

Parental Care Seen in Mountain Plants

A big thistle and a monument plant share the mother-of-the-year award from plant ecologists.

Both species die after flowering only once, and the decaying bodies trap soil moisture that boosts survival of the seedlings, report Candace Galen and Anna Wied of the University of Missouri-Columbia. On high, dry mountain slopes, this advantage amounts to parental care, they suggest in the July *ECOLOGY*.

Plants provide obvious benefits to their seeds, but Galen knows of no other clear demonstration of maternal care for seedlings. She and Wied examined the thistle *Cirsium scopulorum* and the gentian called a monument plant, *Frasera speciosa*. "It's probably the most compelling case," Galen says.

Thistles live on "rocky and miserable" mountain slopes in western North America, dry boulder fields with barely an eye-blink of growing season each year, Galen says. Monument plants also live in dry habitats. Both species follow the so-called big bang approach to life. After decades of growing just a tad larger each season, the plants send up a tall, showy head of flowers and then topple over dead. The seeds have no means for dispersal and just stay in the debris.

Soil under that litter is significantly moister, suffering less evaporation, than in nearby exposed spots, the researchers found. Seeds planted by the scientists in both the debris-strewn spots and exposed areas germinated, but moisture then seemed to make a vital difference in survival. Sheltered monument seedlings survived about twice as well as exposed seedlings. Little thistles were about four times more likely to survive in plots scattered with debris than in the bare ground.

The study sheds new light on the big bang lifestyle, Galen notes. "At first, it

seems like a stupid thing to do—you could get killed before you reproduce if you wait too long."

However, theorists have pointed out that years with no flowers may minimize the attention of short-lived predators, and the fireworks finale of a huge flower head—something a plant growing in harsh conditions needs several years to work up to—may help attract scarce pollinators. Galen now points out that the big bang approach can also secure the advantages of sheltering offspring without competing with them. Mom isn't going to crowd out the seedlings, because she's already dead.

Postmortem parental care is not unprecedented, notes Elizabeth Lacey, a plant evolutionary ecologist with the

University of North Carolina at Greensboro. The male praying mantis can turn into his mate's first prenatal nutrition. Also, plants in fire-adapted ecosystems like longleaf pine and turkey oak communities have to go up in smoke before seedlings can benefit from the bloom of newly available nutrients. In these cases, "provisioning comes from the death of a parent," Lacey notes.

Plant ecologist John Willis of the University of Oregon in Eugene points out that "people usually think of provisioning in terms of seeds." Mother plants essentially pack a lunch for their offspring in the nutrient-rich endosperm tissue inside a seed. He sees the extra help from Galen's moisture boost as "a very strong effect." —S. Milius

Marijuana chemical tapped to fight strokes

The breakfast table may someday feature not only orange juice and vitamins but also a more exotic health booster—a compound extracted from marijuana.

Cannabis contains a chemical that can protect cells by acting as an antioxidant, a new study shows. More effective than vitamins C or E, it offers an appealing option for the treatment and perhaps prevention of stroke, neurodegenerative diseases, and heart attacks, the researchers suggest.

However, there's no worry that those who take it will become too stoned to read the morning paper. The compound, called cannabidiol, doesn't make people high.

Scientists have yet to test whether the chemical has a protective effect in people. In test-tube experiments, researchers at the National Institutes of Health (NIH) in Bethesda, Md., exposed rat nerve cells to a toxin that is typically released during strokes. Cannabidiol reduces the extent of damage, the scientists report in the July 7 *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES*.

In follow-up studies, the researchers induced strokes in rats and treated them with cannabidiol. Those experiments are not yet complete, but "we're getting some good results," says Aidan J. Hampson, a neuropharmacologist at NIH.

Researchers suspect that many antioxidants can reduce the severity of ischemic strokes, in which blood vessels in the brain become blocked. During ischemic strokes, which make up 80 percent of all strokes, a toxin initiates the release of reactive oxygen molecules called free radicals into the bloodstream. These harmful molecules are under suspicion as one of the agents that cause stroke damage, such as paralysis and loss of speech and vision. Antioxidants such as cannabidiol neutralize free radicals and so might limit the damage.

The NIH researchers had suspected that the group of molecules including tetrahydrocannabinol (THC), the marijuana ingredient that produces a high, would act as antioxidants. In their study, THC and cannabidiol provided equal defense against cell damage. An earlier study at the University of Arizona in Tucson turned up no side effects of cannabidiol in people given large doses.

A pharmaceutical company, Pharmos in Rehovot, Israel, is already conducting human clinical trials using a synthetic marijuana derivative, Dexanabinol, to treat damage from strokes and brain injury. Like cannabidiol, this compound is an antioxidant and does not produce euphoria.

"This is a promising area [of research] . . . particularly because we have so few effective means of treating stroke," said JoAnn E. Manson, a researcher in preventive medicine at Harvard Medical School. Stroke is the third leading killer in the United States (SN: 12/21&28/96, p. 388).

The NIH researchers don't anticipate using cannabidiol to treat hemorrhagic stroke, characterized by bleeding within the brain, Hampson says. Antioxidants, however, could help treat other diseases that appear to be caused in part by free radicals. These include heart disease and two neurodegenerative disorders, Alzheimer's disease and Parkinson's disease. —J. Brainard

Tomasz Wycka



Once-in-a-lifetime flower for a monument plant in Colorado.