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BASIDIOMYCETE FUNGI REPORTED ON LIVING OR DEAD GIANT SEQUOIA OR COAST REDWOOD

by

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Since the time of John Muir (8) the beliefs that giant sequoia (*Sequoia gigantea* Lindl. Decne.) and coast redwood (*Sequoia sempervirens* D. Don Endl.) are essentially "disease free" and that the heartwood of giant sequoia is free of decay (6,14) have been perpetuated. However, for each species a number of diseases have been recorded (1,2,3,5,7, 9,15,17).

The following is a list (Table 1) of Basidiomycetous fungi reported from the living or dead giant sequoias and/or coast redwoods. A number of these decay heartwood, and probably most do, but critical demonstrations are lacking. It is hoped that compilation of this list will aid future workers and will dispel the belief that few decay fungi can attack the wood of giant sequoia and redwood. The list includes forest pathogens (*H. annosum*, *P. rivulosa*, *A. mellea*, and others) that might create problems in the management and conservation of valuable stands or specimen trees. It has been reported (11,13) that in 64% (21 of 33) of the giant sequoias that have fallen recently, one third or more of the wood at the point of failure was structurally deteriorated by advanced decay. Further research on the distribution of damaging pests within giant sequoia and redwood ecosystems and their relationship to stand composition and succession is needed to provide a scientific basis for management and protection of these unique resources.

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LITERATURE CITED

1. Bega, R.V. 1964. Diseases of sequoia, p. 131-139. In: Diseases of Widely Planted Forest Trees. Compiled by: Sect. 24: Forest Protection FAO/IUFRO, Working Group on International Cooperation in Forest Disease Research Symp. on Internationally Dangerous Forest Diseases and Insects, Oxford (Limited distribution by GPO, Washington, DC).
2. Berkeley: Forest disease herbarium records, USDA For. Ser., Pacific Southwest For. and Range Exper. Sta. (PSW), P.O. Box 245, Berkeley, CA 94701, USA.
3. Berkeley: Herbarium host-index records of the Univ. of Calif., Dept. of Bot., UC-Berkeley.
4. Commonwealth Mycological Institute. 1940 to present. Index of fungi. A list of names of new genera, species and varieties of fungi, new combinations and new names compiled from world literature. Vol. 1-3, Kew, Surrey.
5. Davidson, J.G.N. 1972. Pathological problems in redwood regeneration from seed. Ph.D. Dissertation, UC-Berkeley.
6. Ellsworth, R.S. 1924. The giant sequoia. J.D. Berger Co., Oakland, CA.
7. Hepting, G. 1971. Diseases of forest and shade trees of the U.S. USDA Agric. Handb. No. 386.

8. Muir, J. 1894. (1961). The mountains of California. Published in cooperation with the American Museum of Natural History. The Natural History Library, Anchor Books, Doubleday and Co., Inc., Garden City, N.Y.
9. Peterson, C.W. and R.S. Smith. 1975. Forest nursery diseases in the United States. USDA Agric. Handb. No. 470.
10. Piirto, D.D., J.R. Parmeter, Jr., and F.W. Cobb, Jr. 1974. *Fomes annosus* in giant sequoia. Plant Dis. Repr. 58(5):478.
11. Piirto, D.D. 1977. Factors associated with tree failure of giant sequoia. Ph.D. Dissertation, UC-Berkeley.
12. Piirto, D.D., J.R. Parmeter, Jr. and W.W. Wilcox. 1977. *Poria incrassata* in giant sequoia. Plant Dis. Repr. 61(1):50.
13. Piirto, D.D., W.W. Wilcox, J.R. Parmeter, Jr. and D.L. Wood. 1983. Causes of uprooting and breakage of specimen giant sequoia trees. Div. of Agric. Sciences, Univ. of California Bulletin 1909.
14. Rundel, P.W. 1971. Community structure and stability of the giant sequoia groves of the Sierra Nevada, CA. Amer. Midl. Nat., 85(2): 478-492.
15. Seymour, A.B. 1929. Host index of fungi of North America. Harv. Univ. Press, Cambridge.
16. Shellhammer, H.S., R.E. Stecker, H.T. Harvey and R.J. Hartsveldt. 1970. Unusual factors contributing to the destruction of young giant sequoias. Madrono 20(8):408-410.
17. United States Department of Agriculture. 1960. Index of plant diseases in the United States. Agric. Handb. 271.

Table 1. Basidiomycete fungi reportedly associated with living or dead giant sequoia and coast redwood (listed alphabetically according to the names currently used by the Center for Forest Mycology Research, U.S. Forest Products Laboratory, Madison, Wisconsin).

Organism	Host	Source
<i>Antrodia serialis</i> (Fr.) Donk <i>Trametes serialis</i> Fr. <i>Corirolellus serialis</i> (Fr.) Murr. <i>Polyporus callosus</i> Fr. <i>Poria callosa</i> (Fr.) Karst.	Coast redwood and giant sequoia	3
<i>Armillariella</i> _____ (Fr.) Karst. <i>Armillaria mellea</i> (Fr.) Quéf.	Coast redwood and giant sequoia	1,3,11,17
<i>Clauvulina</i> _____ (Fr.) Schroet. <i>Clavaria cristata</i> Fr.	Coast redwood and giant sequoia	3,15
<i>Collybia umbonata</i> Pk.	<i>Sequoia</i> sp.	15
<i>Coniophora arida</i> (Fr.) Karst.	Coast redwood	3
<i>Coniophora puteana</i> (Schum. ex Fr.) Karst.	Coast redwood and giant sequoia	3
<i>Coniophorella olivacea</i> (Fr. ex Fr.) Karst. <i>Corticium umbrinum</i> Fr.	Coast redwood	3,15
<i>Coriolus versicolor</i> (L. ex Fr.) Quéf. <i>Polyporus versicolor</i> L. ex Fr.	Coast redwood and giant sequoia	1,2,3,11,15,17
<i>Corticium abeuns</i> Burt	Coast redwood	3
<i>Corticium caeruleum</i> (Schrad. ex Fr.) Fr.	Coast redwood	3,15
<i>Corticium deflectens</i> Karst.	Giant sequoia	3
<i>Crepidotus calolepsis</i> (Fr.) Karst. <i>Crepidotus fulvotomentosus</i> Pk.	Coast redwood	3
<i>Cystostereum pini-canadensis</i> (Schw.) Gilbertson <i>Radulum pini-canadensis</i> Schw.	Coast redwood	3
<i>Dacrymyces stillatus</i> Fr.	Giant sequoia	3,15
<i>Fomitopsis cajanderi</i> (Karst.) Kotl. et Pouz. <i>Fomes cajanderi</i> Karst. <i>Fomes subroseus</i> (Weir) Overh.	Coast redwood	3
<i>Fomitopsis pinicola</i> (Swartz ex Fr.) Karst. <i>Fomes pinicola</i> (Swartz ex Fr.) Cke.	Coast redwood	2,3

Table 1 (continued)

Organism	Host	Source
<u>Phellinus viticola</u> (Schw. ex Fr.) Donk <u>Trametes isabellina</u> Fr. <u>Trametes tenuis</u> Karst. <u>Fomes viticola</u> (Schw. ex Fr.) Lowe	Coast redwood	1,3,15,17
<u>Pholiota rubronigra</u> A.H. Smith et Hesler	<u>Sequoia</u> sp.	4
<u>Pholiota sequoiae</u> A.H. Smith et Hesler	<u>Sequoia</u> sp.	4
<u>Polyporus elegans</u> Bull. ex Fr.	Coast redwood	3
<u>Polyporus hirtus</u> Qué1.	Coast redwood	3
<u>Polyporus perennis</u> L. ex Fr.	Coast redwood	3
<u>Polyporus varius</u> Pers. ex Fr.	Coast redwood	3
<u>Poria cinerascens</u> (Bres.) Sacc. et Syd.	Coast redwood	2
<u>Poria lenis</u> (Karst.) Sacc.	Giant sequoia	3
<u>Poria rivulosa</u> (Berk. et Curt.) Cke. <u>Poria albipellucida</u> Baxter	Coast redwood and giant sequoia	1,2,3,7,11,12
<u>Poria sequoiae</u> Bonar	Coast redwood	1,2,3,7,17
<u>Poria spissa</u> (Schw.) Cke. <u>Polyporus crociporus</u> Berk. et Curt. Misidentified as <u>Poria crocipora</u> Berk. et Curt.	Coast redwood	2
<u>Poria terrestris</u> (DC. ex Fr.) Sacc.	Coast redwood	3
<u>Poria vaillantii</u> (DC. ex Fr.) Cke.	Coast redwood	3
<u>Poria versipora</u> (Pers.) Rom.	Coast redwood	1,2,7
<u>Porothelium fimbriatum</u> (Pers. ex Fr.) Fr.	Coast redwood	3
<u>Psathyrella sequoiae</u> Thiers et A.H. Smith	<u>Sequoia</u> sp.	4
<u>Pseudohydnum gelatinosum</u> (Scop. ex Fr.) Karst. <u>Tremellodon gelatinosus</u> (Scop. ex Fr.) Fr.	Coast redwood	15
<u>Rhizoctonia solani</u> Kuehn. <u>Thanatephorus cucumeris</u> (Frank) Donk	Coast redwood and giant sequoia	1,3
<u>Rigidoporus vitreus</u> (Pers. ex Fr.) Donk Misidentified as <u>Poria undata</u> (Pers.) Bres. in USA	Coast redwood	2
<u>Schizophyllum commune</u> Fr.	Coast redwood	1,2,3,15,17
<u>Serpula incrassata</u> (Berk. et Curt.) Donk <u>Poria incrassata</u> (Berk. et Curt.) Burt	Coast redwood and giant sequoia	1,2,3,11,17
<u>Skeletocutis amorpha</u> (Fr.) Kotl. et Pouz. <u>Polyporus amorphus</u> Fr.	Coast redwood	1,3,15,17
<u>Solenia fasciculata</u> Pers. ex Fr.	Coast redwood	3,14
<u>Stereum hirsutum</u> (Willd. ex Fr.) S.F. Gray	Coast redwood and giant sequoia	1,2,3,11,15,17
<u>Stereum ostrea</u> (Blume et Nees ex Fr.) Fr. <u>Stereum fasciatum</u> (Schw.) Fr.	Coast redwood	1,3,17
<u>Stereum rugisporum</u> (E11. et Ev.) Burt	Coast redwood	3
<u>Trametes carbonaria</u> (Berk. et Curt.) Overh. <u>Hexagonia carbonaria</u> Berk. et Curt. <u>Trametes sequoiae</u> Copeland	Coast redwood and giant sequoia	1,7,15,17
<u>Trechispora farinacea</u> (Pers. ex Fr.) Liberta <u>Hydnum niveum</u> Pers. ex Fr. <u>Grandinia farinacea</u> (Fr.) Bourd. et Galz.	Giant sequoia	15
<u>Trechispora mollusca</u> (Pers. ex Fr.) Liberta <u>Poria mollusca</u> (Pers. ex Fr.) Cke.	Coast redwood	3
<u>Tremella encephala</u> Willd. ex Pers. <u>Naematelia encephala</u> Willd. ex Fr.	Coast redwood	3,15
<u>Tremella lutescens</u> Pers. ex Fr. <u>Tremella mesenterica</u> Retz. ex Fr.	Coast redwood	15
<u>Tubulicrinis gracillima</u> (E11. et Ev. ex Rogers et Jacks.) G.H. Cunn <u>Peniophora gracillima</u> E11. et Ev. ex Rogers et Jacks.	Coast redwood	3

Table 1 (continued)

Organism	Host	Source
<u>Galerina mutabilis</u> A.H. Smith	<u>Sequoia</u> sp.	4
<u>Galerina sahleri</u> var. <u>sequoiae</u> A.H. Smith et Sing.	<u>Sequoia</u> sp.	4
<u>Ganoderma oregonense</u> Murr. <u>Ganoderma sequoiae</u> Murr.	Coast redwood	1,3,15,17
<u>Gloeocystidiellum citrinum</u> (Pers.) Donk <u>Corticium lacteum</u> Fr. <u>Corticium radiosum</u> Fr.	Coast redwood	15
<u>Gloeophyllum saepiarium</u> (Wulf. ex Fr.) Karst. <u>Lenzites saepiaria</u> Wulf. ex Fr.	Giant sequoia	1,3,17
<u>Henningsomyces candidus</u> (Pers. ex Fr.) Kuntz <u>Solenia candida</u> Pers. ex Fr.	Coast redwood	3
<u>Heterobasidion annosum</u> (Fr.) Bref. <u>Fomes annosus</u> (Fr.) Cke. <u>Fomitopsis annosa</u> Fr.) Karst.	Coast redwood and giant sequoia	1,2,3,7,10,11,17
<u>Heterotextus alpinus</u> (Tracy et Earle) Martin <u>Guepiniopsis alpina</u> (Tracy et Earle) Brasf.	Coast redwood	3
<u>Hirschioporus abietinus</u> (Dicks. ex Fr.) Donk <u>Polyporus abietinus</u> Dicks. ex Fr. <u>Polystictus abietinus</u> (Dicks. ex Fr.) Fr.	Coast redwood and giant sequoia	1,2,3,7
<u>Hydnellum caeruleum</u> (Horn. ex Pers.) Karst. <u>Hydnellum cyaneotinctum</u> Pk.	Coast redwood	3
<u>Hymenochaete cinnamonea</u> (Pers.) Bres.	Coast redwood	3
<u>Hymenochaete tabacina</u> (Sow. ex Fr.) Lév.	Coast redwood	1,3,15,17
<u>Hypholoma</u> sp.	Giant sequoia	15
<u>Laetiporus sulphureus</u> (Bull. ex Fr.) Bond. et Sing. <u>Polyporus sulphureus</u> Bull. ex Fr.	Coast redwood	1,3,17
<u>Lepiota xylophila</u> Pk.	Coast redwood	15
<u>Leucogyrophana lusca</u> (Fr.) Pouz. <u>Merulius molluscus</u> Fr.	Coast redwood	15
<u>Merulius hexagonoides</u> Burt	Coast redwood	1,3,15,17
<u>Naematoloma capnoides</u> (Fr.) Karst.	Giant sequoia	10
<u>Omphalia crickiana</u> A.H. Smith	Coast redwood	3
<u>Osmoporus odoratus</u> (Wulf. ex Fr.) Sing. <u>Trametes americanus</u> Overh. <u>Trametes odorata</u> Wulf. ex Fr.	Coast redwood	1,3,15,17
<u>Panel pusillus</u> (Pers. ex Lév.) Burds. et Miller <u>Favolus rhipidium</u> (Berk.) Sacc.	Coast redwood	3
<u>Phanerochaete carnosa</u> (Burt) Parm. <u>Peniophora carnosa</u> Burt	Coast redwood	3
<u>Phanerochaete sanguinea</u> (Fr.) Pouz. <u>Peniophora sanguinea</u> (Fr.) Hoehn. et Litsch. <u>Corticium sanguinea</u> Fr.	Coast redwood	3,15
<u>Phellinus ferreus</u> (Pers.) Bourd. et Galz. <u>Poria ferrea</u> (Pers.) Overh.	Coast redwood	3
<u>Phellinus ferruginosus</u> (Schard. ex Fr.) Pat. <u>Poria ferruginosa</u> (Schard. ex Fr.) Cke.	Coast redwood	3