

## Proposed Disease Cycle for *Phytophthora ramorum* in Forests (Parke and Lucas, 2008)

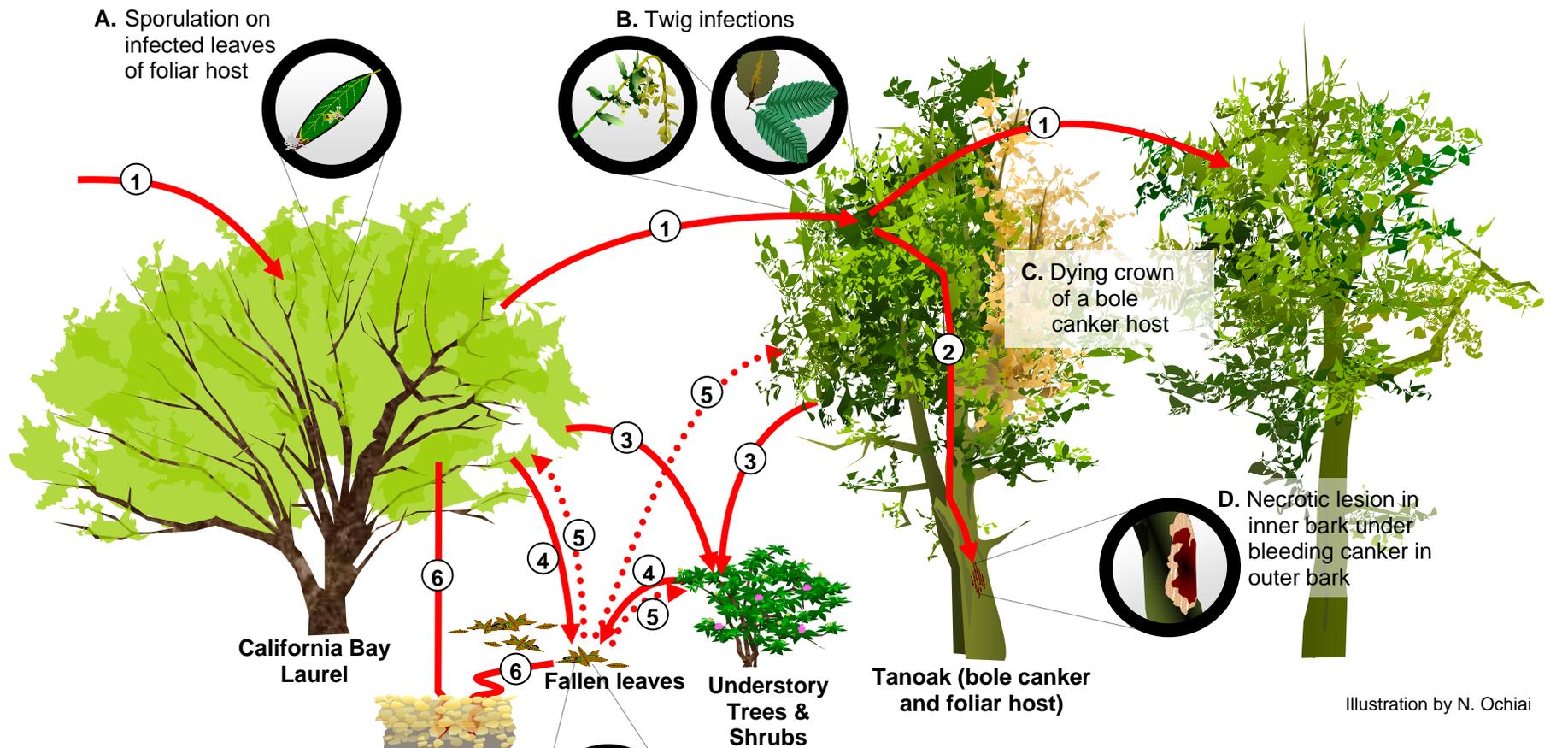


Illustration by N. Ochiai

- Primary inoculum (sporangia) produced on infected leaves is carried to new hosts via rain splash and air currents.
- Secondary inoculum (sporangia or zoospores) is carried down stems by rainwater to infect lower portions of the tree. The pathogen infects the inner bark and sapwood, resulting in a bleeding canker. It is uncertain how the pathogen infects the bole, although zoospores applied to unwounded bark are capable of causing cankers.
- Secondary inoculum produced in the canopy is also splashed or blown onto understory tree and shrub hosts causing local intensification of disease.
- Infected leaves fall to the ground where they also serve as a source of inoculum.
- Sporangia produced on fallen leaves are carried to lower stems and leaves of trees and shrubs by rain splash and possibly air currents.
- Pathogen propagules likely enter the soil through decomposing litter or are carried into soil by rainwater. The soil phase of the disease cycle is poorly understood, but it is clear that the pathogen can persist in soil for several months. Chlamydospores are presumed to have a role in long-term survival although the triggers for germination are not known. There is little evidence of root infection in the forest.