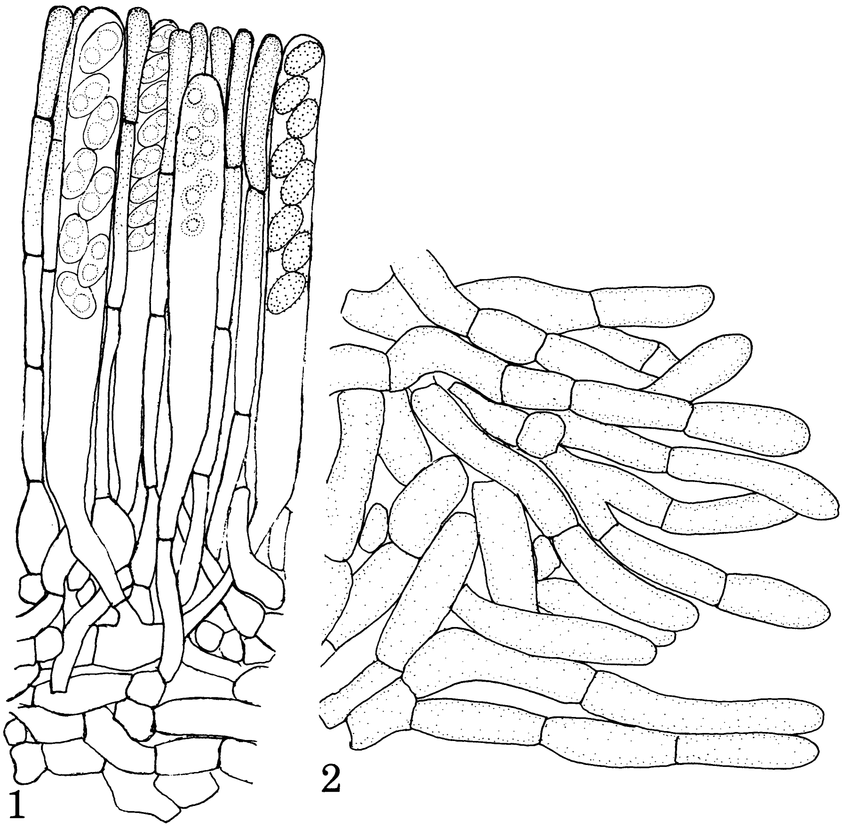
2. **Berry, S. Z., and G. N. Davis.** 1957. Formation of oospores by *Peronospora destructor* and their possible relation to epiphytology. *Pl. Dis. Reporter* **41**: 3–6.
3. **Chen, C. C.** 1961. A species of *Peronophythora* gen. nov. parasitic on litchi fruit in Taiwan. *Special Publ. Coll. Agric. Natl. Taiwan Univ.* **10**: 1–37.
4. **Dunleavy, J., and G. Snyder.** 1962. Inhibition of germination of oospores of *Peronospora manshurica*. *Proc. Iowa Acad. Sci.* **69**: 118–121.
5. **Erwin, D. C., and W. H. McCormick.** 1971. Germination of oospores produced by *Phytophthora megasperma* var. *sojae*. *Mycologia* **63**: 972–977.
6. **Ko, W. H., H. S. Chang, and H. J. Su.** 1978. Isolates of *Phytophthora cinnamomi* from Taiwan as evidence for an Asian origin of the species. *Trans. Brit. Mycol. Soc.* **71**: 496–499.
7. ——, ——, ——, **C. C. Chen, and L. S. Leu.** 1978. Peronophythoraceae, a new family of Peronosporales. *Mycologia* **70**: 380–384.
8. **Leach, L. D.** 1931. Downy mildew of the beet, caused by *Peronospora schachtii* Fuckel. *Hilgardia* **6**: 203–251.
9. **Satour, M. M., and E. E. Butler.** 1968 . Comparative morphological and physiological studies of the progenies from intraspecific matings of *Phytophthora capsici*. *Phytopathology* **58**: 183–192.
10. **Smoot, J. J., F. J. Gough, H. A. Lamey, J. J. Eichenmuller, and M. E. Gallegly.** 1958. Production and germination of oospores of *Phytophthora infestans*. *Phytopathology* **48**: 165–171.
11. **Wolf, F. A., R. A. McLean, and L. F. Dixon.** 1936. Further studies on downy mildew of tobacco. *Phytopathology* **26**: 760–777.
12. **Zentmyer, G. A., and D. C. Erwin.** 1970. Development and reproduction of *Phytophthora*. *Phytopathology* **60**: 1120–1127.

ON "*PEZIZA*" *MELALEUCOIDES*—A SPECIES OF *GYROMITRA* FROM THE WESTERN UNITED STATES

DONALD H. PFISTER

Farlow Reference Library and Herbarium of Cryptogamic Botany, Harvard University, Cambridge, Massachusetts 02138

Earlier, I (Pfister, **1979**) reported briefly on the type collection of *Peziza melaleucoides* Seaver. I noted that the species could not be placed easily in existing genera of the Pezizales known to me. Since that report I have received living material of *P. melaleucoides* from Idaho collected by Mrs. Kit Scates. This material has allowed a complete study upon which I propose a new combination in the genus *Gyromitra*. A comparison shows that *Gyromitra recurva* (Snyd.) Harmaja is a



FIGS. 1, 2. *Gyromitra melaleucoides.* 1. Portion of hymenium and subhymenium. 2. Cross-section of exciple showing outer layer of cells, approx. × 2,500. Scates 1464 (FH).

later synonym. A redescription of the species and discussion follow:

Gyromitra melaleucoides (Seaver) Pfister, comb. nov. FIGS. 1–3

≡ *Peziza melaleucoides* Seaver, North American Cup-Fungi (Operculates), p. 225. 1928.

= *Paxina recurvum* Snyder, Mycologia **28**: 487. 1936.

≡ *Gyromitra recurva* (Snyder) Harmaja, Karstenia **18**: 57. 1978.

Apothecia large, up to 10 cm diam, flat to repand, sometimes slightly convoluted, with a short, ridged stipe up to 3 cm long. Hymenium buckthorn brown (Ridgway, **1912**) or light brown, lighter on the outside and stipe. Excipulum composed of textura intricata throughout, the hyphae 5–15 μm in diam, the broader hyphae found on the outer surface. Outer layer of the excipulum forming an indistinct palisade layer often collapsing upon drying. Ascospores when young nearly globose and biseriate, when mature uniseriate, 10–13 × 7–10 μm, occasionally uniguttulate but mostly biguttulate, tetranucleate, marked with low, isolated warts and short ridges. Asci J −, broadly cylindrical, 180–220 × 10–15 μm. Paraphyses 8–10 μm broad at the apex, septate, containing brownish granules.

FIG. 3. Ascocarps of *Gyromitra melaleucoides*, approx. × 1. Photographed by Mrs. Robert Scates.

Habitat: in conifer woods on soil. Spring.

Specimens examined: USA—Colorado: on ground in conifer forest. Tolland, alt. 9,000 ft., 6–19–1914, L. O. Overholts (NY—Holotype); as above, Tolland (Giants Ladder), alt. 9,000 ft., 7–7–1914, and 6–21–1914, L. O. Overholts (NY). Idaho: on moldy earth, Big Flat below Devil's Elbow, Coeur d'Alene River, 6–6–71, Kit Scates (1464, 1467) (FH); on soil, Blue Creek Road, Panhandle Natl. Forest, 5–14–1979, Kit Scates (FH); duff and decayed coniferous wood in duff, Deception Creek Exp. Forest, Kootenai Co., 16 June 1967, H. Goree 1330 (WSP 57362); forest floor duff and humus layer in 61–80-yr stand of Western white pine, Western red cedar, larch, white pine predominating, Benton Creek Pipeline, Priest River Experiment Forest, SE Forty, NW 1/4, Bonner Co., 4 June 1942, A. W. Slipp (WSP 55593). Washington: On ground in dense woods, Camp Mason, Lake Keechelus, April 15 and May 5, 1934 (NY—presumed isotype of *Paxina recurvum*).

Cytological studies, carried out using a Giemsa procedure (Rogers, **1965**), confirm the placement of *P. melaleucoides* in the Helvellaceae. The ascospores at maturity are tetranucleate. Binucleate stages can often be seen as well as multinucleate stages. The multinucleate spores were most probably fixed just prior to their germination. The material studied was quite mature; no spore primordia were seen. The small nuclei, which were 1.5–2 μm in diam, were found generally in the polar regions of the spores and were almost always closely adherent to the guttules. Observations were made under oil immersion objective using 20× eyepieces.

Berthet (**1964**) discussed the usefulness of the nuclear condition of ascospores in delimiting families in the Pezizales. Most subsequent authors have used the tetranucleate condition of the ascospores as one of the defining characteristics of the Helvellaceae. Until fresh material allowed cytological study of the ascospores, I was uneasy about placing *P. melaleucoides* in *Gyromitra*. Although the apothecial anatomy was convincingly like that of *Gyromitra*, the shallowly cupulate to repand form of the apothecia and small, biguttulate, ornamented ascospores seemed anomolous.

I have chosen to follow Harmaja's (**1969a**, **1973**) broad characterization of the *Discina-Neogyromitra-Gyromitra* complex and have used the name *Gyromitra*. This decision was reached in part by the study of the material of *G. melaleucoides*. Harmaja pointed out that species of this complex show similar apothecial anatomy and that surface ornamentations of spores vary from smooth (under the light microspore) to highly and complexly ornamented. He included those species which were stipitate as well as those with short, indistinct stipes. Most of these species grow in conifer woods on either soil or decayed wood. The excipulum is composed of interwoven hyphae which toward the outside produce a palisade layer. This layer in some cases is indistinct and may be evanescent.

Gyromitra melaleucoides with its distinctly marked, small, biguttulate ascospores and discoid apothecial form is an intermediate species which can not be well accommodated in either *Gyromitra* or *Discina* in a restricted sense. Harmaja (**1969a**, **b**, **1973**, **1976**, **1978**) has described several species in *Gyromitra* and has recombined most species of *Discina* and *Neogyromitra* under the generic name *Gyromitra*. Species distinctions among this group are sometimes difficult, and there is confusion in the application of names in the genus based, in part, upon the lack of material for older European species.

Harmaja (**1978**) in making the combination *Gyromitra recurva* did not describe the holotype which he cited at NY [1]. A study of the material which seems to be a duplicate of material at WTM which was not seen, agrees with that of *G. melaleucoides*.

Both *Peziza melaleucoides* and *Paxina recurvum* were included in Larsen and Denison's (**1978**) checklist of Pezizales in the western United States. There they were questionably placed under a heading "*Pachyella* affinities." *Pachyella, a* genus of the Pezizaceae, has amyloid asci and gelatinous excipular tissues.

I wish to thank Mrs. Scates for sending me the material which ultimately allowed resolution of this problem. I also wish to thank Patricia Holmgren and Clark T. Rogerson, The New York Botanical Garden, for arranging the loan of type material of *Peziza melaleucoides* and *Paxina recurvum*. Dr. Richard P. Korf read and commented upon the manuscript.

LITERATURE CITED

Berthet, P. 1964. *Essai biotaxinomique sur les Discomycetes.* Joanny Lorge, Lyon, France. 157 p.

Harmaja, H. 1969a. A wider and more natural concept of the genus *Gyromitra* Fr. *Karstenia* **9**: 9–12.

——. 1969b. A neglected species, *Gyromitra ambigua* (Karst.) Harmaja, n. comb., and *G. infula* s.str. in Fennoscandia. *Karstenia* **9**: 13–19.

——. 1973. Amendments of the limits of the genus *Gyromitra* and *Pseudorhizina,* with the description of a new species, *Gyromitra montana*. *Karstenia* **13**: 48–58.

[1] Harmaja (*Karstenia* **19**: 46–49. 1979) published a description and discussion of *Gyromitra recurva* which was seen when proof of this paper was being corrected. Our observations generally agree.

——. 1976. New species and combinations in the genera *Gyromitra, Helvella,* and *Otidea. Karstenia* **15**: 29–32.
——. 1978. New species and combinations in *Helvella* and *Gyromitra. Karstenia* **18**: 57.
Larsen, H. J., Jr., and W. C. Denison. 1978. A checklist of the operculate cup-fungi (Pezizales) of North America west of the Great Plains. *Mycotaxon* **7**: 68–90.
Pfister, D. H. 1979. Type studies in the genus *Peziza.* VIII-X. *Mycotaxon* **9**: 501–504.
Ridgway, R. 1912. *Color standards and color nomenclature.* Published by the author, Washington, D. C. 48 p, 53 pl.
Rogers, J. D. 1965. The conidial stage of *Coniochaeta ligniaria:* morphology and cytology. *Mycologia* **57**: 368–378.

EFFECT OF TEMPERATURE AND LIGHT ON PERITHECIAL DEVELOPMENT IN *SORDARIA MACROSPORA*

KARL ESSER

Lehrstuhl für Allgemeine Botanik, Ruhr-Universität, D-4630 Bochum 1, Germany

In many fungi fruit-body formation is not only the expression of a transition from mycelial growth to the formation of a specific morphogenetic structure as a prerequisite for recombination of the genetic material but is also correlated with the production of specific secondary metabolites. This chain of events is also of practical importance. It reflects exactly the conversion from growth phase to production phase observed in many fungi in the fermentation industry (**5**). Therefore it is of interest not only for basic but also for applied research to understand the genetic environmental factors such as nutrition, temperature and light responsible for passing the threshold between these two stages of development.

The self-fertile ascomycete *Sordaria macrospora* Auersw. is very well suited as a model organism for studies of this kind, because the genetics of fruiting became known some decades ago in detail: There are at least 14 mostly nonlinked genes which control the various steps of differentiation from ascogonium formation to spore ejaculation (**3**). Furthermore the influence of nutrition on fruit-body formation was studied recently in detail; it became evident that biotin and arginine are required for perithecial development (**4, 6**). It was, therefore, of interest to examine the effect of temperature and light on the formation of fruit bodies parameters which have been studied in fungi from many aspects (**1, 7**).