The Orchid Recovery Program
At Illinois College:
Who We Are and
What We Do

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Founded in 1829 (oldest college in Illinois)
Site of first medical school in Illinois

ILLINOIS COLLEGE TODAY

Private, 4-year, co-educational, liberal arts institution
1,000 Undergraduate students (70% live on campus)
Illinois College’s Statement of Community Responsibility Emphasizes that…

“…we are all caretakers of our community and recognize that our individual responsibilities are essential for nurturing collaborative relationships, critical exploration, and global awareness”

The ORCHID RECOVERY PROGRAM at ILLINOIS COLLEGE

OUR MISSION

Integrate undergraduate student learning with the conservation of North America’s rarest native orchids. Instill in our students an appreciation for the planet’s natural resources, and provide the basic tools for lifelong learning, stewardship, and service.

Photos: Larry Richardson
Logo Design: JJ Sadler
Incentives for Students to Carry Out Orchid Research

- Do something meaningful (personal achievement)
- Earn college credit hours
- Earn a side income
- Learn science by doing science
- Improve *curriculum vita*
- Publish/present papers
- Travel/work with experts

Chichinautzin region, Mexico (2006)
If all else fails….

CAPTURE THEM!
Since 1996, the Orchid Recovery Program has focused mostly on growing endangered species from seed, but other aspects of conservation are also studied.

**ORCHID SEEDS**

Dust-like

Lack sufficient food for embryo
**ORCHID SEEDS**

a,b,c) *Paphiopedilum*; d,e) *Cattleya*; f) *Odontoglossum*.

**FUNGAL INFECTION OF ORCHID SEED**

Left: Ungerninated seed of *Goodyera repens* with embryo and testa.
Middle: Penetration of embryo's basal cells by fungal hyphae.
Right: Fungal proliferation within embryo.

PELOTON

MYCOTROPHY
= “FUNGUS FEEDING”

Digested Peloton
**ORCHID SEEDLING STAGES**

**Epidendrum magnoliae**

**MIXOTROPHY**

= orchids “feed” via sunlight + fungi
WHEN LOOKING AT AN ORCHID, REMEMBER THAT IT IS ACTUALLY MIXOTROPHIC!

Each natural habitat should be viewed as a refuge for orchid prey (= fungi) and managed accordingly.

-- Dr. Scott L. Stewart
IOCC3, Costa Rica
Terrestrial orchids harbor “captive” fungi in lateral (branch) roots and consume them as needed.
PROTOCORM RECOVERY TECHNIQUE

Seed Baits

35 mm slide mounts

Packets are buried adjacent to existing plants that presumably harbor fungi

existing orchid seedling

seeds within nylon plankton mesh

wire connecting slide mounts

Photo: D. Maurer
For terrestrial orchids, seed packets are buried.

For epiphytic orchids, seed packets are affixed to tree trunks using staple gun and gutter mesh.
Example: *Epulorhiza*

Terrestrial and epiphytic orchids alike appear to utilize members of this anamorphic genus throughout North America.
Case in point - *Spiranthes brevilabris* from Florida
North American Orchidaceae

Platanthera leucophaea

- Approximately 205-223 spp. N of Mexico, >60 exclusive to S Florida
- Excluding Florida, ca. 145 spp. in 35 genera. All except one are terrestrial
- Few have been cultivated from seed, raising conservation concerns
SEED PROPAGATION AND REINTRODUCTION OF THE U.S. FEDERALLY ENDANGERED HAWAIIAN ENDEMIC, *Platanthera holochila* (Orchidaceae)

European Journal Environmental Science (in press)

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*Platanthera holochila* (Hbd.) Krzl.

Terrestrial, with small greenish flowers - probably not a good candidate for the horticulture trade.

Once found on 4 islands, primarily in cloud forests.

Today (2011), 33 known plants remain.

Existing plants threatened by wild pigs and exotic species encroachment.

US Federal Endangered Global Rank G1

“Puahala a kane”
In 2002, a collaborative effort between the National Tropical Botanical Garden (NTBG) and Illinois College on the mainland was initiated to propagate *P. holochila* from seed.
### ASYMBIOTIC GERMINATION ON P723 - 351 days after sowing.

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<tr>
<th>Seed Source</th>
<th>Island/Date</th>
<th>#</th>
<th># Seeds</th>
<th># Viable (%)</th>
<th># Stage 0</th>
<th># Stage 1</th>
<th># Stage 2</th>
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<td>149</td>
<td>62</td>
<td>110</td>
<td>313</td>
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*ASYMBIOTIC GERMINATION ON P723 - 351 days after sowing.*
Arrived on Kauai, 6 March 2011
Platanthera holochila

Hawaii’s rarest native orchid and the battle to save it

Lawrence W. Zettler
Steven P. Perlman

Orchids (anticipated February 2012)
Florida Orchidaceae

Nearly half of species in USA and Canada reside in Florida.

More than half of these 106 species are confined to four counties in S Florida, many as epiphytes

Few have received scientific study (pollination biology, propagation)
Case Study #1

Seed propagation and reintroduction of *Epidendrum nocturnum*

**Florida Panther NWR**


In 2005, Illinois College students cultivated *Epidendrum nocturnum* from seed in lab using fungi.
SEEDLINGS AFFIXED TO TREES WITH GUTTER MESH

Photo: Larry Richardson

Photo: Will Kutosky
CASE STUDY #2
Ghost Orchid Floral Fragrance Analysis (2009)


Photo: JJ Sadler

EXTRACTION OF GHOST ORCHID FLORAL FRAGRANCE *IN SITU*: SET-UP

Jaclyn Smith
James “JJ” Sadler

Site located in Collier Co., FL
13 Ghost Orchids in flower at time
Population size = ca. 50 individuals
Sampling carried out over 2 nights (22-23 June 2009)
Flowers sampled on 3 plants

Photo: Larry Richardson
WHY (E,E)-α-FARNESCENE?

CLUES:

Odorless to humans.

Oddly, it is often associated with insects and/or insect-damaged plants.

Aphids (Hemiptera: Apidae) known to release trans-β-farnescene as an alarm pheromone when disturbed.
Why Farnesene?

In July 2009, insects were observed affixed to flowers of a Ghost Orchid specimen in urban Naples, Florida.

Upon closer inspection, ants were tending soft scales (*Pulvinaria* sp.), and a second plant was infested with mealybugs (*Ferrisia* sp.).

Are scales more widespread in South Florida?
Are scales more widespread in South Florida?

Are scales now in natural areas?

YES, apparently so…

Of 49 orchids sampled in 2010 in FPNWR 26 were infested with three scale types

Boisduval Scale was found on four orchid taxa:

Epidendrum amphistomum
Epidendrum nocturnum
Epidendrum rigidum
Prosthechea cochleata*

(* heaviest infestations)

**South Florida Research, 2011**

Goal #1: Survey more orchids for scales  
Goal #2: Capture Ghost Orchid pollinator  
Students: Haleigh Ray, John McCormick

**Capture Ghost Orchid Pollinator(s)**

Outcome: No Pollinators Collected
Scale Survey, Fakahatchee Strand
## Orchid Scale Data, 2011 – Collier Co., Florida

<table>
<thead>
<tr>
<th>Site</th>
<th>Orchids</th>
<th>Scale</th>
<th>Hopper</th>
<th>Counted</th>
<th>Yellow Helmet</th>
<th>Cigar</th>
<th>Songbird</th>
<th>Ribbits</th>
<th>Total</th>
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<td>2</td>
<td>9</td>
<td>10</td>
<td>8</td>
<td>11</td>
<td>2</td>
<td>40</td>
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<td>Fakahatchee Strand Site 2</td>
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<td>139</td>
<td>4</td>
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</table>


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