THE THRILL OF DISCOVERY

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With all the press coverage during the past few years, most of you are aware that tropical rainforests contain a wealth of undescribed plant species. Would it surprise you to know that the same is true for Utah? In a recent article in Science News entitled "Unknown Plants Under Our Noses", Susan Milus identifies Dr. Stanley Welsh (Brigham Young University) as the most prolific describer of new plant species for North America. In the past three decades, Dr. Welsh has named 57 new species, nearly all of them from Utah! Combined with the work of other botanists (both professional and amateur), the rate of new discoveries in Utah averages three species per year…..and show no sign of declining.

The discovery of a species new to science is always a thrill, even to those who have experienced it before. It's like a paleontologist finding an intact dinosaur skeleton or an archaeologist encountering a pristine habitation site. Often it's a simple matter of being in the right place at the right time. Important botanical discoveries can be made by anyone with a keen eye and familiarity with local plants. Sometimes the novelty of the plant leaves no question as to its recognition of a new species. In other cases, the plant's status must be determined by more technical means.

As this article goes to press, UMNH staff are in the process of describing Utah's the newest plant species. The small, yellow flowered mustard known as Burke's draba (Fig. 1) is currently on display in the Museum's lobby exhibit.

It grows only in the Wasatch and Wellsville Mts. of Utah, ranging from Snowbasin on the south to near Honeyville on the north.

Figure 1

Plants of Burke's draba were first collected in 1932 and were identified as Draba maguirei, a species found east of Logan in the Bear River Range. In a study of the group published in 1941, C. Leo Hitchcock noticed that leaf hairs of plants from the Wellsville Mts. (now assigned to Burke's draba) differed from those found in typical D. maguirei. The difference was confirmed by our scanning electron microscope studies. The leaf hairs of Maguire's draba were always branched (Fig. 2) whereas those of Burke's draba were broad bases and unbranched (Fig. 3).

Aside from this consistent difference in leaf hairs, the two taxa look very similar. Do such seemingly minor differences warrant the recognition of a new species? Botanists have argued that question for decades, and the status of Burke's draba has remained

unresolved. Now, after 58 years we have the answer….thanks to the advent of new analytical techniques and a grant to the UMNH from the U.S forests service.

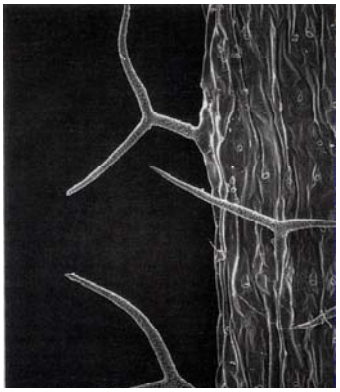

Figure 2

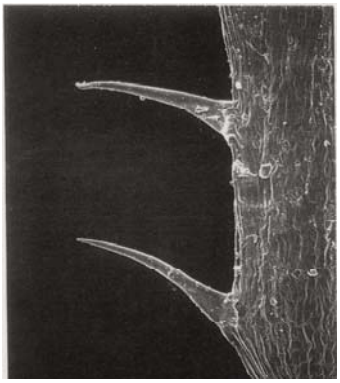

Figure 3

With more detailed study, it turns out that the differences in leaf hairs are just the tip of the proverbial iceberg. The geographic gap between Burke's draba and Maguire's draba, though narrow (essentially the width of the Cache Valley) is absolute; the two taxa do not grow together. They generally occupy different geological substrates as well, with Maguire's draba favoring dolomite and Burke's draba commonly found on quartzite, shale, or limestone.

Chromosome studies of these plants showed unexpected levels of divergence. They revealed that the type of leaf hair on a plant is perfectly correlated with differences in chromosome base number. If the two taxa formed hybrids, these differences in base number would almost certainly render the hybrid sterile. Hybrid sterility is an important criterion for recognizing new species in both plants and animals.

The final piece of evidence regarding the status of Burke's draba was provided by DNA studies. A section of DNA known as the ITS (internal region spacer) region was cloned and analyzed to determine the exact sequence of nucleotides (e.g., -G-A-T-T-A-C-A-). This allowed us to estimate the level of genetic divergence between Burke's draba and Maguire's draba, and reconstruct their relationships to other Draba species.

The degree of divergence between Burke's draba (top of figure) and Maguire's draba was greater than nearly any other pair of yellow flowered Draba species. If these taxa are classified as a single species, then everything between then on the tree would have to be included. Nearly every yellow flowered Draba would be subsumed in this "superspecies", including some that have been recognized as distinct by every botanist for the last century!

The alternative we have chosen is to recognize Burke's draba for what it is….a separate species with its own range, preferred habitat, distinctive genetics, and unique evolutionary history. With upcoming publication of the name and our research findings, Burke's draba becomes a recognized part of Utah's unique biological legacy. Now, the fate of this rare species lies in the hands of the Forest Service and the people of Utah.