

Blodgett Itinerary

We will meet at 7:50 AM on Saturday at the West Circle and will leave by 8:00. We will drive together to Blodgett forest (see directions below), and will probably arrive in the Georgetown area around 10:30. From there we will make several stops on the way to and within Blodgett Forest and we will probably We will try to head back no later than about 1:00 on Sunday which will get us back to Berkeley between 3:00 and 4:00.

What to bring

Bring a **sleeping bag** (or sheets and a blanket) **lunch**, snacks, water, warm clothes or layers, raincoat, personal items, and of course your notebook.

Directions to Blodgett

- 1) **Head East on I-80** and continue on it until Auburn. Be careful at Sacramento **not** to take the business 80 cut-off (Stay to the right).
- 2) At Auburn **take 49 South** until the junction of 193 at Cool (don't blink or you will miss the town).
- 3) At Cool **turn left onto 193** (it only goes East) and proceed to the town of Georgetown. You will be coming into the town from the North. The main street is to your left; its the second main turnoff once you reach town (it will be obvious). If we get separated on the way up we'll meet in the middle of Georgetown in front of the Georgetown hotel, which is on the right side of the main street almost immediately after you enter the town. Together we will proceed East along the Georgetown Wentworth Springs Rd. Blodgett is 12.1 miles down it on the left. There is a small sign, but it is not well marked. If you come to a large lake (stumpy meadows) and cross over a dam you have gone too far.

Blodgett paper assignment due Tuesday May 5

Select any 3 sites that we visited at Blodgett. For each give the location, describe the composition of the forest (i.e., the dominant trees), and discuss all of the following that are relevant to the site: insects and diseases that have had or are having an impact on the site, recent management and fire history, and fuel types (1, 10, and 100 hr fuels, litter, duff) and loads. Then project ahead 50 years and discuss what would happen to the forest composition and insect and disease problems at each of these sites under the following conditions:

- 1) Fire suppression, and no additional management.
- 2) A wildfire in late summer of 2007

In the case of the wildfire scenario, describe the type or types of fire severity you would expect and explain your reasoning.

Notes on Blodgett area from previous trips

Blodgett forest is a good example of the **Sierra Mixed Conifer type: Douglas fir** (*Pseudotsuga menziesii*), **Ponderosa Pine** (*Pinus ponderosa*), **Sugar pine** (*Pinus lambertiana*), **Incense cedar** (*Calocedrus decurrens*) **California black oak** (*Quercus kelloggii*), **White fir** (*Abies concolor*). Relative shade tolerances of these should be well known to you by now. The forest is about 65-90 years old because of earlier **Railroad logging**, which was common in the area. Initially this resulted in selective removal of the most valuable trees - pine and Doug-fir - favoring shade tolerant species such as true fir and incense cedar. .

Mistletoes: We saw and discussed dwarf mistletoe (*Arceuthobium* spp.) at Walton lake on both Ponderosa and Sugar pines, and we reviewed its lifecycle and behavior. We also saw lots of leafy mistletoe (*Phorodendron*) on black oak, and later we saw it on white fir. The species on black oak appears to be a generalist that attacks many broadleaved trees, while the species on white fir is restricted to white fir. A closely related species can be found on incense cedar and is probably one of the most important diseases on this relatively disease-free host.

Root diseases were covered in both lecture and the field trip. You should know names, host ranges of varieties/biological, infection cycles, effects on species composition, and interactions with insects for species of:

Heterobasidion annosum Biology of the S strain (*H. parviporum*) in fir was discussed - review your lecture notes about both P and S. On the field trip you were shown the laminar rot pattern common in true fir, and the conks produced within the stumps.

Black-stain root disease in Ponderosa pine (causal agent, *Leptographium wageneri*) was examined. **Species-specific varieties** of the disease, **effects of monoculture**, and interactions with later beetle attacks were mentioned. **Beetle vectors of disease** are important especially in Douglas-fir. The main vectors are in the genus *Hylastes*.

Differences in infection anatomy between black-stain and blue-stains were mentioned, and the frequency of beetle-vectoring.

Bluestains were shown on beetle-killed trees near Georgetown. These are ascomycetous fungi that are almost sticky beetle vectored. They colonize the parenchyma cells (especially rays) in the wood and so move mostly laterally (across a log). In contrast, Blackstain moves vertically via tracheids. Each beetle has common bluestain associates; many are vectored by accident, that is their spores stick to the outside of adult beetles, but some beetles also introduce fungi intentionally via specialized organs called mycetangia. Insects that behave this way include the bark beetles, the ambrosia beetles, and wood wasps.

Wood decay

Differences between heartwood and sapwood and white rots and brown rots were reviewed.

The importance of brown rots for soil structure was discussed: Common brown rots : *Fomitopsis pinicola* (red belt fungus) and *Phaeolus schweinitzii*.

White rots seen included: *Phellinus pini*. This species is the most common cause of **heart rot** in living trees of Douglas fir and pine, and it is made up of many species-specific "biological species" Many other conifers can also be hosts. Entry is usually ascribed to wounds - it causes a white pocket rot. *Heterobasidion annosum*, *Cryptoporus volvatus* (the golfball fungus), *Trametes versicolor* (turkey tail), and *Stereum sp.* are other white rots that you saw. It should have been mentioned that most wood decaying fungi are white-rots. You also saw *Tremella mesenterica*, a mycoparasite on *Stereum*

common Saprobiic wood decay fungi (all basidiomycetes)

Trametes (Polyporus, Coriolus) versicolor - turkey tail

Stereum hirsutum

Trichaptum (Polyporus, Hirshioporus) abietinum - purple conk

Cryptoporus volvatus - golf ball fungus

Ectomycorrhizae were shown on young sugar pine seedlings and their absence on Incense cedar (which is a VAM host); The difference costs & benefits of ectomycorrhizae (which are expensive) versus VA (vesicular / arbuscular, or endomycorrhizae, which are cheap) and host ranges of each were discussed. Carbohydrate transfers via shared mycorrhizal fungi: e.g. pine drops (*Pterospora andromedia*). were mentioned. The fungi associated with *Pterospora* is *Rhizopogon salebrosus* and *R. arctostaphylis* . They are false-truffle which provides food for squirrels and deer. Ectomycorrhizal fungi seen were: *Balsamia sp.* Another truffle-like fungus. The link to the vertebrate food web was mentioned.

Needle cast fungi, which are ascomycetes, were briefly discussed. The example of true fir needle cast: *Lirula abietis-concolor* is usually seen. The interesting pattern of Needle casts is that they infect one year, but cause disease the next. In order for significant disease to occur the humidity must be very high at the right time of year and the host must be genetically susceptible. This humidity effect can be seen on individual trees, where the lower branches are usually more infected. Similar patterns exist with other foliar pathogens such as rusts. We also saw *Elytraderma deformans* on Lodgepole pine; this one would have been better to see on Ponderosa pine, where it forms brooms and a perennial infection. We also saw medusa needle cast, caused by *Davisonmycella medusa*, on Ponderosa pine at the first stop near Georgetown.

Sooty molds (Ascomycetes, family Capnodiaceae) on incense cedar were seen - these looked like a burned surface, but were caused by saprobic fungi growing on "honeydew" exudates from scale insects. These insects are common on thin-barked understory trees and provide food for Douglas squirrels and chickadees.

Rust fungi - the complex life cycle of these basidiomycetes was not given in any depth but the importance of proximity of the telial host and influence of environment were mentioned at least twice.

white pine blister rust (*Cronartium ribicola*) on sugar pine and its **telial host: gooseberry or current (*Ribes spp.*)** was seen. The fact that it is an introduction and its effect on the distribution and abundance of white pines and the likely indirect effects on the forest were mentioned. You saw it on two young trees, which is the common pattern of occurrence due to microclimate effects. In the overstory you saw a flagged branch, which could have been caused by blister rust, but may have been due to a canker fungus (*Atropellis pinicola*) instead. The latter is a much more common cause of dead branches high in Sugar pine trees at Blodgett.

Western gall rust, *Peridermium harknessii*, was shown to briefly, and its life-cycle and host range were reviewed.

The **incense cedar broom rust (*Gymnosporangium libocedri*)** was seen. Its alternate host is *Amelanchier* (Juneberry).

Fire points (that I remember are):

1) **fire suppression** has had several direct effects on these forests: increased stocking levels, increased component of fir and cedar, increased fuel loads, increased ladder fuels, increased soil **seed banks** of shrubs. The density of the forest at the "control plots" was seen.

2) Fire and fire surrogate plots were visited and discussed. The objective and problems with achieving them were discussed.

Important Insects covered in depth:

Mountain pine beetle *Dendroctonus ponderosae* - common throughout most of the west, **virtually all pines are hosts**. A mid-bole primary tree killer. Long vertical galleries.

Western pine beetle *Dendroctonus brevicomis* - spaghetti galleries in the mid-bole of the tree, larvae move out into the bark, adults vector a wood rotting basidiomycete (*Peniophora*) main **host is *Pinus ponderosus***. A mid-bole primary tree killer.

Red turpentine beetle *Dendroctonus valens* - pines are the host at base of bole; especially common on fire scorched trees, or trees weakened by other factors. One of the beetles that is attracted to Black-stain trees.

Ips - tops of pine trees, tuning fork galleries.

Fir engraver *Scolytus ventralis* limited to species of *Abies*. where it fulfills a similar role as the western and mountain pine beetles do in pine.

Hylastes sp. and their interaction with Blackstain root disease was discussed.

other insects

Sugar pine cone beetle *Conophthorus lambertiana*.