

ROSES ARE RED, SOME VIOLETS ARE WARM?

by Bernhardt et al.

Remember how you were told that a dark coat keeps you a little warmer on a cold but sunny day? Some plants blooming in chilly environments have dark purple or almost black patches on their flowers to keep cold-blooded insects toasty warm as they pollinate. Three years of research at the Bernhardt/Meier Laboratory at the St. Louis University illustrate a new side to this colorful tale in a upcoming issue of the online, "Journal of Pollination Ecology." The birds foot violet (*Viola pedata*) has two, common, color forms when it blooms during the cool, Missouri, April. The concolor form makes flowers with 5 light violet-mauve petals. The flower of a bicolor plant has 3 mauve petals plus two top petals that are a deep, dark, funereal purple. Using thermocouples, and a hypodermic tissue probe, Dr Retha Edens-Meier learned that these dark petals are up to 3 degrees Celsius (5.4 degrees Fahrenheit) warmer than the surrounding atmosphere when they stand in a pool of sunlight. As bees usually prefer to forage upside down on these flowers the hind legs and abdomen of the insect are warmed by the petals as it drinks nectar and collects pollen.

What is so unusual about these findings is that, when given a choice over two years, native bees preferred to forage on the concolor form so concolor flowers made more seeds compared to bicolors. Comparing violet populations, at two isolated sites, the research team noted that when the plants grew in a sunny, open, limestone glade (at the Shaw Nature

Reserve) the concolors outnumbered the bicolors by 40 to one. It was very different in the shade of a forested slope (Cuivre River State Park) where bicolors and concolors occurred in almost equal numbers or bicolors outnumbered concolors by almost two to one in one season. As pools of light shifted over the course of the day under the trees, in the cooler forest, cold-blooded bees needed the less desirable bicolors to warm themselves briefly as a single bee often visited more than 30 flowers over a 20 minute period before stopping to rest.



Bicolour flower of Viola pedata, with thermocoupler probe inserted through the posterior petals (R. Edens-Meier, photographer).