

BOTANY

Picky Eaters Club

Fungi that orchids need to grow are just as finicky as the exotic flowers themselves

In *The Orchid Thief*, writer Susan Orlean describes the cultlike devotion that these exotic-looking flowers inspire among plant collectors. One reason, in addition to their beauty, that orchids are so prized is that they are fragile: although they grow in every U.S. state and on every continent except Antarctica, many are endangered, and the flowers are exceedingly sensitive to environmental changes. Native orchids' dustlike seeds will grow only if nourished by certain groups of root fungi, known as mycorrhizal fungi.

Little is known about these organisms—so little that many have not been named. They grow into the roots of orchids, which digest the fungi to obtain needed nutrients. Recently a four-year study has shed new light on where mycorrhizal fungi grow and under what conditions they stimulate orchids to germinate. The results, published online January 24 in *Molecular Ecology*, will help ecologists preserve rare orchid varieties.

The team of researchers, led by ecologist Melissa McCormick of the Smithsonian Environmental Research Center in Edgewater, Md., planted and tracked three U.S. orchid species—all present in the East and endangered somewhere in the country—in six study sites:

three in younger forests, which were 50 to 70 years old, and three in older forests, which were 120 to 150 years old. Investigators covered each plot with leaf litter, decomposing wood or nothing and provided half the plots with the specific fungi known to promote growth in each orchid.

The researchers also identified the existing fungi in each forest. Because the organisms have no fruiting structures, they can be tough to detect, so the team pioneered the use of testing for DNA in the soil to identify

where and how much fungus was present. Older forests, McCormick and her colleagues found, had about five to 12 times more orchid-friendly fungi than younger forests, and the fungi in older forests were more diverse.

Each orchid had different requirements to grow. For *Goodyera pubescens* (a stalk of its small white flowers is pictured), only older forests held enough fungus for it to flourish. Adding the fungus to younger forests alone or in combination with decomposing wood did not make *Goodyera* seeds germinate.

The host fungus of *Tipularia discolor*, which has many small mauve-purple flowers with yellowish centers, was widespread in young and old forests alike but could support germination only on decomposing wood. The host fungus for *Liparis liliifolia* wasn't common in the wild, but the orchid would germinate if the fungus was added.

Orchid conservation plans generally do not account for orchid fungi abundance or requirements, simply because the techniques and knowledge to identify the fungi haven't been in place. Says McCormick, "We're hoping others can apply these techniques to figure out what environmental conditions affect the fungi."

—Carrie Madren



PATENT WATCH

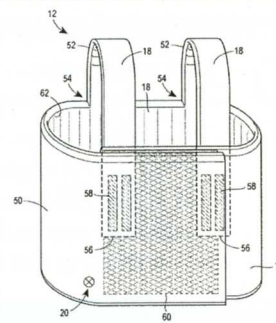
Proprioceptive feedback system: When Hilary Mass was eight years old, her family added a new member who would change her life forever. Her little brother was born with special needs, and as the oldest child Mass found herself in a new position. "I was always the helper," she says, "so I always knew this was what I was going to do."

For the past 30 years she has worked with special-needs kids. As Mass spent time with her charges, she noticed something that she thought could be better: many children with special needs have what specialists call sensory diets—activity plans that ensure their unique sensory needs are met. Some autistic children, for example, like to be hugged or have their shoulders pressed on—they find such touching calming, and it allows them better control over their anxiety and hyperactivity.

To achieve that sensation, many of them wear a weighted vest with sandbags to provide pressure on their shoulders and elsewhere. But Mass noticed that the children did not like wearing this bulky vest even if they liked the result. "My students don't choose to put it on," she says. "You have to talk them into it or force them to wear it."

Seven years ago Mass began developing her own system. What she came up with—patent No. 8,095,994, which she is calling Big Hug—is a suit that children could wear just like an article of clothing. Mass's design does not rely on sandbags or weights like the standard vests but instead inflates with air to create even and customizable pressure on the body.

She has tested it only on her own students and children she knows, but so far it has been a success. "The students really seem to like it," she says. "They ask for it." Mass is now trying to put Big Hug on the market. "My motivation was to help families to make things a little easier when they're trying to get through the day," she says. —Rose Eveleth



LARRY WEST/Minidrop Pictures (orchid); COURTESY OF U.S. PATENT AND TRADEMARK OFFICE (vest)