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FULL PAPER

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Redheadia quercus gen. et sp. nov., the teleomorph of *Mycopappus quercus*, the frosty mildew fungus in *Quercus acutissima*

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Abstract The teleomorph of *Mycopappus quercus* causing frosty mildew in *Quercus acutissima* is described as a new genus and species, *Redheadia quercus*, in the Sclerotiniaceae. Apothecia sprout from sclerotia on the fallen infected leaves kept for 10 months at 5°C and subsequent incubation at 15°C under diffused room light. Typical zonate lesions and multicellular propagules of *M. quercus* are produced on *Q. acutissima*, by mycelial inoculation using an isolate from a single ascospore, confirming the teleomorph–anamorphic connection. No significant differences are observed between cultured colonies of isolates from the ascospore and those from the propagule. Sclerotia and microconidia of the fungus are produced on culture media.

Key words Frosty mildew · *Mycopappus quercus* · *Quercus acutissima* · *Redheadia quercus* · Teleomorph

Introduction

Mycopappus quercus Y. Suto et M. Kawai causes brown leaf spots and brown shoot tips in *Quercus acutissima* Carr. ("Kunugi" in Japanese). This disease was named "frosty mildew" ("Shirotsubu-hagare-byo" in Japanese) and has been an economic problem in the southwestern districts of Japan (Suto 1993, 1994). Although the ascogenous stage and true conidia of the fungus are not observed, multicellular propagules of the fungus were abundantly produced on the lesions of the living leaves and shoots, and this fungus was proposed as a fungus belonging to the genus *Mycopappus* based on the propagules (Suto and Kawai 2000). Subsequently, we investigated the teleomorphic (ascogenous) stage of the fungus and were successful in producing apothecia in vitro from sclerotia formed on the infected fallen leaves (unpublished data).

From the morphological characteristics of the fungus, its teleomorphic stage is considered to belong to the family Sclerotiniaceae. Although the apothecium of the fungus morphologically resembles that of *Ciborinia*, the present fungus has the anamorphic stage, *Mycopappus quercus*, as a propagule. Thus, a new genus *Redheadia* with its first species *Redheadia quercus* is proposed to accommodate this fungus.

This article describes and illustrates the teleomorph of *M. quercus*. The teleomorph–anamorphic connection was confirmed by producing the typical lesions with propagules of *M. quercus* on leaves of *Q. accutissima* after mycelial inoculation with an ascospore isolate. Cultural characteristics were compared between ascospore isolates and propagule isolates, and production of sclerotia and microconidia was observed on agar media.

Materials and methods

Collection and isolation of the fungus

On October 30, 2001, about 70 fallen infected leaves of *Q. acutissima*, where sclerotia of the fungus were produced, were collected at a forest nursery in Daito-cho, Shimane Prefecture, Japan. These sclerotia were used for on apothecial production test.

Isolation from mono-ascospore: Isolates A-1, -2, and -3, *Q. acutissima*, Daito-cho, Shimane Prefecture, Febuary 25, 2003. A piece of apothecial disk was attached onto the inner surface of the lid of a petri dish with white vaseline, and then the lid was placed over a 2% glucose agar. After 3–5 days at 20°C, a single discharged and germinated ascospore was transferred to potato dextrose agar (PDA) slants. Isolation from mono-multicellular propagule: Isolates P-1 and -2, *Q. acutissima*, Daito-cho, Shimane Prefecture, Novem-

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ber 9, 2001, and isolate P-3, *Q. acutissima*, Nita-cho, Shimane Prefecture, October 20, 2001. A single fresh propagule produced on the lesion was removed with a sterile needle and placed on a petri dish containing 2% glucose agar. After 3–5 days at 20°C, hyphal tips from the single propagules were transferred to PDA slants. These isolates were used for inoculation and cultural experiments.

Inoculation

Leaves of four *Quercus* species, *Q. acutissima*, *Q. dentata* Thunb. ("Kashiwa" in Japanese), *Q. myrsinaefolia* Blume ("Shirakashi" in Japanese), and *Q. serrata* Murray ("Konara" in Japanese), were used. A mono-ascospore isolate A-2 was used for the experiment. Mycelial fragments of the isolate with PDA medium were put on both surfaces of the picked leaves. As a control, only agar medium was put on the leaves. The leaves were inoculated on September 15, 2003 and put in polypropylene containers (12 cm in diameter and 4 cm in height), together with moist cotton to maintain moisture, and were placed under diffused room light in the laboratory for 10 days.

Cultural experiments

Mono-ascospore isolates of A-1, -2, and -3, and mono-propagule isolates of P-1, -2, and -3, were used. Pieces of fresh mycelium of the isolates were transplanted onto the center of petri dishes containing agar media. Mycelial growth of the fungus was examined on PDA, malt agar, Waksman agar, Richards agar, and Czapek agar, at 20°C. The diameter of the colonies was measured 10 days after inoculation. Five dishes were prepared for each isolate.

Results and discussion

Production of apothecia

On December 20, 2001, the fallen infected leaves with sclerotia were placed with moist sphagnum in polypropylene containers. These were then transferred into a refrigerator (5°C) in the dark, simulating the conditions encountered during winter in the field. On May 8, 2002, the containers were transferred to the laboratory under diffused light, in the hope that the sclerotia might germinate. None of them, however, germinated that spring. Then, on August 30, 2002, the containers were again placed into the refrigerator. On December 22, 2002, they were transferred to 15°C in a glass front panel incubator under diffused room light. Inspection of the sclerotia on December 29, 2002, revealed that several sclerotia had germinated, producing small apothecial initial. As apothecial initials continued to develop, new germination occurred successively in the remaining sclerotia. Apothecia matured about 40 days after germination.

Twelve of 200 sclerotia produced 20 mature apothecia, varying from 1 to 2 apothecia per sclerotium. Sclerotia producing the apothecia were thicker than those producing no apothecia. We had been investigating the sclerotial germination using various sclerotial specimens for many years, and this was the first success.

It was considered that exposure to a low temperature for a long term, i.e., twice for 5 months each, totaling 10 months, stimulated the germination of the apothecial initial, and then the moderate temperature of 15°C favored apothecial maturation and ascospore production.

In the field, the first symptoms of the present disease appeared from early September as conical white to yellowish tufts, multicellular propagules of the causal fungus, scattered on the adaxial surface of the infected leaves. The infected leaves are prematurely shed and sclerotia of the fungus are formed only after the leaves have fallen to the ground (Suto 1993, 1994; Suto and Kawai 2000). It is supposed that sclerotia are formed as the overwintering stage, apothecia arise from sclerotia next spring, and ascospores disperse as the primary infection source. Apothecial production and development, ascospore production, and its dissemination of the fungus should be examined in field conditions in the future.

Morphology of sclerotia and apothecia

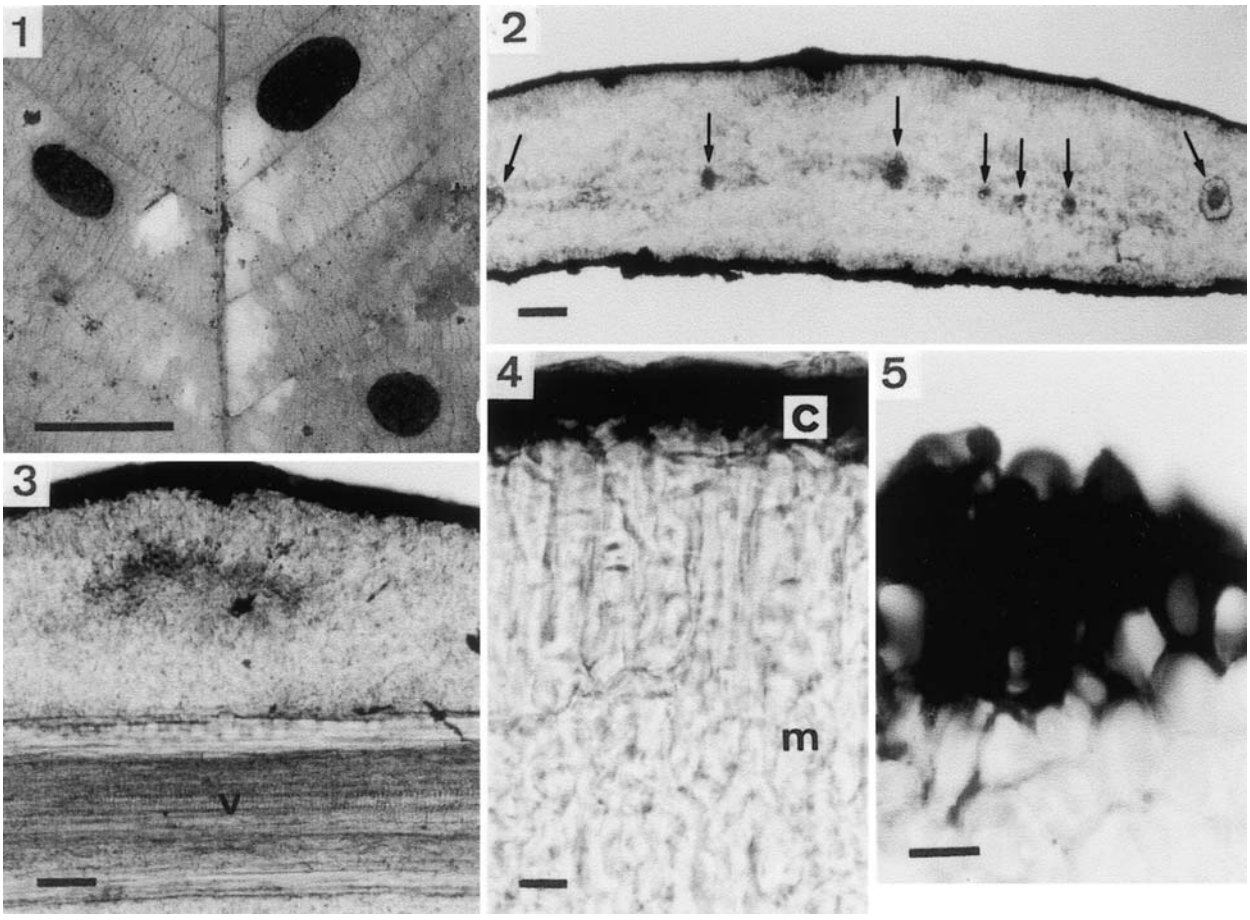
Sclerotia formed in the leaf tissue only after the infected leaves had fallen to the ground and became scattered, becoming erumpent, discoid, orbicular to oblong, shiny black, (2.0–)3.5–8.5(–10.5) × (1.5–)3–6.5(–7) mm in diameter, in cross section 400–550 µm, cortex black, 15–55 µm thick, composed of cells 8–11 µm in diameter, medullary hyphae compactly packed, 3–4.5(–7.5) µm broad, containing undigested remnants of the leaf parenchyma and vascular elements (Figs. 1–5).

Apothecia arising usually singly, sometimes 2 from a sclerotium; disks plane or concave-convexoid, 1.5–4 mm in diameter, 0.2–0.3 mm thick, pale brown, stipitate, hymenium subhyaline; medullary excipulum of loose "textura intricata," hyphae 1.5–4.5 µm thick, septate; ectal excipulum of "textura angularis", cells 15–30 × 8–15 µm; stipes cylindrical, 4–9(–11) × 0.3–0.6 mm, pale brown, of "textura porrecta," hyphae 3–4.5 µm in diameter. Rhizoidal tufts present at near the base of the stipe. Asci cylindrical to clavate, inoperculate, 100–120 × 6.5–8 µm, 8-spored, with a pore bluing in Melzer's reagent. Ascospores uniseriate, continuous, hyaline, ellipsoidal or fusiform, 7–9 × 4.5–5 µm. Paraphyses filiform, slightly inflated at the apex, 2–3-septate, hyaline, simple, 105–130 × 2.5–3 µm (Figs. 6–12).

Taxonomy of the fungus

Redheadia Y. Suto et Suyama, gen. nov.

Sclerotiis disciformibus, orbiculatis vel oblongis, nigris, in mesophyllo folii formatis, contextu ex hyphis dense intertextis cum vestigio parenchymatis et fascis vascularis cintinentibus compositsu; apotheciis e sclerotiis ortis



Figs. 1–5. Sclerotia of *Redheadia quercus*. **1** Sclerotia on a fallen leaf of *Quercus acutissima*. **2** Vertical section of sclerotium containing undigested remnants of the leaf (*arrows*). **3** Remnant of vascular bundle (*v*). **4** Cortex (*c*) and medullary hyphae (*m*) packed compactly. **5** Cells of cortex. *Bars* **1** 10 mm; **2** 100 µm; **3** 50 µm; **4, 5** 10 µm

efferentibus, stipitatis; disco plano, umbrino vel orchraceos; ascis inoperculatis, cylindricis vel clavatis, octosporis; ascosporis continuis, fusiformi-ellipticis, hyalinis, uniseriatis; paraphysibus filiformibus, simplicibus; popagulis epiphyllis, multicellularibus, conicis, nievis vel flavidis, gregariis, basi stromaticis et appendicibus hyphoideis praeditis, disseminatis.

Species typica: *Redheadia quercus* Y. Suto et Suyama.

Etymology: Honoring S.A. Redhead, who established the genus *Mycopappus* and suggested that *M. alni*, the type species of *Mycoppapus*, is a sclerotiniaceous fungus.

Redheadia quercus Y. Suto et Suyama, sp. nov.

Figs. 1–12

Sclerotiis primo in mesophyllo immersis, dein erumpentibus, disciformibus vel oblongis, nigris, nitentibus, (2.0–)3.5–8.5(–10.5) × (1.5–)3–6.5(–7) mm diametro; in sectione longitudionale 400–550 µm crassis; cortice arto, 15–55 µm crasso, ex cellulis 8–11 µm diametro compositio; hyphis medullaribus arcte contiguis, 3–4.5(–7.5) µm latis, cum vestigio parenchymatis et fascis vascularis continentibus; apotheciis e sclerotiis efferentibus, plerumque solitariis, interdum duobus, pallide brunneis, stipitatis; disco plano vel concavo-convexo, 1.5–4 mm diametro, 0.2–0.3 mm crasso, hymenio subhyalino; excipulo medullari laxe "textura intricate," ex hyphis septatis 1.5–4.5 µm crassis compositio; excipulo ectali "textura angularis," ex cellulis 15–30 × 8–15 µm composito; stipite cylindraceo, pallide brunneo, "textura porrecta," 4–9(–11) × 0.3–0.6 mm, ex hyphis 3–4.5 µm crassis composito, prope basin caespite rhizoidei praedito; ascis inoperculatis, cylindricis vel clavatis, stipitatis, octosporis, apice pro jodo caerulescenti praeditis, 100–120 × 6.5–8 µm; ascosporis uniseriatis, ellipticis vel fusiformibus, continuis, apice utrinque rotundatis vel obtusatis, hyalinis, 7–9 × 4.5–5 µm; paraphysibus filiformibus, simplicibus, ad apicem leviter inflatis, hyalinis, 2–3-septatis, 105–130 × 2.5–3 µm.

Status anamorphicus: *Mycopappus quercus* Y. Suto et M. Kawai.

Etymology: Named after its host genus.

Holotype: On fallen leaves of *Quercus acutissima* Carr. ("Kunugi" in Japanese) , Daito, Shimane Pref., October 30, 2001, collected by H. Suyama; TFM:FPH 7752 (Herbarium of Forest Mycology and Pathology, Forest and Forest Products Research Institute, Japan).

Ex-holotype cultures: RQ-A-1 and RQ-A-2; MAFF 410982 and MAFF 410983 (National Institute of Agrobiological Resource, Tsukuba, Japan).

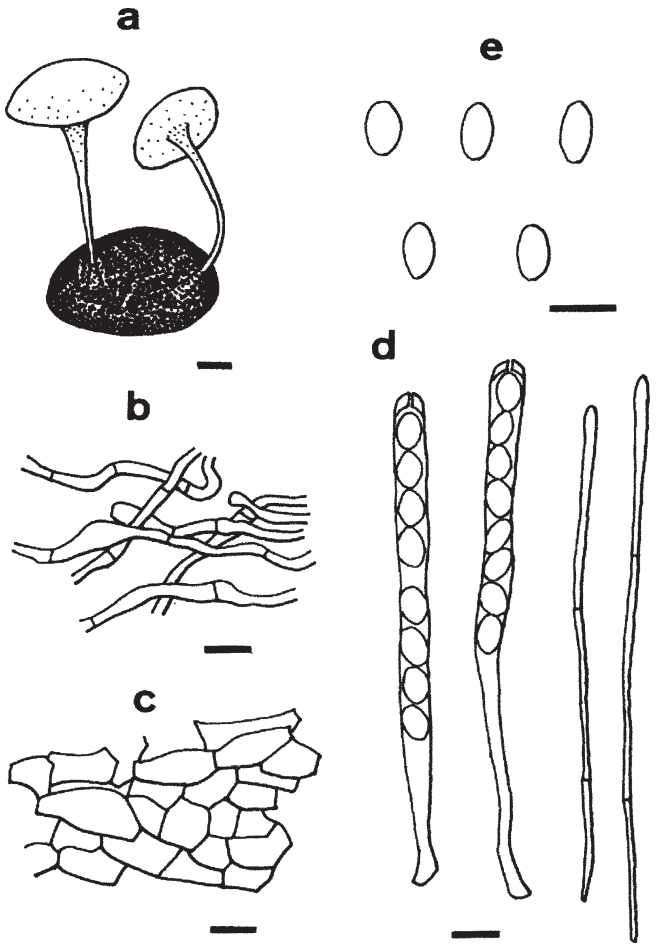


Fig. 6. Apothecial state of *Redheadia quercus*: line drawings. **a** Two apothecia arising from a sclerotium. **b** Vertical section of apothecial medullary excipulum, composed of textura intricata. **c** Vertical section of apothecial ectal excipulum, composed of textura angularis. **d** Mature asci and paraphyses. **e** Ascospores. *Bars* **a** 1 mm; **b–e** 10 µm

Notes: *Readheadia quercus* is characteristic of Discomycetes, Leotiales, Sclerotiniaceae sensu Whetzel (1945). It develops a discoid sclerotium within host leaf tissue, becoming erumpent, a stipitate apothecium, ellipsoidal to fusiform ascospores, white to yellow conical multicellular propagules. Although the apothecia of the fungus is macroscopically similar to those of *Ciborinia* (Whetzel 1945), this species is segregated into a new genus primarily on the basis of its associated macroconidial stage (*Mycopappus*) following the tradition of Whetzel (1945), Korf (1973), and Otani (1990).

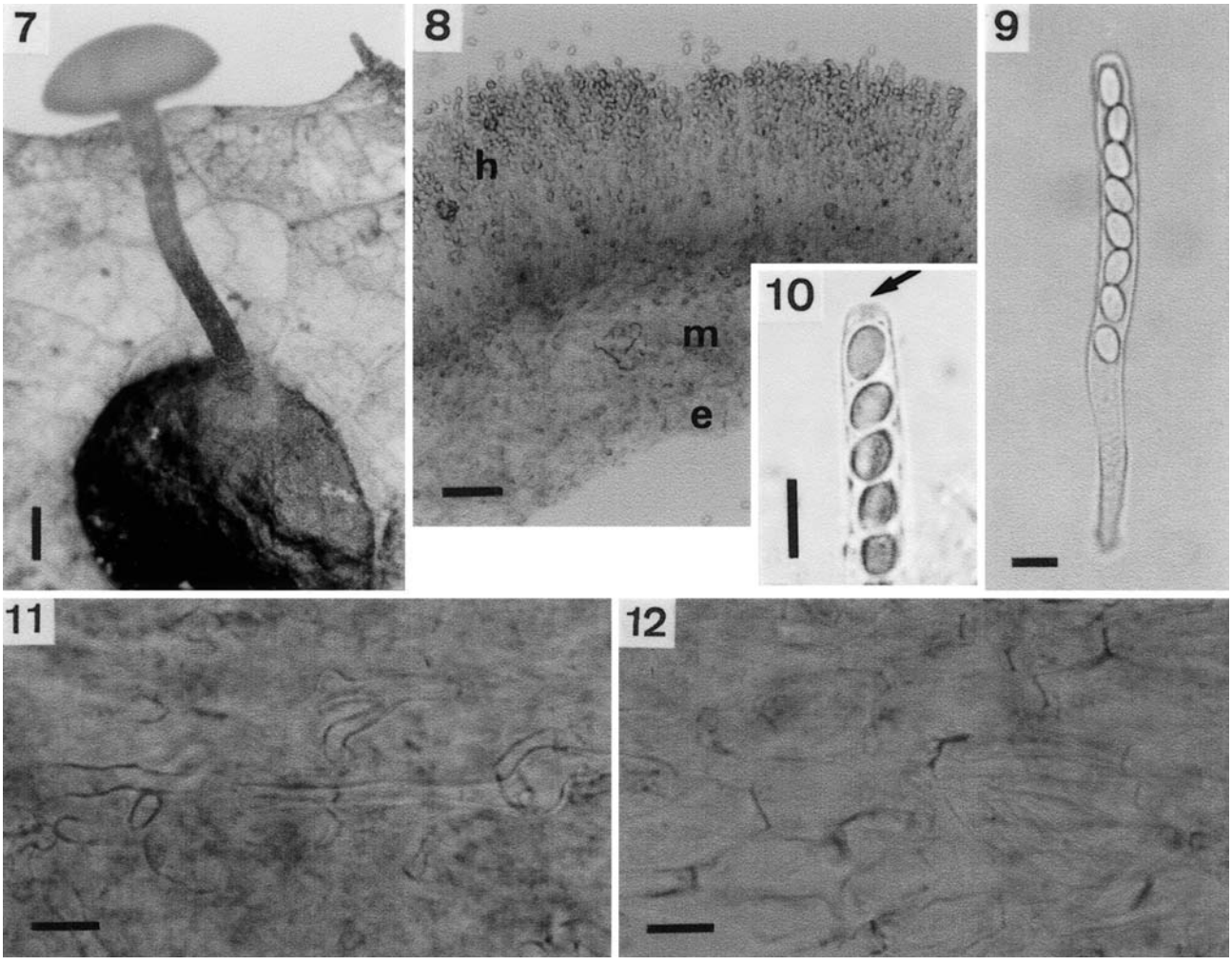
The large multicellular propagules of the *Mycopappus* somewhat resemble those characterizing the genus *Cristulariella* Höhnel. The genus *Grovesinia* was erected in the Sclerotiniaceae by Cline et al. (1983), taking *G. pyramidalis* as the type species for the teleomorph of *Cristulariella moricola* (I. Hino) Redhead. Subsequently, Harada and Noro (1988) proposed a new species of *Grovesinia*, *G. pruni* Y. Harada et Noro, as a teleomorph of *C. pruni* Harada et Noro.

Narumi and Harada (2000) collected black sclerotia on fallen infected leaves of *Quercus mongolica* Fischer ex Turez. var. *grosseserrata* (Bl.) Rehder et Wilson ("Mizunara" in Japanese), producing apothecia from the sclerotia. They inoculated the living leaves of *Q. mongolica* var. *grosseserrata* with the fungus isolated from the ascospore, producing leaf spots with multicellular popagules, which resembled those on *Q. acutissima* described by Suto (1994). Apothecia of the fungus arose from black, stromatic sclerotia, brown, carnose, disks 4–4.5 mm in diameter, stipes 3–4 mm in height, asci 110–130 × 6–9 µm, and ascospores 8.5–12.5 × 3.5–7.5 µm. Measurements of apothecia and ascospores of our fungus differ from those of Narumi and Harada's fungus in having smaller disks, longer stipes, and smaller ascospores. No microanatomy of the apothecium, however, was presented by Narumi and Harada (2000), and its relationship with *R. quercus* must await further study.

Ciborinia candolleana (Lév.) Whetzel (Whetzel 1945; Batra 1960) is a parasitic fungus on leaves of *Quercus* spp. distributed widely in Europe and North America. The sclerotia of the fungus are formed on the fallen leaves, and apothecia develop from the sclerotia as in the present fungus. *C. candolleana*, however, has no anamorphic stage, and macroscopical characteristics of sclerotia and apothecia significantly differ from those of the present fungus. Sclerotium of *C. candolleana* is loaf shaped, 2–4 × 1–2 mm, and the disk of apothecium is cupulate or discoid, 1–2 mm diameter, with stipes 2–4 cm in height.

Four *Mycopappus* species, i.e., *M. aceris* (Dearn. et Barthol.) Redhead et G.P. White (1985), *M. aesculi* C.Z. Wei, Y. Harada et Katum. (1998), *M. alni* (Dearn. et Barthol.) Redhead et G.P. White (1985), and *M. quercus* Y. Suto et M. Kawai (2000), have been reported. *Mycopappus alni*, the type species of the genus, produced microconidia and microsclerotia in culture, and is suggested to be a sclerotiniaceous fungus (Redhead and White 1985), although the apothecia has not been found. The teleomorphs of *M. aceris* and *M. aesculi* were described as *Mycosphaerella mycopappi* A. Funk et Dorworth (1988) and *Mycodidymella aesculi* C.Z. Wei, Y. Harada et Katum. (Wei et al. 1998), respectively. The genus *Mycosphaerella* and *Mycodidymella* belong to Loculoascomycetes, Dothideales, Mycosphaerellaceae. Funk and Dorworth (1988) and Wei et al. (1998), however, did not mention that *M. alni*, the type species of *Mycopappus*, to be a sclerotiniaceous fungus. On the other hand, *Mycopappus quercus* developed a teleomorph belonging to Sclerotiniaceae, as suggested by Redhead and White (1985) in *M. alni*. The taxonomic position of Sclerotiniaceae is quite different from that of Mycosphaerellaceae, in which the teleomorphs of *M. aceris* and *M. aesculi* are included.

Mycopappus aceris and *M. aesculi* have the synanamorphic stage of *Stigmina zilleri* A. Funk (1987) and *Blastostroma aesculi* C.Z. Wei, Y. Harada et Katum. (Wei et al. 1998), respectively. These fungi produced true conidia on spots on leaves, as well as on sporodochia (multicellular propagules) in *M. aesculi* (Wei et al. 1998). The



Figs. 7–12. Apothecial state of *Redheadia quercus*: photomicrographs. **7** An apothecium arising from a sclerotium. **8** Vertical section of disk of apothecia: hymenium (*h*), medullary excipulum (*m*), and ectal excipulum (*e*). **9** Ascus. **10** A pore of ascus bluing in Melzer's reagent (*arrow*). **11** Medullary excipulum, composed of textura intricata. **12** Ectal excipulum, composed of textura angularis. *Bars* **7** 1 mm; **8** 50 μm; **9–12** 10 μm

synanamorophic stage of *M. alni* and the present fungus, *R. quercus*, however, has not been found.

Suto and Kawai (2000) compared the morphological characteristics of multicellular popagules of four species of *Mycoppapus*. *Mycopappus alni* and *M. quercus* differ morphologically from *M. aceris* and *M. aesculi*. In the stroma-like base, *M. alni* bears shorter clavate to ovoid end cells and *M. quercus* is composed of short, clavate end hyphae, whereas *M. aceris* and *M. aesculi* is composed of only interlocking hyphae. The hyphal appendages of *M. alni* and *M. quercus* are long and densely fasciculate to form a conical erect structure, although the appendages sometimes flared loosely in wet conditions. The hyphal appendages of *M. aceris* and *M. aesculi* are short but not fasciculate, and sparse in *M. aceris*. In their key to *Mycopappus* species, Redhead and White (1985) divided the two species, *M. alni* and *M. aceris*, on the basis of the morphological characteristics of propagules as follows: "Propagules either conical when agglutinated or moplike when spread" in *M. alni*, and "Propagules leniform, sparsely covered by radiating hyphal appendages give an overall appearance of sea urchins" in *M. aceris*.

Mycopappus aceris and *Mycopappus aesculi*, the anamorphs of *Mycosphaerella mycopappi* and *Mycodidymella aesculi*, might not properly belong to the *Mycoppapus*, because these two species have no sclerotial states in contrast to *M. alni*, the type species of the genus, and *M. quercus*. Moreover, as already described, *M. mycopappi* and *M. aesculi* differ in morphology from *M. alni* and *M. quercus*. The taxonomy of *Mycopappus aceris* and *M. aesculi* may be subject to revision in future.

Inoculation experiment

All the leaves of *Q. acutissima* inoculated with the ascospore isolate of *R. quercus* on the abaxial surface and some of the leaves inoculated with the same isolate on the adaxial surface were infected. Symptoms and signs on *Q. acutissima* leaves induced by inoculation with ascospore

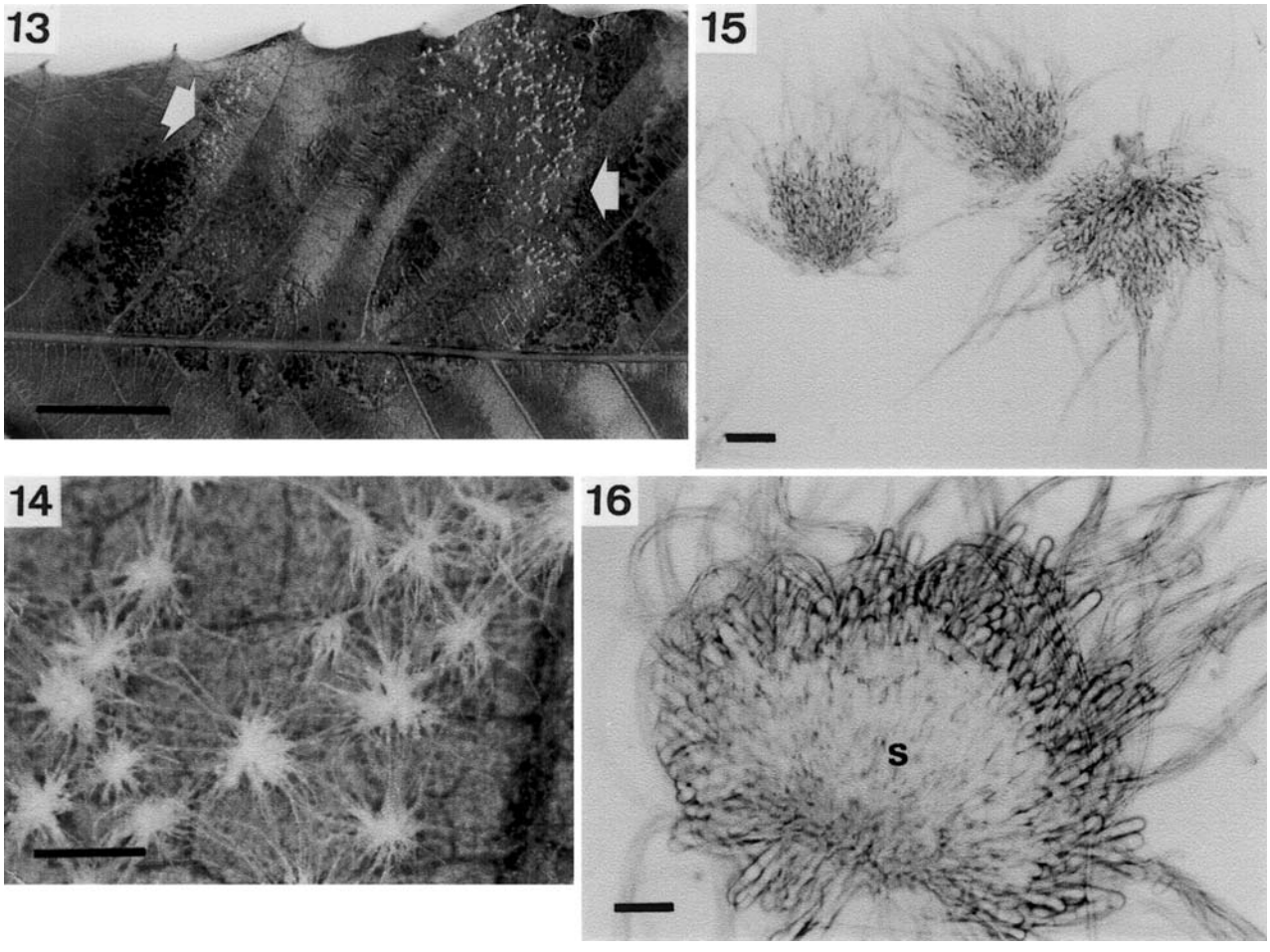
Table 1. Results of inoculation of leaves of *Quercus* spp. with *Readheadia quercus*

Tree species	Disease development			
	Inoculated		Noninoculated	
	Upper surface[a]	Lower surface	Upper surface	Lower surface
Quercus acutissima	2/10[b]	20/20	0/5	0/5
Q. dentata	0/10	4/10	0/5	0/5
Q. myrsinaefolia	0/10	0/10	0/5	0/5
Q. serrata	0/10	8/10	0/5	0/5

Inoculation on Sept. 15, 2003, using mono-ascospore isolate A-2, and investigation on Sept. 25, 2003

[a] The surfaces on which inocula were placed

[b] Number of infected leaves/number of inoculated leaves



Figs. 13–16. *Mycopappus quercus* on *Quercus acutissima*. **13** Propagules (*arrows*) produced on the spot produced by inocuolation with single ascospore after 7 days. **14** Propagules, enlarged. **15** Propagules under light microscope, mounted in Shear's mounting fluid. **16** Stroma-like base of the propagule (*s*), composed of clavate end hyphae. *Bars* **13** 10 mm; **14** 0.5 mm; **15** 100 µm; **16** 50 µm

isolate of the fungus were the same as those on the naturally infected leaves. A part of the leaves of *Q. serrata* and *Q. dentata* were infected when inoculated with the same fungus isolate only on the abaxial surface. None of the leaves of *Q. myrsinaefolia* were infected. The noninoculated leaves remained uninfected (Table 1). In *Q. acutissima*, the first symptom, small reddish-brown spots, appeared on the leaves 1–2 days after inoculation, and then developed to the leaf margins 7 days after inoculation. The infected spots consist of alternating pale and dark brown necrotic zones, or brown necrotic and green healthy tissues (Fig. 13). Multicellular propagules of the inoculated fungus were abundantly produced on the adaxial surface 4 days after inoculation (Figs. 13, 14). In *Q. dentata* and *Q. serrata*, only

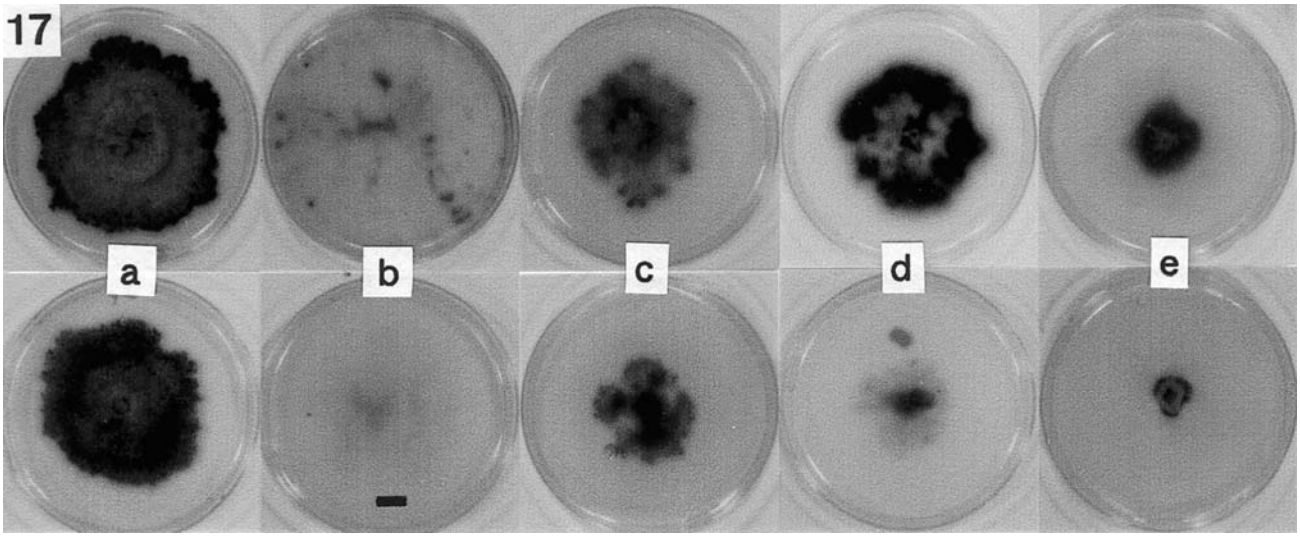


Fig. 17. Colony appearance of *Redheadia quercus* and *Mycopappus quercus* on various agar media. **a** Potato dextrose agar (PDA); **b** malt agar; **c** Waksman agar; **d** Richards agar; **e** Czapek agar. *Upper row: R. quercus*, isolate A-1; *lower: M. quercus*, isolate P-1; in 20 days at 20°C. *Bar* 10 mm

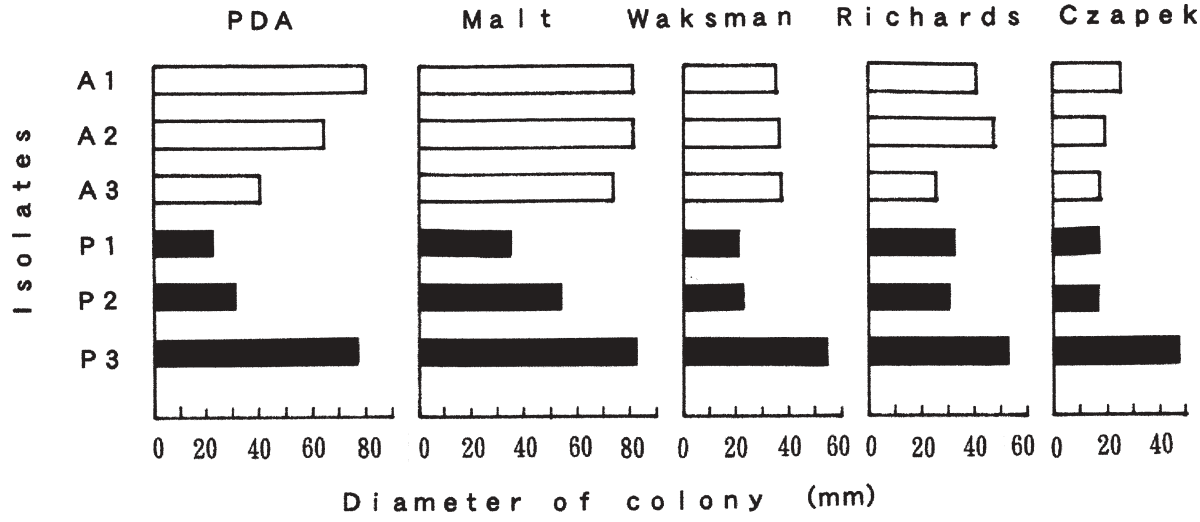


Fig. 18. Mycelial growth of *Redheadia quercus* and *Mycopappus quercus* on various agar media. Isolates A-1, -2, -3: isolated from mono-ascospore; isolates P-1, -2, and -3: isolated from mono-propagule. In 20 days at 20°C

a few spots developed, if any, with fewer propagules of the fungus. The susceptibility of four *Quercus* trees to the fungus in the present inoculations was similar to the results in the inoculation with the propagules onto leaves of those trees (Suto 1993, 1994).

The propagules produced on the infected leaves had globose to subglobose, stroma-like bases, 290–530 µm wide, 240–360 µm high, and long cylindrical hyphal appendages, 360–720 µm × 4–5 µm. The morphology and dimension of the propagules are the same as those on naturally infected leaves. Hyphal appendages aggregated into dense fascicles to form 5–10, sometimes more than 10, conical erect structures per stroma-like base, in contrast to the stroma-like base on naturally infected leaves, where 1–5, usually 1–2, erect structures were formed (Suto and Kawai 2000). It appeared that the appendages loosened up in the moist condition of the containers (Figs. 15, 16).

Cultural characteristics

In all isolates tested from the ascospore and the propagule, colonies were plane, consisting of thin mycelia colored whitish at first, then brown to reddish-brown on PDA, Waksman, Richards, and Czapek agar, and whitish- to pale brown on malt agar. Aerial hyphae grew cottony and margins lacerated. On PDA, colonies sometimes darkened in mottled concentric zones centrally (Fig. 17). Radial growth of mycelia was vigorous on PDA and malt agar, but poor on Waksman, Richards, and Czapek agar in isolates A-1, A-2, and P-3, and poor on PDA, the same as on Waksman, Richards, and Czapek, in isolates A-3, P-1, and A-2 (Fig. 18). Cultural characteristics of the isolates from the ascospore and those from the propagule were not significantly different. The cultural features showed that ascospore isolates and propagule isolates are of the identical fungus.

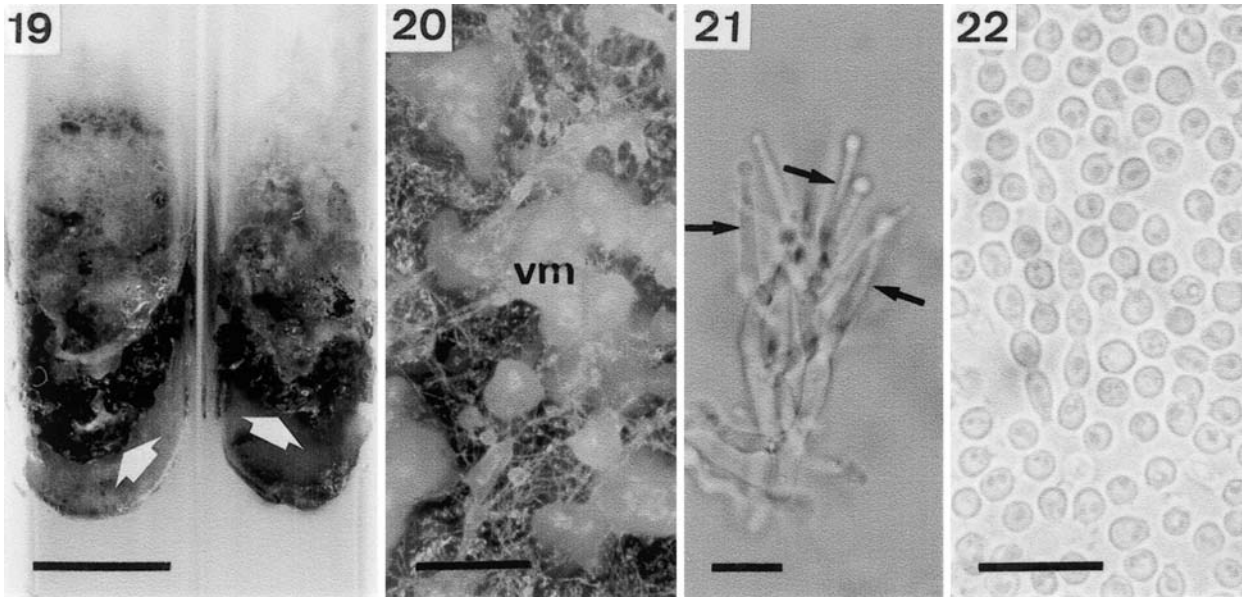


Fig. 19–22. Sclerotia, phialides, and microconidia of *Redheadia quercus* produced on PDA. **19** Black sclerotia (*arrows*) produced on agar slant. **20** White viscous masses of microconidia (*vm*) produced on agar plate. **21** Phialides (*arrows*) borne on congested, branched, and hyaline hyphae. **22** Microconidia. *Bars* **19** 10 mm; **20** 0.5 mm; **21, 22** 10 µm

Sclerotia were produced on PDA slant, mainly on the borders of the test tube glass, ~6 months after inoculation. They are circular to oblong, 3–5 mm in diameter, and shiny black (Fig. 19).

Whitish wet viscous masses of microconidia were formed at some areas on the PDA plate (Fig. 20). Microconidia are catenate, globose to obovate, 2–3(–3.5) µm, hyaline, unicellular, guttulate, sometimes with two small fringes. Microconidia are borne on discrete phialidic pegs. Phialidic pegs flask shaped, 5–13 µm × 2.5–3 µm, hyaline. Phialides are borne on congested, branched, and hyaline hyphae, forming white clusters (Figs. 21, 22). Microconidia did not germinate after 10 days in distilled water and on PDA.

Mycelial appearance, and sclerotia and microconidia production of the present fungus, are similar to those of *M. alni.* Mycelia of *M. alni* on PDA develop cottony to floccose, whitish at first, then the whole colony darkened in mottled concentric zones centrally, some areas with whitish wet viscous masses of microconidia, and form microsclerotia (Redhead and White 1984). Cultural characteristics of *M. mycopappi* (*Stigmina zilleri*) and *M. aesuculi* (*Mycopappus aesculi, Blastostroma aesuculi*) are different from those of the present fungus. Mycelia of *M. mycopappi* on malt agar develop a dark blackish-green center, a broad hyaline border, with a sparse aerial hyphae, but no sporulation was observed (Funk 1987). Colonies of *M. aesuculi* on potato sucrose agar are raised, circular, white, with abundant aerial hyphae, and produce sporodochia, conidia (on the sporodochia), and spermogonia (Wei et al. 1998).

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