well represented in Hawai`i on numerous substrates. Reported from Hawai`i by Gilbertson and Adaskaveg (1993) on hau, rose-apple, and gunpowder tree.

***Hyphoderma sambuci* (Pers.) Jülich.**

*Specimens examined:* Mauna Kea Rd., on dead, fallen mamane, 22 August 1999, RLG 17456, 17458, 17459, 17461, 17462; Pu`u La`au, Mauna Kea, on dead naio branches, 21 October 1997, DEH 1552, 1554; Parker PTA, Mauna Kea, on fallen naio branch, 16 December 1997, DEH 1648; Pu`u La`au, Mauna Kea, on naio branches, 18 November 1997, DEH 1587; Parker PTA, Mauna Kea, on naio branches, 16 December 1997, DEH 1635, 1649; Mauna Kea, on naio, 2 December 1997, DEH 1775, 1779, 1788; Pu`u Huluhulu, Saddle rd at junction with Mauna Loa Rd, on naio, 22 November 1998, RLG 22290, 22300, 22304, 22325, 22331, 22333, 22347.

Associated with a white rot. This is a widely distributed and highly variable taxon characterised by a smooth white hymenial surface, slightly capitate to fusoid cystidia, and broadly ellipsoid spores. It is one of the most common wood-rotting fungi in the mamane-naio type. Not previously reported from the Hawaiian Islands.

***Hyphoderma sphaeropedunculatum* Gilb. and Hemmes, sp. nov. (Fig. 6)**

*Fructificatio* annua, resupinata; superficies hymenii pallido-bubalina, laeves; systema hypharum monomiticum; *hyphae* fibulatae, 2-4  $\mu\text{m}$  diam; *cystidia* curta, late capitata, apices sphaericus, vel 7  $\mu\text{m}$  diam. pedicellus 1.5-2.5  $\mu\text{m}$  diam; *basidiosporae* cylindricae-ellipsoidae, hyalinae, laeves, non-amyloidae, 6.5-7.5  $\times$  3-3.5  $\mu\text{m}$ ; putrido alba.

*Holotype:* Pu`u Huluhulu, Junction of Mauna Loa Rd. and Saddle Rd., North Hilo District, Hawai`i County, Hawai`i, on *Dodonaea viscosa*, 22 November 1998, R.L. Gilbertson 22299. in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

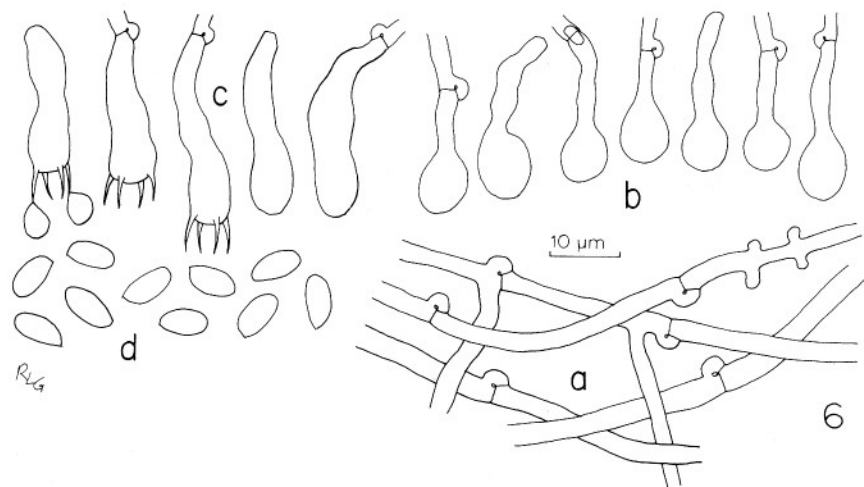
*Etymology:* for the sphaeropedunculate cystidia.

*Basidiomes* resupinate; hymenial surface pale buff, smooth; *hyphal system* monomitic, hyphae thin-walled, hyaline, with clamps, 2-4  $\mu\text{m}$  in diam; *cystidia* short, capitate with a conspicuous spherical apex up to 3 times wider than the stalk portion, 15-20  $\mu\text{m}$  long, spherical apex up to 7  $\mu\text{m}$  diam. stalk portion 1.5-2.5  $\mu\text{m}$  diam; *basidia* clavate, 4-sterigmate, 20-21  $\times$  5-6.5  $\mu\text{m}$ , with a basal clamp; *basidiospores* cylindric-ellipsoid, hyaline, smooth, thin-walled, negative in Melzer's reagent, 6.5-7.5  $\times$  3-3.5  $\mu\text{m}$ .

Associated with a white rot. This taxon is in the *Hyphoderma sambuci* complex but is morphologically distinct because of the short cystidia with wide spherical swellings at the apices and more cylindric spores.

***Hyphodermella maunakeaensis* Gilb. and Hemmes, sp. nov. (Fig. 7)**

*Fructificatio* annua, resupinata; superficies hymenii subtiliter hydncea; systema hypharum monomiticum; hyphae simple-septatae, 2.5-3.5  $\mu\text{m}$  diam; *cystidia* tenue,



**Fig. 6.** *Hyphoderma sphaeropedunculatum* (RLG 22299). **a**, subicular hyphae; **b**, sphaeropedunculate cystidia; **c**, basidia; **d**, basidiospores.

tenuitunicatae, non-incrustatae, projecta 10-60  $\mu\text{m}$ , 2-3.5  $\mu\text{m}$  diam; *aculei* cum fasciculi hyphae incrustatae, fasciculi usque ad 40  $\mu\text{m}$  diam; *basidiosporae* anguste ellipsoidae, hyalinae, tenuitunicatae, non-amyloidae, 6.5-7.5  $\times$  3.5-4  $\mu\text{m}$ ; putrido alba.

**Holotype:** Pu'u La'au, Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporium sandwicense*, 22 November 1998, R.L. Gilbertson 22335. in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

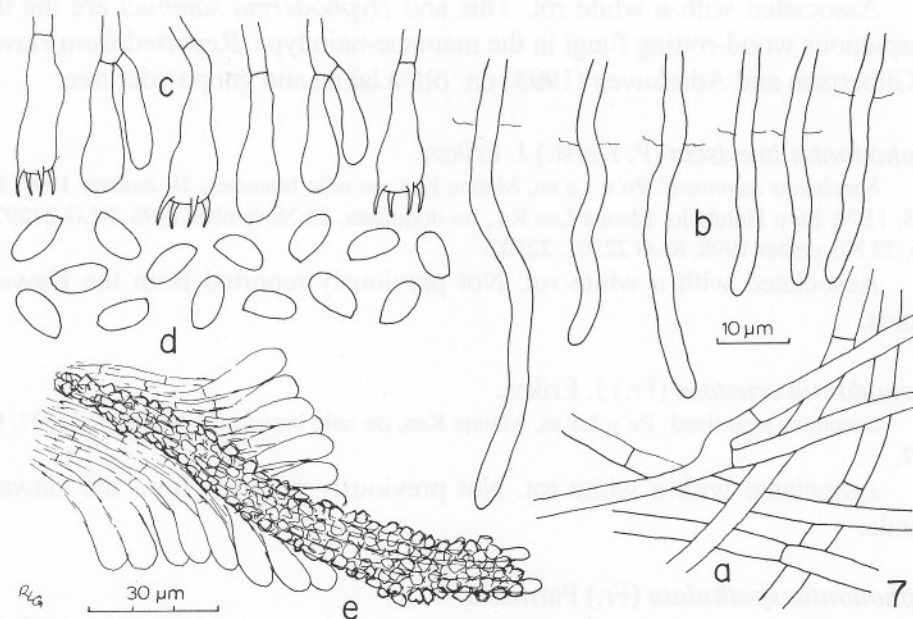
**Etymology:** of Mauna Kea, non-active volcanic mountain on the Island of Hawai'i.

**Basidiomes** resupinate; hymenial surface finely hydnyaceous due to projecting incrustated hyphal fascicles; *hyphal system* monomitic; hyphae hyaline, thin-walled, simple-septate, 2.5-3.5  $\mu\text{m}$  diam; *cystidia* narrow, hyphoid, thin-walled, not incrustated, projecting 10-60  $\mu\text{m}$ , 2-3.5  $\mu\text{m}$  diam; coarsely incrustated fascicles of hyphae in core of aculei, sometimes projecting beyond the apex, fascicles up to 40  $\mu\text{m}$  diam. sometimes branching into the cores of two aculei; *basidia* 15-25  $\times$  5-7  $\mu\text{m}$ , 4-sterigmate, simple-septate at the base; *basidiospores* narrowly ellipsoid, hyaline, smooth, thin-walled, negative in Melzer's reagent, 6.5-7.5  $\times$  3.5-4  $\mu\text{m}$ . Associated with a white rot.

**Specimens examined:** Parker PTA, Mauna Kea, on naio, DEH 1641, 1652, 12/16/97; Bird Park, HVNP, Hawai'i, on pilo, 19 November 1998, RLG 22185; Pu'u La'au, Mauna Kea, on naio, RLG 22335, 11/22/98 2nd stop, Mauna Kea, on naio, 22 November 1998, RLG 22357.

Similar to *Hyphodermella corrugata* (Fr.) Erikss. and Ryvardeen which has larger spores (7-10  $\times$  4-6  $\mu\text{m}$ ).





**Fig. 7.** *Hyphodermella maunakeaensis* (RLG 22335). **a**, subicular hyphae; **b**, cystidia; **c**, basidia; **d**, basidiospores; **e**, imbedded fascicle of incrusted hyphae.

***Hyphodontia aloha*** Gilb. and Adask.

*Specimen examined:* Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22326.

Associated with a white rot. Characterised by narrow tubular cystidia with a thick wall thinning to the apex, presence of skeletal type hyphae, and small ovoid spores. Described from Hawai'i on hau.

***Hyphodontia alutaria*** (Burt) J. Erikss.

*Specimen examined:* Pu'u Huluhulu, Mauna Loa Rd at junction with Saddle Rd, on dodonaea, 22 November 1998, RLG 22298.

Associated with a white rot. Reported from Hawai'i by Gilbertson and Hemmes (1997a) on tree fern.

***Hyphodontia arguta*** (Fr.) J. Erikss.

*Specimens examined:* Mauna Kea Rd., on dead, fallen mamane, 22 August 1991, RLG 17460, 17463; Pu'u La'au, Mauna Kea, on dead, fallen naio, 21 October 1997, DEH 1551; same data as last one, 18 November 1997, DEH 1575, 1586, 1592; Parker PTA, Mauna Kea, on fallen naio branches, 16 December 1997, DEH 1637, 1647; Mauna Kea, on naio, 2 December 1998, DEH 1781, 1784, 1785; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22312, 22346, 22353.

Associated with a white rot. This and *Hyphoderma sambuci* are the most conspicuous wood-rotting fungi in the mamane-naio type. Reported from Hawai'i by Gilbertson and Adaskaveg (1993) on 'ōhi'a lehua and gunpowder tree.

***Hyphodontia breviseta*** (P. Karst.) J. Erikss.

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio branches, 18 January 1997, DEH 1575, 1579; Pu'u Huluhulu, Mauna Loa Rd., on dodonaea, 22 November 1998, RLG 22297, on naio, 22 November 1998, RLG 22301, 22302.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Hyphodontia crustosa*** (Fr.) J. Erikss.

*Specimen examined:* Pu'u La'au, Mauna Kea, on naio branch, 18 November 1997, DEH 1577.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Hyphodontia spathulata*** (Fr.) Parmasto.

*Specimen examined:* Pu'u La'au, Mauna Kea, on naio branch, 18 November 1997, DEH 1588.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Oligoporus stipticus*** (Pers.: Fr.) Gilb. and Ryvarden.

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead, fallen naio, DEH 1249, date unknown; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22313.

Associated with a brown rot. Rather common in the Hawaiian Islands on hardwood and conifer substrates but not previously reported.

***Peniophora cinerea*** (Fr.) Cooke.

*Specimen examined:* Mauna Kea, on naio, 2 December 1998, DEH 1778.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Peniophora incarnata*** (Fr.) P. Karst.

*Specimen examined:* Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22351.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Peniophora nuda*** (Fr.) Bres.

*Specimen examined:* Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22358.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Phanerochaete aculeata* Hallenb.**

(Fig. 8)

*Basidiomes* resupinate, effused up to 15 cm; hymenial surface cream coloured, becoming ochraceous on drying, odontoid with narrowly conical to flattened aculei; *hyphal system* monomitic; subicular hyphae thin- to thick-walled, loosely interwoven and distinct, 4-10  $\mu\text{m}$  diam. mostly simple-septate but occasional conspicuous single clamps present on some thin-walled hyphae; *cystidia* scattered, cylindric, thin-walled, lightly incrustated with small crystals, 50-70  $\times$  6-7.5  $\mu\text{m}$ , projecting to 50  $\mu\text{m}$ ; *basidia* clavate with a narrow base, 4-sterigmate, 25-30  $\times$  5-6  $\mu\text{m}$ , simple-septate at the base; *basidiospores* cylindric, hyaline, smooth, thin-walled, negative in Melzer's reagent, 5-6  $\times$  2-2.5  $\mu\text{m}$ .

Specimen examined: Pu'u La'au, Mauna Kea, on dead naio branch, 21 October 1997, DEH 1555.

Burdsall (1985) described the type of *P. aculeata* from Iran as having simple-septate hyphae only. Otherwise, our Hawaiian specimen has similar characters. Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Phanerochaete crescentispora* Gilb. and Hemmes, sp. nov.**

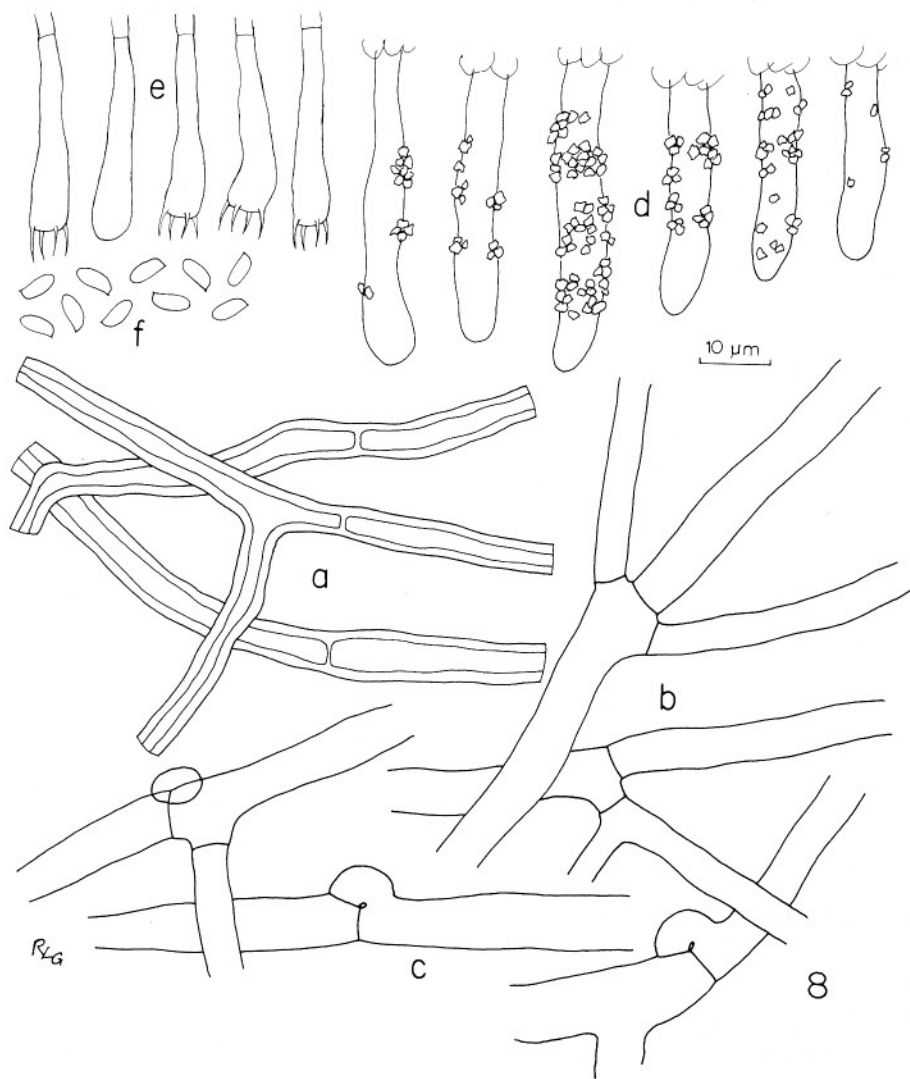
(Fig. 9)

*Fructificatio* annua, resupinata, mollis et fragilis; superficies hymenii albo-cinerea, laeves; anguste rhizomorphae praesens infra fructificatio et ad margine; systema hypharum monomiticum; hyphae pro parte maxima simple-septatae, aliquando fibulatae, 2-5  $\mu\text{m}$  diam; *cystidia* nulla; *basidia* simple-septatae ad basim; *basidiosporae* crescentiformae, hyalinae, laevis, tenuitunicatae, non-amyloidae, 7.5-8.5  $\times$  2-3  $\mu\text{m}$ ; putrido alba.

***Holotype***: Pu'u La'au, Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, R.L. Gilbertson 22352, 22 November 1998. in Herb. Nat. Fungus Collections, Beltsville, MD (BPI).

***Etymology***: from the crescent-shaped basidiospores.

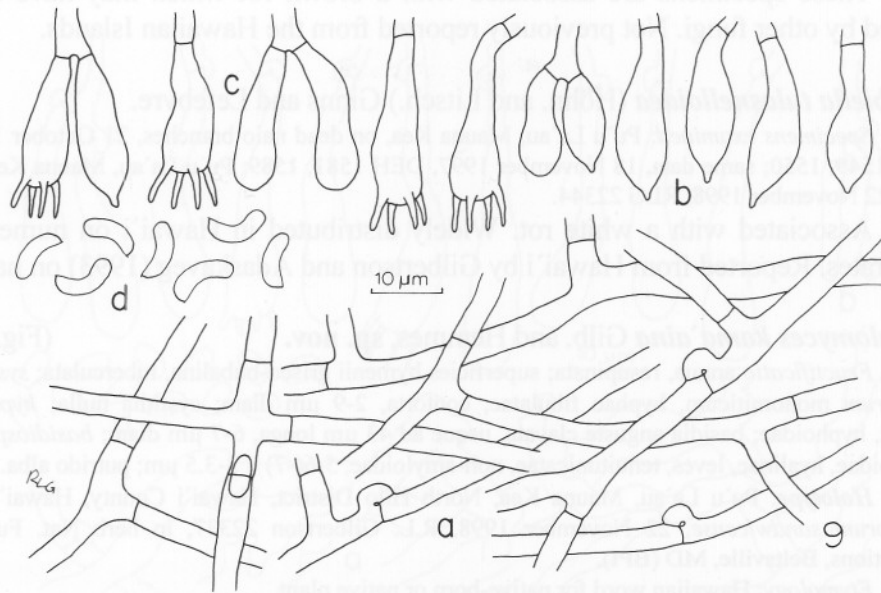
*Basidiomes* resupinate, effused up to 5 cm, soft and fragile, easily separated; hymenial surface greyish white, smooth; some narrow white cordons present under subiculum and at margins; *hyphal system* monomitic; hyphae hyaline, thin-walled, mostly simple septate, with occasional but rather conspicuous clamps, 2-5  $\mu\text{m}$  diam; *cystidia* absent; occasional fusoid to distinctly mammillate cystidioles present, 15-25  $\times$  6-7  $\mu\text{m}$ , simple-septate at the base; *basidia* terminal, clavate, 4-sterigmate, 18-25  $\times$  6-7  $\mu\text{m}$ , simple-septate at the base; *basidiospores* crescent-shaped, hyaline, smooth, thin-walled, negative in Melzer's reagent, 7.5-8.5  $\times$  2-3  $\mu\text{m}$ . Associated with a white rot. Specimens examined: Parker PTA, Mauna Kea, on fallen naio branch, DEH 1637, 16 December 1997; Pu'u La'au, Mauna Kea, on naio, RLG 22352, 22 November 1998. Clamps are occasional and conspicuous on hyphae of this taxon, but simple



**Fig. 8.** *Phanerochaete aculeata* (DEH 1555). **a**, thick-walled subicular hyphae; **b**, thin-walled subicular hyphae; **c**, hyphae with single clamps; **d**, cystidia; **e**, basidia; **f**, basidiospores.

septa predominate. Hymenial elements, basidia and cystidioles, are clearly simple-septate at the base. These septation characters indicate *Phanerochaete* is the appropriate genus for this taxon.





**Fig. 9.** *Phanerochaete crescentispora* (RLG 22352). **a**, subicular hyphae; **b**, cystidia; **c**, basidia, **d**, basidiospores.

***Phanerochaete sordida*** (P. Karst.) J. Erikss. and Ryvarden.

*Specimens examined:* Mauna Kea, on naio, 2 December 1998, DEH 1792A.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Phellinus robustus*** (P. Karst.) Bourdot and Galzin.

*Specimens examined:* Pu'u La'au, Mauna Kea, on living naio, sine anno, DEH 1250, date unknown; Pu'u La'au, Mauna Kea, on living naio, 21 October 1997, DEH 1559; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22327.

Associated with a white heartrot. Not previously reported from the Hawaii Islands.

***Phlebia lilascens*** (Bourdot) J. Erikss. and Hjortst.

*Specimens examined:* Mauna Kea, on naio, 2 December 1998, DEH 1786.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Phlebiella fibrillosa*** (Hallenb.) K.H. Larss. and Hjortstam

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio, 18 November 1997, DEH 1591, 1599; Pu'u La'au, Mauna Kea, on fallen naio branches, 22 November 1998, RLG 22343.

These specimens are associated with a brown rot which may have been caused by other fungi. Not previously reported from the Hawaiian Islands.

***Phlebiella tulasnelloidea* (Höhn. and Litsch.) Ginns and Lefebvre.**

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead naio branches, 21 October 1997, DEH 1549, 1550; same data, 18 November 1997, DEH 1581, 1589; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22344.

Associated with a white rot. Widely distributed in Hawai'i on numerous substrates. Reported from Hawai'i by Gilbertson and Adaskaveg (1993) on hau.

***Radulomyces kama'aina* Gilb. and Hemmes, sp. nov. (Fig. 10)**

*Fructificatio* annua, resupinata; superficies hymenii griseo-bubalina, tuberculata; *systema hypharum* monomiticum, hyphae fibulatae, contorta, 2-9  $\mu\text{m}$  diam; *cystidia* nulla; *hyphidia* adsunt, hyphoidae; basidia anguste clavata, usque ad 43  $\mu\text{m}$  longa, 6-7  $\mu\text{m}$  diam; *basidiosporae* ellipsoidae, hyalinae, leves, tenuitunicatae, non-amyloidae, 5-6(-7)  $\times$  3-3.5  $\mu\text{m}$ ; putrido alba.

*Holotype:* Pu'u La'au, Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, 22 November 1998, R.L. Gilbertson 22337, in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

*Etymology:* Hawaiian word for native-born or native plant.

*Basidiomes* resupinate; hymenial surface tuberculate, greyish buff; margin abrupt; *hyphal system* monomitic, clamps present; some subicular and subhymenial hyphae contorted, with swellings and constrictions, 2-9  $\mu\text{m}$  in diam; *cystidia* absent, hyphoid elements present among basidia, some contorted or lobed; *basidia* clavate with long, narrow base, 4-sterigmate, up to 43  $\mu\text{m}$  long, 6-7  $\mu\text{m}$  in diam., with a basal clamp; *basidiospores* ellipsoid, hyaline, smooth, thin-walled, negative in Melzer's reagent, 5-6(-7)  $\times$  3-3.5  $\mu\text{m}$ . Associated with a white rot. *Radulomyces kama'aina* differs from the following species in having a greyish buff hymenial surface, wider, contorted and irregular hyphae, and smaller spores.

***Radulomyces poni* Gilb. and Hemmes, sp. nov. (Fig. 11)**

*Fructificatio* annua, resupinata; superficies hymenii vinaceo-cinerea; *systema hypharum* monomiticum; hyphae fibulatae, regularis, 2.5-4.5  $\mu\text{m}$  diam; *cystidia* nulla; *hyphidia* adsunt, hyphoidae, aliqua contorta vel lobata; basidia clavata, basis anguste, elongata, 32-42  $\times$  6-7.5  $\mu\text{m}$ ; *basidiosporae* cylindric-ellipsoidae, hyalinae, laeves, tenuitunicatae, non-amyloidae, 7-8  $\times$  3.5-4  $\mu\text{m}$ ; putrido alba.

*Holotype:* Mauna Kea, North Hilo District, Hawai'i County, Hawai'i, on *Myoporum sandwicense*, 2 December 1998, D.E. Hemmes 1768, in herb. Nat. Fungus Collections, Beltsville, MD (BPI).

*Etymology:* from the Hawaiian word for purple.

*Basidiomes* annual, resupinate; hymenial surface purplish (Dark Vinaceous-Grey to Vinaceous-Slate), smooth to shallowly tuberculate; margin

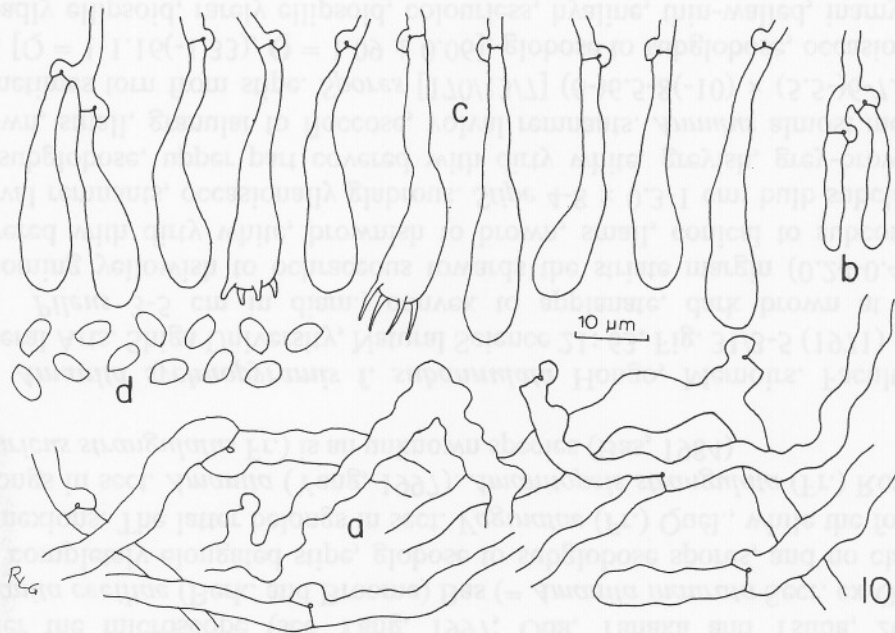


Fig. 10. *Radulomyces kama'aina* (RLG 22337). a, subicular hyphae; b, hyphoid hymenial elements; c, basidia; d, basidiospores.

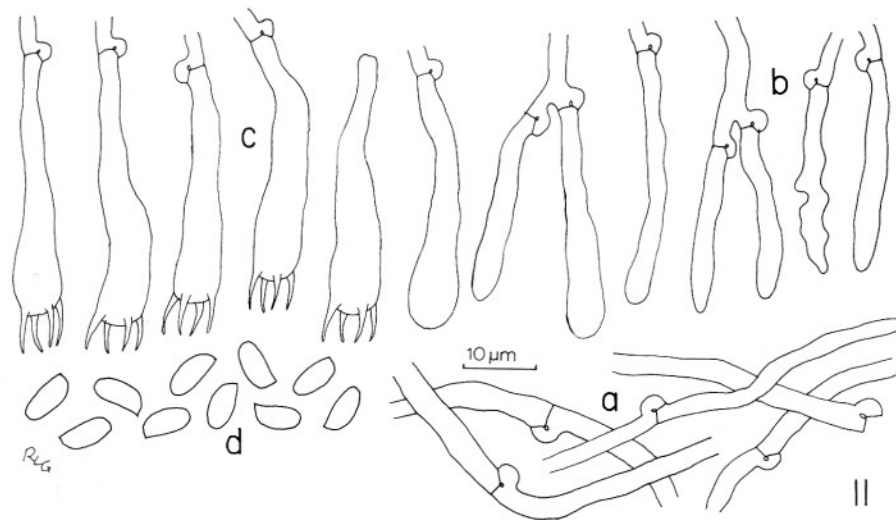
abrupt, light buff; *hyphal system* monomitic; subicular hyphae thin-walled, not contorted, with clamps, 2.5-4.5  $\mu\text{m}$  diam; *cystidia* absent; hyphoid hyphidia present among basidia, 2-3.5  $\mu\text{m}$  diam. some contorted or lobate; *basidia* clavate, with an elongated narrow base, 32-42  $\times$  6-7.5  $\mu\text{m}$ ; *basidiospores* cylindrical-ellipsoid, hyaline, smooth, thin-walled, negative in Melzer's reagent, 7-8  $\times$  3.5-4  $\mu\text{m}$ . Associated with a white rot.

*Radulomyces poni* differs from the preceding species in having a purplish hymenial surface, more regular, narrower hyphae, and larger, more cylindrical spores.

***Resupinatus striatulus* (Pers.: Fr.) Murrill.**

*Specimen examined:* Pu'u La'au, Mauna Kea, clustered on fallen decorticated naio branches, 2 January 1999, DEH 1818.

This species forms very small basidiomes with sessile, cupulate, grey, pruinose pilei 2-4 mm diam. Associated with a white rot. Not previously reported from the Hawaiian Islands.



**Fig. 11.** *Radulomyces poni* (DEH 1768). **a**, subicular hyphae; **b**, hyphoid hymenial elements; **c**, basidia; **d**, basidiospores.

***Tomentella chlorina*** (Masse) G. Cunn.

*Specimens examined:* Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22323, 22350; Mauna Kea, on naio, 2 December 1998, DEH 1777.

Associated rot uncertain. Basidiomes of this taxon vary from strongly hydnyaceous and bright blue green to almost smooth and yellowish green. Microscopic characters are relatively stable. Not previously reported from the Hawaiian Islands.

***Trametes hirsuta*** (Wulfen:Fr.) Pilát.

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead, fallen naio, sine anno, DEH 1248; same data, 18 November 1997, DEH 1583; Parker PTA, Mauna Kea, on fallen naio branch, 16 December 1997, DEH 1650; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22330.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Trametes versicolor*** (L.: Fr.) Pilát.

*Specimens examined:* Pu'u La'au, Mauna Kea, on dead naio branch, 21 October 1997, DEH 1557; same data, 18 November 1997, DEH 1612; Pu'u La'au, Mauna Kea, on naio, 22 November 1998, RLG 22324.



Associated with a white rot. Reported from Hawai'i by Gilbertson and Adaskaveg (1993) on `ōhi`a lehua and Tasmanian blue gum.

***Tubulicrinis calothrix* (Pat.) Donk.**

*Specimen examined:* Pu`u Huluhulu, junction of Saddle Rd and Mauna Loa Rd, on naio, 22 November 1998, RLG 22306.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Tubulicrinis effugiens* (Bourdot and Galzin) Oberw.**

*Specimen examined:* Pu`u La`au, Mauna Kea, on naio, 22 November 1998, RLG 22322A.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Tubulicrinis gracillimus* (D.P. Rogers and H.S. Jacks.) G. Cunn.**

*Specimen examined:* Mauna Kea, on naio branch, 18 November 1997, DEH 1578.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

***Tubulicrinis subulatus* (Bourdot and Galzin) Donk.**

*Specimens examined:* Pu`u La`au, Mauna Kea, on naio branches, 18 November 1997, DEH 1590; Parker PTA, Mauna Kea, on fallen naio branches, 16 December 1997, DEH 1634, 1639B, 1644, 1646; Pu`u Huluhulu, junction of Saddle Rd and Mauna Loa Rd, on naio, 22 November 1998, RLG 22308, 22310, 22315.

Associated with a white rot. Not previously reported from the Hawaiian Islands.

**Key to Wood-rotting Basidiomycetes from Mamane-Naio Habitat**

- 1. Hymenophore lamellate; basidiomes fleshy, deteriorating rapidly after maturity ..... 2
- 1. Hymenophore smooth, hydnceous, merulioid, in the form of single or united tubes; if partially lamellate then basidiomes tough-fibrous, persistent, not deteriorating rapidly after maturity ..... 5
- 2. Spores darkly pigmented; spore print black; basidiome deliquescing at maturity ..... *Coprinus radians*
- 2. Spores hyaline in KOH; spore print not black; basidiome not deliquescing ..... 3
- 3. Basidiomes centrally stipitate; pileus 10-45 mm broad; pilear surface cream to buff, radially striate; hyphal system dimitic; generative hyphae simple-septate; basidia simple-septate at the base; causing a brown rot ..... *Heliocybe sulcata*
- 3. Basidiomes sessile, dimidiate to reniform or cupulate; pileus 2-15 mm broad; pilear surface grey to almost black; hyphal system monomitic; generative hyphae with clamps; basidia with a basal clamp; causing white rots ..... 4

4. Basidiomes dark grey to nearly black; dimidiate to reniform; 10-15 mm broad; thick-walled, conical, apically incrustated cystidia present in hymenium . <i>Hohenbuehelia atrocaerulea</i> var. <i>grisea</i>	
4. Basidiomes grey, cupulate; 2-4 mm broad; cystidia absent.....	<i>Resopinatus striatulus</i>
5. Hymenophore in form of single or united tubes .....	6
5. Hymenophore smooth or hydnceous.....	16
6. Hymenophore in form of single crowded to widely separated tubes.....	7
6. Hymenophore in form of united tubes .....	9
7. Basidiomes dull brown, crowded.....	<i>Cyphellopsis anomala</i>
7. Basidiomes white, crowded to widely separated .....	8
8. Basidiomes widely separated; external hyphae thick-walled, rarely branched, apical portion coarsely incrustated .....	<i>Henningsomyces separatus</i>
8. Basidiomes gregarious to crowded; external hyphae terminating in intricately branched dendrohyphidia.....	<i>Henningsomyces candidus</i>
9. Basidiomes perennial, woody; tissue brown, blackening in KOH; tube layers distinctly stratified; spores dextrinoid in Melzer's reagent.....	<i>Phellinus robustus</i>
9. Basidiomes annual; soft to tough-fibrous or corky; tissue white to brown, not blackening in KOH; tubes not stratified; spores negative in Melzer's reagent.....	10
10. Basidiomes always resupinate.....	11
10. Basidiomes sessile to effused-reflexed, sometimes resupinate at first but becoming pileate at maturity.....	12
11. Basidiomes tough-fibrous; tubes deep; hyphal system dimitic; generative hyphae with single clamps; causing brown rot.....	<i>Antrodia sinuosa</i>
11. Basidiomes soft, thin; tubes shallow; hyphal system monomitic; most hyphae simple-septate but some double or multiple clamps present.....	<i>Ceriporia excelsa</i>
12. Pilear surface, context, and hymenophore brown; hymenophore irregularly poroid to sublamellate.....	<i>Gloeophyllum trabeum</i>
12. Pilear surface white to grey or with variously coloured zones; hymenophore poroid or merulioid .....	
.....	13
13. Pilear surface white to cream, glabrous to finely tomentose, not zonate; basidiomes fleshy to soft-fibrous; hyphal system monomitic.....	14
13. Pilear surface grey and hirsute or with multicoloured zones; basidiomes tough-fibrous; hyphal system trimitic .....	15
14. Hymenophore merulioid with hymenium extending over dissepiments; pore surface reddish purple to dark purplish at maturity; causing a white rot .....	<i>Gloeoporus dichrous</i>
14. Hymenophore polyporoid; pore surface white to cream at maturity; causing a brown rot .....	<i>Oligoporus stipticus</i>

15. Pilear surface greyish, densely hirsute; margin usually pale brownish ..... *Trametes hirsuta*  
 15. Pilear surface zonate with multicoloured zones ..... *Trametes versicolor*
16. Basidia septate; spores often germinating by repetition ..... 17  
 16. Basidia not septate; spores germinating by hyphal germ tubes ..... 18
17. Hymenial surface cream to buff, with projecting sterile fascicles; basidia 2-celled, spores broadly allantoid ..... *Heterochaete shearii*  
 17. Hymenial surface greyish, smooth; basidia 4-celled; spores globose to subglobose .....  
 ..... *Basiodendron eyrei*
18. Subiculum and hymenial region with conspicuous dextrinoid asterohyphidia .....  
 ..... *Asterostroma cervicolor*  
 18. Dextrinoid asterohyphidia absent ..... 19
19. Basidiomes soft, byssoid to floccose, bluish green to yellowish green; spores pigmented, shallowly verrucose, bluish in KOH, weakly amyloid in Melzer's reagent ..... *Tomentella chlorina*  
 19. Basidiomes membranous, not bluish or yellowish green; spores hyaline to pigmented, smooth..  
 ..... 20
20. Hymenial surface smooth, olivaceous; hyphae mostly simple-septate but some with single, double, or multiple clamps; spores brown, dextrinoid in Melzer's reagent . *Coniophora kawaiiensis*  
 20. Hymenial surface smooth to hydnceous, white to buff, orange, or purplish; spores hyaline, negative in Melzer's reagent ..... 21
21. Generative hyphae entirely simple-septate or mostly simple-septate with occasional double or multiple clamps; basidia simple-septate at the base ..... 22  
 21. Generative hyphae with obvious to inconspicuous single clamps; basidia with basal clamp .. 25
22. Hymenial surface finely hydnceous; coarsely incrustated fascicles of hyphae in core of aculei, sometimes projecting at the apex ..... *Hyphodermella maunakeaensis*  
 22. Hymenial surface smooth to raduloid; incrustated fascicles of hyphae absent ..... 23
23. Cystidia absent; basidiospores crescent-shaped,  $7.5-8.5 \times 2-3 \mu\text{m}$ ; some double or multiple clamps present ..... *Phanerochaete crescentispora*  
 23. Cystidia present; double or multiple clamps absent or extremely rare ..... 24
24. Cystidia thin- to firm-walled, usually heavily to lightly incrustated; subicular hyphae firm- to thick-walled, loosely interwoven ..... *Phanerochaete sordida*  
 24. Cystidia thin-walled, not incrustated; subicular hyphae thin-walled, more closely interwoven ..... *Phanerochaete aculeata*
25. Cystidia thick-walled, amyloid, often rooted at the base, wall thinning toward the apex to form a thin-walled apical bulb ..... 26  
 25. Cystidia, if present, not as above ..... 29

26. Cystidia tapering to an acute, pointed apex.....	27
26. Cystidia with a rounded, obtuse apex.....	28
27. Cystidia with a short thin-walled apex, usually apically incrustated just below the tip; spores narrowly allantoid, $6-8 \times 1.5-2 \mu\text{m}$ .....	<i>Tubulicrinis subulatus</i>
27. Cystidia with a long thin-walled apex, not incrustated; spores broadly cylindric, slightly curved, $6-7.5 \times 2.5-3 \mu\text{m}$ .....	<i>Tubulicrinis effugiens</i>
28. Cystidia often with asymmetrical thin-walled apex; spores $5-7 \times 1.5-2 \mu\text{m}$ .....	<i>Tubulicrinis calothrix</i>
28. Cystidia with symmetrical thin-walled apex; spores $7-9 \times 1.5-2.5 \mu\text{m}$ .....	<i>Tubulicrinis gracillimus</i>
29. Hymenial surface grandinioid; aculei with a core of large, spherical crystal clusters up to $26 \mu\text{m}$ diam; basidia barrel shaped, $10-14 \mu\text{m}$ long .....	<i>Brevicellicium vulcanense</i>
29. Hymenial surface smooth to hydnceous or tuberculate; aculei without crystalline core; basidia clavate, mostly $15-40 \mu\text{m}$ long.....	30
30. Spores ornamented .....	31
30. Spores smooth .....	32
31. Basidiomes white to cream coloured; developing over hyphal strands; margin fibrillose .....	<i>Phlebiella fibrillosa</i>
31. Basidiomes bluish grey, crustose; margin not fibrillose .....	<i>Phlebiella tulasnelloidea</i>
32. Hymenial surface violaceous to dark purplish or orange; conical, incrustated cystidia abundant ..	33
32. Hymenial surface mostly white to cream or buff, rarely purplish; cystidia, if present, not as above .....	36
33. Hymenial surface orange.....	<i>Peniophora incarnata</i>
33. Hymenial surface violaceous to dark purplish .....	34
34. Hymenial surface dark purplish; margin white to cream; dendrohyphidia present in hymenium. ....	<i>Dendrophora albobadia</i>
34. Hymenial surface violaceous; margin concolorous; dendrohyphidia absent.....	35
35. Gloeocystidia absent or rare .....	<i>Peniophora cinerea</i>
35. Gloeocystidia abundant and conspicuous .....	<i>Peniophora nuda</i>
36. Hymenial surface grandinioid to strongly hydnceous.....	37
36. Hymenial surface smooth or tuberculate.....	42
37. Lagenocystidia present in hymenium.....	38
37. Lagenocystidia not present.....	39
38. Hymenial surface strongly hydnceous with cylindric aculei.....	<i>Hyphodontia arguta</i>



38. Hymenial surface grandinioid with minute rounded papillae ..... *Hyphodontia alutaria*
39. Spores narrowly ellipsoid to subcylindric; hymenial surface with small, crowded aculei, cracking into small polygons with age or drying ..... *Hyphodontia crustosa*
39. Spores subglobose or ovoid to ellipsoid; hymenial surface not as above ..... 40
40. Hymenial surface strongly hydnceous; aculei up to 2 mm long, mostly flattened to subcylindric ..... *Hyphodontia spathulata*
40. Hymenial surface grandinioid with small, fimbriate, scattered aculei ..... 41
41. Spores ellipsoid, 4-5 × 3-3.5 μm; hyphal system monomitic ..... *Hyphodontia breviseta*
41. Spores ovoid to subglobose; 3-4 × 2-3 μm; hyphal system dimitic ..... *Hyphodontia aloha*
42. Basidiocarps waxy, crustose on drying; hyphae agglutinated and clamps difficult to discern in dried specimens; cystidia absent ..... *Phlebia lilascens*
42. Basidiocarps membranous; not becoming crustose; hyphae not agglutinated in dried specimens and clamps apparent; cystidia or hyphoid hyphidia present ..... 43
43. Hymenial cystidia thin-walled, clavate, 80-150 × 8-15 μm; associated with brown rot .....  
..... *Crustoderma gigacystidium*
43. Hymenial cystidia not as above; associated with white rot ..... 44
44. Cystidia of three types, some cylindric, thick-walled, some cylindric, thin-walled, and others conical, thick-walled, heavily incrustated ..... *Hyphoderma naiophila*
44. Cystidia, if present, not as above ..... 45
45. Hymenial surface speckled with a brown secretion; spherical masses of brown amorphous material abundant in sections; cystidia thin-walled, fusiform; spores allantoid .....  
..... *Hyphoderma pallidum*
45. Hymenial surface and other characters not as above ..... 46
46. Hymenial surface cream to pale buff, smooth; basidia clavate, often with a median constriction, up to 30 μm long ..... 47
46. Hymenial surface greyish buff to purplish, shallowly tuberculate; basidia clavate with an elongated narrow base, up to 45 μm long ..... 49
47. Hymenial cystidia cylindric or capitate; large, imbedded or projecting, fusiform gloecystidia abundant; stephanocysts usually present ..... *Hyphoderma praetermissum*
47. Hymenial cystidia fusoid to capitate; gloecystidia and stephanocysts absent ..... 48
48. Cystidia short, sphaeropedunculate, 15-20 μm long, with broad capitate apex up to 7 μm diam. and 3 times wider than stalk portion; spores narrowly ellipsoid .....  
..... *Hyphoderma sphaeropedunculatum*
48. Cystidia up to 50 μm long, capitate apex only slightly wider than stalk; spores more broadly ellipsoid ..... *Hyphoderma sambuci*

49. Hymenial surface greyish buff; subicular hyphae often with irregular swellings and constrictions; spores  $5-6 \times 3-3.5 \mu\text{m}$ .....*Radulomyces kama`aina*  
 49. Hymenial surface bright purplish; subicular hyphae uniform in diam; spores  $6.5-7.5 \times 3-4 \mu\text{m}$  .  
 ..... *Radulomyces poni*

### Acknowledgments

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