

*Some Probable Mycorrhizal Associations
in the Pacific Northwest. IV*

JAMES M. TRAPPE

*Pacific Northwest Forest and Range Experiment Station,
Forest Service, U.S. Department of Agriculture,
Portland, Oregon*

FURTHER APPLICATION of criteria for determining probable mycorrhizal associations between specific fungi and trees (Trappe, 1960) has indicated these additions to lists previously published in *Northwest Science*.

Amanita junquillea Quél.: *Tsuga heterophylla*—coastal fog belt of northern Oregon at 50 ft. elev.

Amanita muscaria (L. ex Fries) Pers. ex Hooker: *Picea sitchensis*, *Pinus contorta*, and *Tsuga heterophylla*—coastal fog belt of northern Oregon at numerous localities between 50 to 500 ft. elevs.

Amanita pantherina (D. C. ex Fries) Schum.: *Cedrus libani*—on a lawn at Portland, Oreg., at 400 ft. elev.; *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.; *Castanea dentata*—U.S. Forest Service Wind River Arboretum in southern Washington at 1,150 ft. elev.

Amanita strobiliformis (Vitt.) Quél.: *Pseudotsuga menziesii* var. *menziesii*—Collawash River, western slope of Cascade Range in northern Oregon at 3,000 ft. elev.

Boletellus zelleri (Murr.) Singer, Snell & Dick (*Xerocomus zelleri* (Murr.) Snell): *Tsuga heterophylla*—coastal fog belt of northern Oregon at 50 ft. elev.

Boletus edulis Bull. ex Fries: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.

Boletus erythropus (Fries) Pers.: *Pseudotsuga menziesii* var. *menziesii*—South Umpqua River, western slope of Cascade Range in southern Oregon at 3,000 ft. elev.

Boletus pulverulentus Opat.: *Abies amabilis*—Agnes Creek, Chelan County, eastern slope of Cascade Range in northern Washington at 3,000 ft. elev.

Cortinarius cinnamomeus (L. ex Fries) Fries: *Pseudotsuga menziesii* var. *menziesii* and *Tsuga heterophylla*—Willamette Valley of northern Oregon at 400 ft. elev.

Cortinarius croceofolius Peck: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.

- Cortinarius decolorans* Fries: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.
- Gomphidius glutinosus* (Schaeff. ex Fries) Fries: *Pseudotsuga menziesii* var. *menziesii* (previously reported by Singer, 1949)—Willamette Valley of northern Oregon at 400 ft. elev.
- Gomphidius tomentosus* Murr.: *Pseudotsuga menziesii* var. *menziesii* and *Tsuga heterophylla*—Clackamas River, western slope of Cascade Range in northern Oregon at 900 ft. elev.
- Hygrophorus chrysodon* (Batsch ex Fries) Fries: *Pseudotsuga menziesii* var. *menziesii*—Willamette Valley of northern Oregon at 400 ft. elev. and South Umpqua River, western slope of Cascade Range in southern Oregon at 3,000 ft. elev.
- Laccaria laccata* (Scop. ex Fries) Berk. & Br.: *Pseudotsuga menziesii* vars. *menziesii* (previously reported in New Zealand by Rawlings, 1951) and *glauca*, *Picea sitchensis*, *Tsuga heterophylla*, *Pinus contorta*, *P. ponderosa*, and probably all other Pinaceae of the region—common throughout coniferous forests of the region from the coastal fog belt to high elevations in the mountains.
- Lactarius aurantiacus* (Fries) S. F. Gray: *Pseudotsuga menziesii* var. *menziesii* and *Tsuga heterophylla*—southern Puget Sound area of Washington at 1,000 ft. elev.
- Lactarius deliciosus* (L. ex Fries) S. F. Gray: *Abies amabilis*, *Picea engelmannii*, and *Tsuga heterophylla*—Swamp Creek, Chelan County, eastern slope of Cascade Range in northern Washington at 3,000 ft. elev.
- Lactarius rufus* (Scop. ex Fries) Fries: *Pseudotsuga menziesii* var. *menziesii*—Wind River, western slope of Cascade Range in southern Washington at 1,500 ft. elev.
- Lactarius substriatus* A. H. Smith: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.; *Tsuga heterophylla*—coastal fog belt of southern Washington at 300 ft. elev.
- Pisolithus tinctorius* (Pers.) Coker & Couch: *Pseudotsuga menziesii* var. *menziesii*—Wind River, western slope of Cascade Range in southern Washington at 1,100 ft. elev.
- Russula emetica* (Schaeff. ex Fries) Pers. ex Fries: *Abies amabilis* and *Picea engelmannii*—Swamp Creek, Chelan County, eastern slope of Cascade Range in northern Washington at 3,000 ft. elev.
- Russula foetens* Pers. ex Fries: *Picea sitchensis* and *Tsuga heterophylla*—coastal fog belt of northern Oregon at 50 ft. elev.

- Russula murrillii* Burl.: *Pseudotsuga menziesii* var. *menziesii*—Willamette Valley of northern Oregon at 400 ft. elev.
- Russula nigricans* Fries: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.; *Pseudotsuga menziesii* var. *menziesii*—Willamette Valley of northern Oregon at 400 ft. elev.
- Russula placita* Burl.: *Pseudotsuga menziesii* var. *menziesii*—Willamette Valley of northern Oregon at 400 ft. elev.
- Russula vesicatoria* Burl.: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.
- Russula xerampelina* (Schaeff. ex Secr.) Fries: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.
- Suillus granulatus* (L. ex Fries) O. Kuntze: *Pinus contorta*, *P. echinata* x *rigida*, *P. heldreichii* var. *leucodermis*, *P. jeffreyi*, *P. nigra* var. *nigra* (previously reported by Singer, 1945), *P. nigra* var. *poiretiana*, *P. parviflora*, *P. ponderosa*, *P. pungens*, *P. sylvestris* var. *sylvestris* (demonstrated in pure culture synthesis by Melin, 1923, and Fries, 1942), *P. sylvestris* var. *mongolica*, *P. thunbergii* (previously reported in Argentina by Takacs, 1961)—U.S. Forest Service Wind River Arboretum in southern Washington at 1,150 ft. elev.
- Suillus grevillei* (Klotzsch) Sing.: *Larix gmelinii*, *L. decidua* var. *decidua* (demonstrated in pure culture synthesis by Melin, 1922, and Hammarlund, 1923), *Larix decidua* var. *polonica* (previously reported in Poland by Dominik, 1950)—U.S. Forest Service Wind River Arboretum in southern Washington at 1,150 ft. elev.
- Suillus luteus* (L. ex Fries) S. F. Gray: *Pinus mugo* (demonstrated in pure culture synthesis by Melin, 1924)—U.S. Forest Service Wind River Arboretum in southern Washington at 1,150 ft. elev.
- Suillus subluteus* (Peck) Snell: *Pinus massoniana* and *P. mugo*—U.S. Forest Service Wind River Arboretum in southern Washington at 1,150 ft. elev.; *Pinus contorta*—Blue Mountains of northeastern Oregon at 4,000 ft. elev.
- Suillus tomentosus* (Kauffm.) Singer, Snell & Dick: *Pinus massoniana*, *P. mugo* vars. *mugo* and *rostrata*, *P. ponderosa*—U.S. Forest Service Wind River Arboretum in southern Washington at 1,150 ft. elev.
- Tricholoma imbricatum* (Fries) Kumm.: *Picea sitchensis*—coastal fog belt of northern Oregon at 50 ft. elev.
- Xerocomus subtomentosus* (L. ex Fries) Quéf.: *Tsuga heterophylla*—Zigzag River, western slope of Cascade Range in northern Oregon at 1,500 ft. elev. and Hood River, eastern slope of Cascade Range in northern Oregon at 2,500 ft. elev.

Pisolithus tinctorius (*P. arenarius*, *Polysaccum crassipes*) has been suggested as a mycorrhizal fungus for several host genera—*Pinus* (Bruns, 1894), *Eucalyptus* (Bijl, 1918; Smith and Pope, 1934), and *Quercus* (Klyushnik, 1952). It occurs frequently in Oregon and Washington, sometimes arising directly from mycorrhizae with Douglas-fir. However, it sometimes appears where hyphal connections with tree roots seem unlikely and has been reported as a nonmycorrhizal, rhizosphere fungus on *Eucalyptus camaldulensis* (Neumann, 1959). Consequently, its status as a mycorrhizal fungus has been in doubt until the recent experiments of Bryan and Zak (1961) conclusively proved it to form ectotrophic mycorrhizae with *Pinus echinata*. Bryan and Zak also cleared a similar doubt about the mycorrhizal status of *Laccaria laccata*, which formed ectotrophic mycorrhizae with *Pinus echinata*, *P. taeda*, *P. elliotii*, and *P. palustris* in pure culture syntheses.

The identification of *Boletus erythropus* as a probable mycorrhizal associate of Douglas-fir is included with some reservation, because circumstances at time of collection did not permit saving the specimen for laboratory study. Its macroscopic characteristics were unquestionably those of *B. erythropus*, but occurrence of the species in North America has been in doubt. On the basis of other collections, however, Snell and Dick (1962) now consider it to occur on the west coast.

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