Participating in the docent training, surveys, and other events at Jasper Ridge has had a profound impact on my life, helping to expand my interests way beyond birds. It has reawakened my curiosity about the greater natural world and made me want to learn about different aspects – plants, lichens, dragonflies, bees, and butterflies – all sorts of wonderful stuff. This will be with me always and I am very grateful. I also very much appreciate the opportunity to work with and make friends with such a wonderful group of knowledgeable and motivated people. The Jasper Ridge community is very special and I won't soon forget it.

PLANTS THAT LIKE HOSTS
BY TONI CORELLI

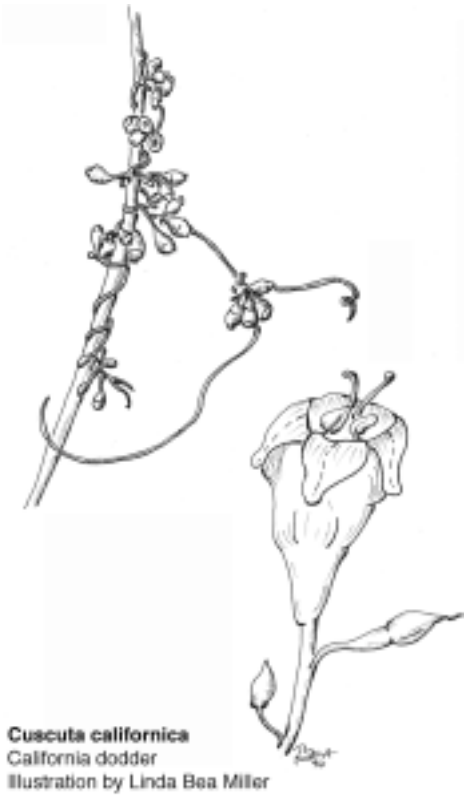
Often while researching a topic I find that more questions come up and my curiosity was peaked about some of our other vascular plants that have parasitic relationships. These plants are within four families and seven genera at JRBP (see the table).

Parasitism for vascular plants is a relationship in which one organism uses the nutrients and water and sometimes photosynthates (carbohydrates) of another plant, the **host plant**. Nutrients and water are transported by thread-like **haustoria** produced by the root system of the parasitic plant that permeate and become embedded in the host tissue. To be a true vascular plant parasite the plant must produce haustoria.

The vascular plants that produce haustoria are in two groups:

1. Holoparasite/Obligate Group – these are nonphotosynthetic so are obligated to and must have a host to survive. They obtain water and nutrients from the host xylem and photosynthates from the host phloem. Within this group are the fleshy-stemmed holoparasites (holo = complete) in the Orobanchaceae family and the nonphotosynthetic annual vines in the Cuscutaceae family. The Orobanche's are root parasites, and they have their parasitic connection with the roots of the host plant. The Cuscuta's are stem parasites, and they have their parasitic connection with the stems of the host plant.

2. Hemiparasite/Facultative Group – these are partial (hemi = half) parasites capable of both photosynthesis and parasitism and do not require a host (facultative = optional). However, in nature, when without a host they are usually smaller and not as vigorous. They are mostly obtaining water and nutrients from the host xylem. Our members of hemiparisites are in the Scrophulariaceae family. When the new edition of *The Jepson Manual* comes out in 2008, the genera listed in the table within the Scrophulariaceae family will be included in the Orobanchaceae family, based on molecular studies and their parasitic relationships. These members of the Scrophulariaceae are root parasites.



Cuscuta californica
California dodder
Illustration by Linda Bea Miller

Nonphotosynthetic Mycotrophic Group

The coralroot orchids are not considered "true" vascular plant parasites because they do not have haustoria. They are called a nonphotosynthetic mycotrophic (myco = fungus, trophic = turning) plant. They have a symbiotic relationship with the mycorrhiza of living soil fungi and absorb carbohydrates and minerals from this fungal partner, which in turn absorbs these nutrients from the roots of nearby plants.

There are various reasons why plants from several different evolutionary lines have evolved these relationships with host plants. Research has shown that parasitism in the group of holo- and hemi parasites evolved only once, but the loss of chlorophyll has occurred multiple times within the descendants of that first parasitic species. Some of the advantages of the parasitic relationship are a steady supply of water and nutrients to put more energy into seed production. Although this may be a drain on the host, in most cases it does not lead to the death of the host.

Plant name	Type of Parasite	Host Plant(s)	Habitat; Trail; Flowering Time
DICOTS			
CUSCUTACEAE – dodder family			
Cuscuta californica California dodder	holoparasite/obligate	poison oak, toyon	evergreen forest; Road D; May-August
Cuscuta subinclusa canyon dodder	holoparasite/obligate	coyote brush	evergreen forest; Trail 2; June-November
OROBANCHACEAE – broom-rape family			
Orobanche bulbosa* chaparral broom-rape	holoparasite/obligate	chamise	chaparral; Trail E; May-October
Orobanche californica ssp***. jepsonii***[+] Jepson's broom-rape	holoparasite/obligate	members of the Asteraceae	+
Orobanche fasciculata clustered broom-rape	holoparasite/obligate	buckwheat	grasslands; Trail 12; April-August
Orobanche uniflora* naked broom-rape	holoparasite/obligate	members of Asteraceae, Crassulacaceae, Saxifragaceae ++	open woodland, evergreen forest; Trail F; March-April
Orobanche vallicola hillside broom-rape	holoparasite/obligate	elderberry	evergreen forest; Trail 2; July-September
SCROPHULARIACEAE – figwort family			
Castilleja affinis Indian paintbrush	hemiparasite/facultative	bunch grasses, chamise, sagebrush, buckwheat ++	open woodland; many trails; March-August
Castilleja densiflora owl's clover	hemiparasite/facultative	members of Poaceae*	grasslands; many trails; March-May
Cordylanthus spp. bird's-beak	hemiparasite/facultative	oaks ++	edge of chaparral; Trail b; July-October
Pedicularis densiflora Indian warrior	hemiparasite/facultative	oaks, chamise	oak woodlands, chaparral (rarely); many trails; January-July
Triphysaria eriantha butter-and-eggs	hemiparasite/facultative	members of Poaceae**	grasslands; Trail F; March-April
Triphysaria pusilla dwarf orthocarpus	hemiparasite/facultative	members of Poaceae**	grasslands; Trail F; March-May
MONOCOTS			
ORCHIDACEAE – orchid family			
Corallorhiza spp. coralroot	+++	soil fungus	evergreen forest; Trail 3, 14; April-June

[+]Information now indicates that we had been misidentifying *O. californica* ssp. *jepsonii*; it is most likely *O. vallicola*.
[++]Need more information what host plant is at JR, information is from the literature.
[+++]Not true parasites, but are called "nonphotosynthetic mycotrophic" plants.
*Not seen since the 70's.
**These species are generalists and their host plants can be from other families as well, information on hosts from the literature.
spp. = includes all species at JR

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