

Speaker for
 May 16
 MSSF Meeting



Judy Rogers

**“The Oregon Chanterelle Study-
 20 years and Counting...”**

During the last two decades, the chanterelle mushroom harvest has become a multi-million dollar industry. In the 1980s, little was known about the effects of commercial mushroom picking on the fruiting patterns of chanterelles or their response to harvesting pressures. This controversy resulted in a cooperative study on *Cantharellus formosus*, the Pacific Golden Chanterelle, now honored as the state mushroom of Oregon. Our May meeting speaker is Judy Roger, who reports on the Oregon Chanterelle Study begun in 1986 by the Oregon Mycological Society.

Continued on page 4

CONTENTS

May 16 Meeting1
 MycoDigest: Dead Man's Foot.....1
 Freedom Song-Another View.....2
 Foragers' Report.....3
 Far West Fungi Farm Field Trip.....4
 Flower and Garden Show Report.....6
 Upcoming Morel Forays.....6
 Cultivation Corner.....7
 Calendar8

Myцена News

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MycoDigest: Dead Man's Foot

Else Vellinga

When in August crumbly dog turds appear along the side walk, I know that autumn is coming, and my heart leaps up! These turds are MUSHROOMS. In a time of year when there is not much moisture around, in the midst of our rainless California summer, these mushrooms are able to grow and form these firm juicy fruit bodies. They are so firm, and are so turgid, that they can even push up the pavement and pop up in other unexpected places to shed their spores (fig. 1). I remember a foray in Denmark into a dry sandy pine plantation where these weird fungi were sticking their heads up. Their ugliness was admired by all of us, but nobody wanted to be photographed with them... In New Zealand I have seen a related species just outside the fence that kept me from the dangers of a thermal vent. Officially, the dog turd fungus is called *Pisolithus arhizus*, one of many names for it. The name is derived from the Greek and means the 'rootless pea-stone'. Dead man's foot and Dye ball are two common names for it. You'll also find '*tinctorius*' as its species name, referring to its qualities as a dye for wool - this has been known for a long time; Micheli mentioned it already in his book from 1729. Can we assume that even in antiquity it was used as such? Older names for the genus include *Polysaccum* - the mushroom with the many bags. We can compliment all those mycologists in finding very suitable names for this species. *Pisolithus* starts out as a club-shaped dark brown object, that when cut open shows those 'peas' - little compartments in which the spores are formed. Arora described them as 'Rice Krispies in tar' - a beautiful comparison. In this stage, the mushroom is firm, and wet, and stains your hands. In the next phase the top matures, the outer wall disintegrates and a dark chocolate brown dry spore mass is visible. Those spores are well suited for air transport - they have pigmented hydrophobic walls, and are spiny, real long-distance dispersers. The fruitbodies wither slowly and can, when not kicked, remain in place for months, until only a small depression in the ground might show their former place.

There is wide variation in the shape and size of the species - from round and small ones to humongous amorphous lumps. Do these forms represent different stages of one species or many species with each their own host? Only one species is commonly recognized here in the U.S.A. Until very recently all the *Pisolithuses* found all over the world were thought to be just one species, but molecular research has shown that there are at least eleven different types, and several species beside those eleven have been described. More work is needed to show whether these are all good species. Some of these molecular types are only found with one host plant species, e.g. *Cistus*, a shrub in the Mediterranean basin or with *Azelia* in Africa. One part of the genus is exclusively Australian, growing with *Eucalyptus* and *Acacia*, but now these species can be found far away from the place of origin, wherever *Eucalyptus* has been planted.

British authors speculated that their local *Pisolithus* had been introduced with the planted *Eucalyptus*, but the Northern Hemisphere species *P. arhizus*, (the species

Continued on page 4

MycoDigest is a section of the *Myцена News* dedicated to the scientific review of recent mycological information.

Mycodigest

Continued from page 1

found in the Bay Area), does not associate with Eucalyptus. Most fungi mycorrhizal with Eucalyptus do not grow with other tree species at all. On the other hand, *P. arrhizus* can be found in the southern Hemisphere, growing with introduced pine species. To the surprise of Australian researchers, Eucalyptus planted in China picked up a local species which formed partial ectomycorrhizae with the tree roots, but was detrimental to the growth of the trees. The whole point of planting the Eucalyptus there was to get a good crop of wood fast, so the newly planted trees would in future be inoculated with a different *Pisolithus* species to accomplish that. Earthstars and puffballs in the genera *Geastrum*, *Lycoperdon* and *Bovista* are saprotrophes, decomposing dead plant material, but *Pisolithus* is an ectomycorrhizal associate. Here in central coastal California it grows with coastal live oak, planted birch, cedars, Monterey



Fig. 1. *Pisolithus arrhizus* breaking through asphalt in Berkeley. Photo by John Lennie.

pine and other pine species. Just last autumn it popped up beside the European beech in our neighbor's yard, a truly surprising host (fig. 2). As already hinted at above, *Pisolithus* is widely used in initial inoculation of tree seedlings especially for forestry purposes. Here also different species are probably used, but the name given to the fungus is in most cases *P. tinctorius*. Paul Stamets' Fungi Perfecti sells a mycorrhizal mix containing *Pisolithus tinctorius* (with four species of *Rhizopogon*). *Pisolithus* is ideal as it is so well adapted to drought. Mine tailings, dry sandy areas, restoration projects - *Pisolithus* will grow and help establish the young tree seedlings. Judging from the abundance of the species with full-grown trees here in California, it is also a good competitor that is not rapidly displaced by other fungal mutualists when the tree grows up.

Pisolithus arrhizus is a very common sight here, both in the city, and in more natural habitats under oak. Many people who come to the fungus fair comment that it grows in their yard. It was the first species we saw when we stopped at a campground in the Yuba river area in the Sierra Nevada foothills last fall. In the northern Sierras and Lassen area it is common, especially in disturbed areas (like that campground),

in foothill woodland and open oak woods. But it is not easy to get a good picture of its occurrence in the rest of North America. As the species fruits in those times of year that are too dry for others, they can easily be missed by 'normal' mushroom forays. So there is only one record in the NAMA voucher data base, from the 2000 foray in Newton, Texas. The species is common in the northeast of the U.S.A., especially in the dry sandy and pine-forested areas along the coast, such as the New Jersey Pine Barrens, and Cape Cod (Gene Yetter, personal communication). It is also found in Florida (again Gene Yetter), and Alabama and South Carolina. It is said to be common in the Pacific Northwest, but for the rest ??? This species (group/complex) would be a great candidate for a national recording project! We should also look under Eucalypts for other species than *P. arrhizus*. *Pisolithus albus* for instance has been found in Spain and Morocco, and *P. microcarpus* in Portugal. From its appearance it is not easy to guess the closest relative of our dog turd fungus, but the presence of pulvinic acids and their derivatives point in the direction of the boletes. These are the pigments that stain the wool. Molecular comparisons have confirmed that bolete connection (Binder & Bresinsky 2002). In their study *Astraeus hygrometricus*, another drought adapted 'bolete', is a sister group to *Pisolithus*. A bit further removed in the family tree are *Scleroderma* and real boletes like *Gyroporus* and *Boletinellus merulioides*. Enjoy the presence of this species - autumn is on its way, and your tree has a useful partner on its roots!

Further reading:

Binder, M. & A. Bresinsky, 2002. Derivation of a polymorphic lineage of Gasteromycetes from boletoid ancestors. *Mycologia* 94: 85-96.

Martin, F., J. D'ez, B. Dell & C. Delaruelle, 2002. Phylogeography of the ectomycorrhizal *Pisolithus* species as inferred from nuclear ribosomal DNA ITS sequences. *New Phytologist* 153: 345-357.



Fig. 2. *Pisolithus arrhizus* under European beech. Photo by John Lennie.