

***Phytophthora* species from oak and tanoak forests in California and Oregon**

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The current sudden oak death epidemics in Europe and western North America triggered a search of western oak forests for *Phytophthora* species, and the results have been surprising. *Phytophthora ramorum* has been the main quarry, and as an aerial pathogen, it is a surprise in itself. It isn't alone, however. *Phytophthora nemorosa* was recently described from stem cankers on coast live oak and tanoak and leaves of various hosts. It resembles and is closely related to *P. ilicis* (which is present on holly within the SOD range) with homothallic, amphigynous antheridia and deciduous, semi-papillate sporangia. Symptoms and host range are similar to *P. ramorum*, although *P. nemorosa* does not appear to cause wide-spread mortality of oak trees. It appears to be a native forest pathogen. A third *Phytophthora* species is also present as a foliar and bark pathogen in western oak forests. *Phytophthora pseudosyringae* was first described from European oak forest soils, but it is present and causing disease in western tanoak and coast live oak forests. It was first reported and is most abundant in California, but is present in Oregon as well. Other *Phytophthora* species have been isolated less frequently from leaves and stems of various SOD hosts, including *P. gonapodyides*, *P. syringae*, *P. europaea*, and something akin to *P. capsici*.

P. ramorum and *P. lateralis*, the invasive pathogen of Port-Orford-cedar, are closely related, and their ranges overlap in Oregon. *P. lateralis* also has the potential for aerial dispersal. The most notorious forest *Phytophthora* species, *P. cinnamomi*, causes significant losses in oak woodlands, especially in southern California, along with *P. citricola*. *P. cambivora* is killing chinquapin in Oregon forests.

Forest streams also yield a variety of *Phytophthora* species. In SOD country, the above mentioned foliar pathogens are also recovered from streams, where they are presumably deposited by rain and litter fall. *P. gonapodyides* and the related, but unnamed species “*Pgchlamydo*” are nearly ubiquitous in western forest streams. *P. cambivora*, is occasionally recovered by baiting, and there are a number of as yet uncharacterized isolates, including one group related to *P. tropicalis* and *P. capsici*, but apparently different than the foliar species mentioned above. Some of these certainly represent new species.

The diverse array of *Phytophthora* species present in western forests raises a number of challenging questions. Most practically, it highlights the need for careful and complete diagnostics when working with symptomatic plant tissues. Is it only chance that we find closely related species in the *ilicis*, *lateralis*, and *cambivora* clades occupying such similar niches? Can we distinguish indigenous from exotic species? What are these pathogens doing ecologically? What should be the regulatory consequences of these apparently indigenous species? Why is there a different suite of *Phytophthora* species killing oaks in cities than in the woodlands and forests? Is the diversity of species somehow a consequence of the mixed evergreen forest type, or the Mediterranean climate?