A high-magnification, black and white photograph of a flower head, likely from the Boraginaceae family. The image shows the intricate details of the floral parts, including the central disk and surrounding involucres. The text is overlaid on this image.

The Identity of *Lappula fremontii*  
(Torr.) Greene in the Great  
Plains (Boraginaceae)

Susan J. Rolfsmeier, Steven B.  
Rolfsmeier, and Ronald R. Weedon.  
High Plains Herbarium, Chadron State  
College, Chadron NE.

# Family Boraginaceae

- 5-lobed corolla
- 4 nutlets or 2 corky mericarps borne on a flat or pyramidal gynophore
- Nutlets often differentiated into a disk and a margin
- Fruiting specimens important for positive identification but most are collected in flower



## *Lappula* Moench

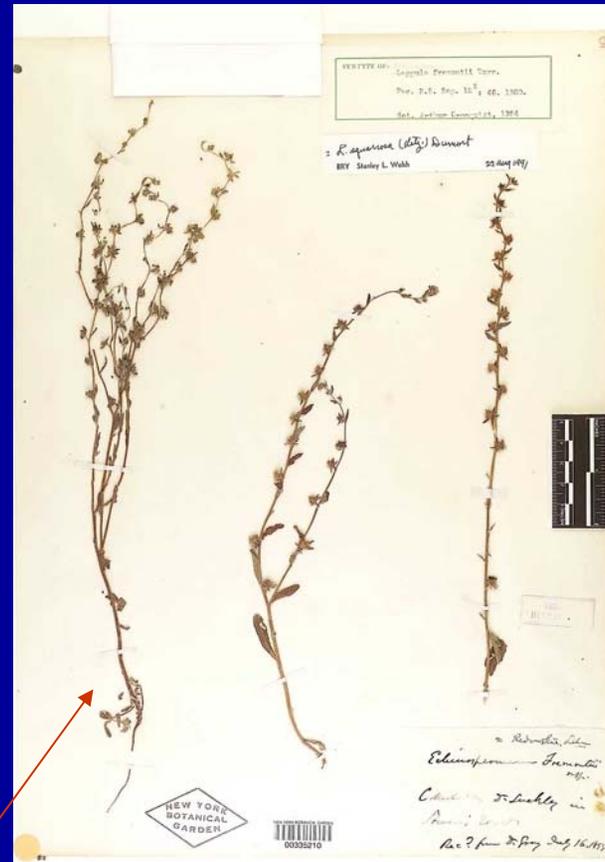
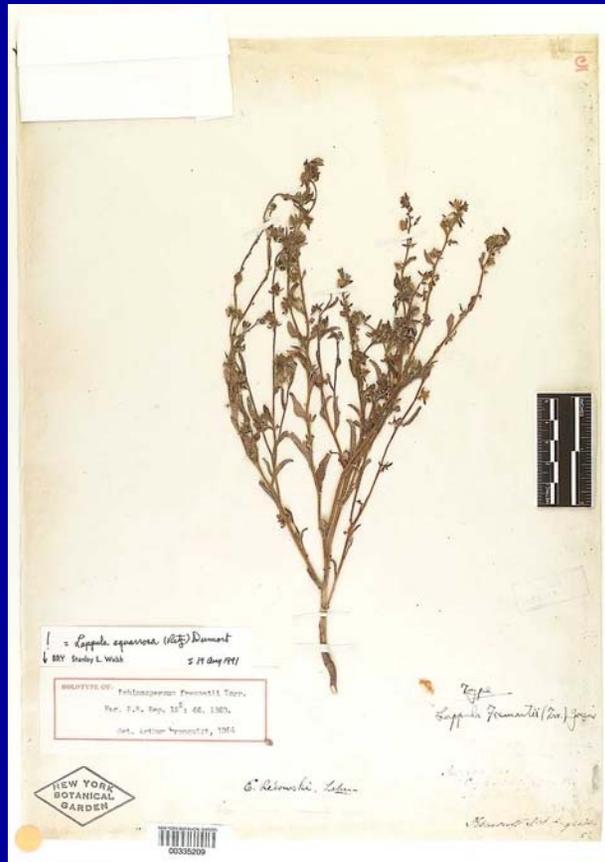
- Blue, rarely white corolla
- Nutlets broadly triangular to ovoid, ornamentation variable
- Around 50 species world-wide
- Center of diversity in Central Asia and Siberia (Edmondson, 1978)
- New World 2-4 spp., at least one introduced



# *What name to use for Great Plains Material?*

- *Lappula cenchrusoides* Nels. used in the Great Plains Flora, PLANTS Database, and ITIS
- *Lappula fremontii* (Torr.) Greene listed as synonym of *Lappula squarrosa* (Retz.) Dum.
- *Echinosperrum fremontii* Torr. is the older name and has priority over *L. cenchrusoides*
- Nelson's *Lappula cenchrusoides* may be a different taxon

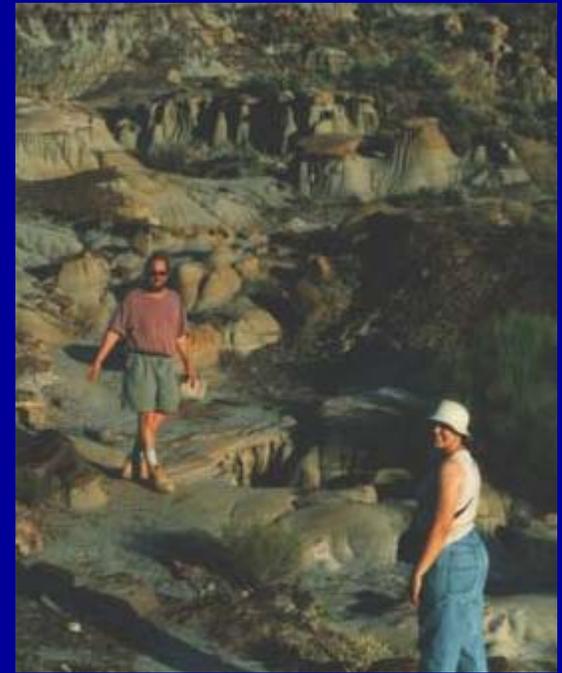
Specimens collected in the Plains seem to be equivalent to the type specimens of *Echinosperrnum fremontii* Torr. from NYBG!



*Lappula redowskii*  
(Hornem.) Greene

# 2003 Field Season

- Collected samples of *L. fremontii* in the Panhandle of NE, eastern WY, MT, and western SD & ND
- Collected samples of *L. squarrosa* in northeastern MT and ND
- Recorded detailed locality and habitat notes



# 2004 Field Season



- Checked White River formation badlands in CO, and Green River basin region of UT and CO for populations of *Lappula fremontii*

- Re-visited sites in the Northern Great Plains
- Recorded habitat data and collected soil samples
- Collected *Lappula spp.* in the Uinta Mts. of Utah, and throughout the basins of Wyoming



# Results

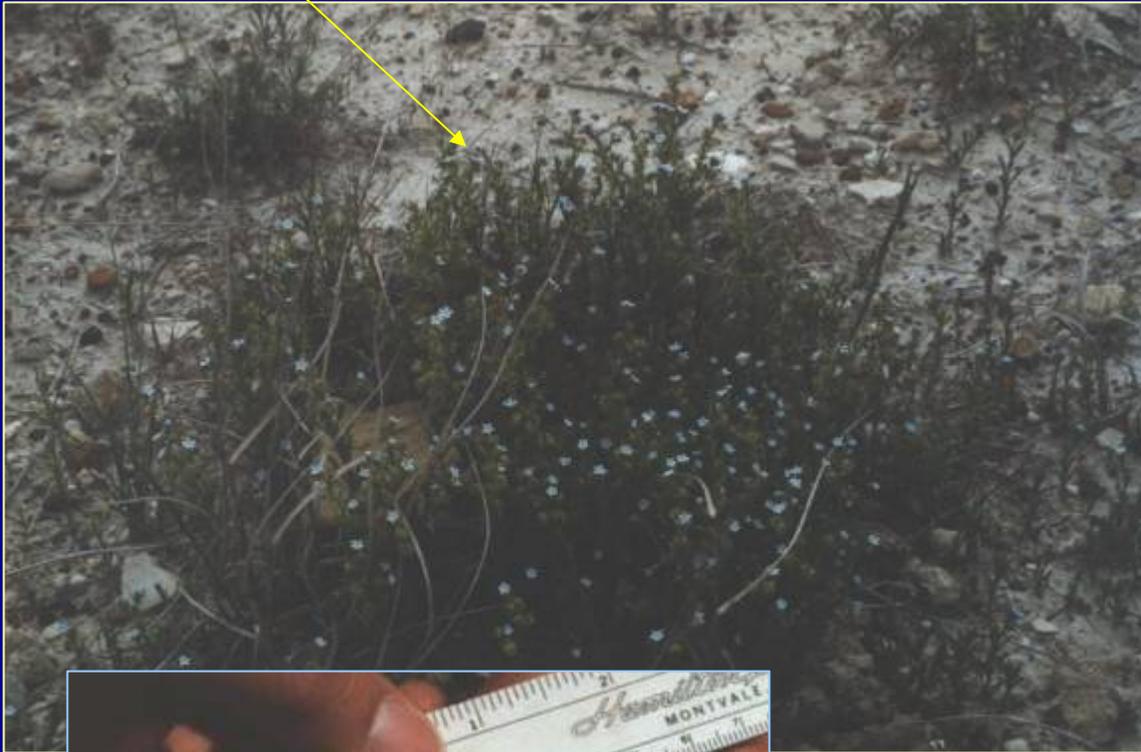
- Initial measurements suggest that *L. fremontii* and *L. squarrosa* can be readily separated by morphology
- Field observations suggest a more specialized habitat for *L. fremontii*
- Distribution data from Rocky Mountain Herbarium (RM) seemed to suggest different distributions for the two species in WY and potential populations of *L. fremontii* in CO and UT
- Variation seems to suggest multiple taxa

# *Lappula fremontii* (Torr.) Greene



- Branches ascending (directed upward with angle of divergence of  $16^{\circ}$ - $45^{\circ}$ )
- Fruiting branches tend to arise from base of plant
- Foliage green with sparse tuberculate hairs
- Tends to flower May-June, with full fruit by mid-July
- Strict annual?

Several individual plants growing crowded together



Plants early in season,  
mostly in flower



corolla measurement of  
6mm across

# *Lappula squarrosa* (Retz.) Dumort

- Divaricate branching (more or less horizontally spreading)
- Tends to fruit in upper third of plant
- Often a grayish cast to plant
- Tends to flower June through July with full fruit by late summer.
- Annual, Winter annual, Biennial?



# *Lappula fremontii* (Torr.) Greene

- Dorsal face  $\geq 1.0$  mm wide and  $>2.5$  mm tall
- Longest spinules on outer row  $\frac{1}{3}$  to  $\frac{1}{2}$  as long as those on inner row
- Third row present only as tubercles
- Longest spinule measurement  $>1.5$  mm long
- Style hidden by apical spines in mature fruit



# *Lappula squarrosa* (Retz.) Dum.



- Dorsal face up to 0.6mm wide, < 2.0 mm tall
- Spinules on inner and outer rows subequal
- Third row of short spinules present
- Longest spinule measurement < 0.9 mm long
- Style visible above mature nutlets



# Dried and Pressed Mature Fruiting Specimens



# Habitat observations for *Lappula fremontii*

- ✓ Sparsely vegetated areas
- ✓ Low sod tables on the Oglala National Grassland
- ✓ Native habitats
- ✓ Seems to be restricted to silty clay soils
- ✓ Does not seem to occur in prairie nor as an agricultural weed



# Winter View of Toadstool Park showing site of *Lappula fremontii* population



Typical habitat for *L. fremontii* in the Northern Great Plains

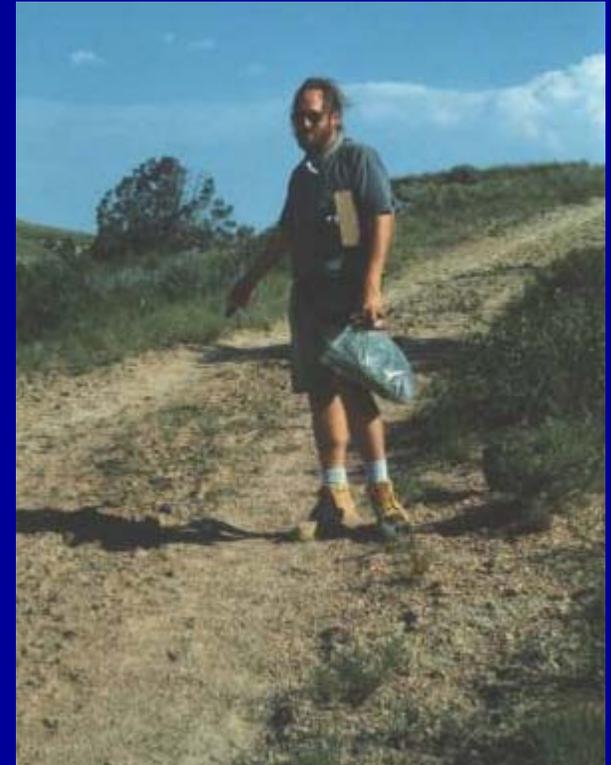
2004 was a bad year for *Lappula fremontii* on the ONG!



June 2004: Toadstool Park  
Susan showing where a population of *L.*  
*fremontii* had been thriving in  
2003

# Habitat observations for *Lappula squarrosa*

- ✓ Along disturbed roadsides
- ✓ Occasionally found in openings in native prairie
- ✓ Areas of human disturbance
- ✓ Observed in various soil types
- ✓ Occurs as weed in cultivated fields



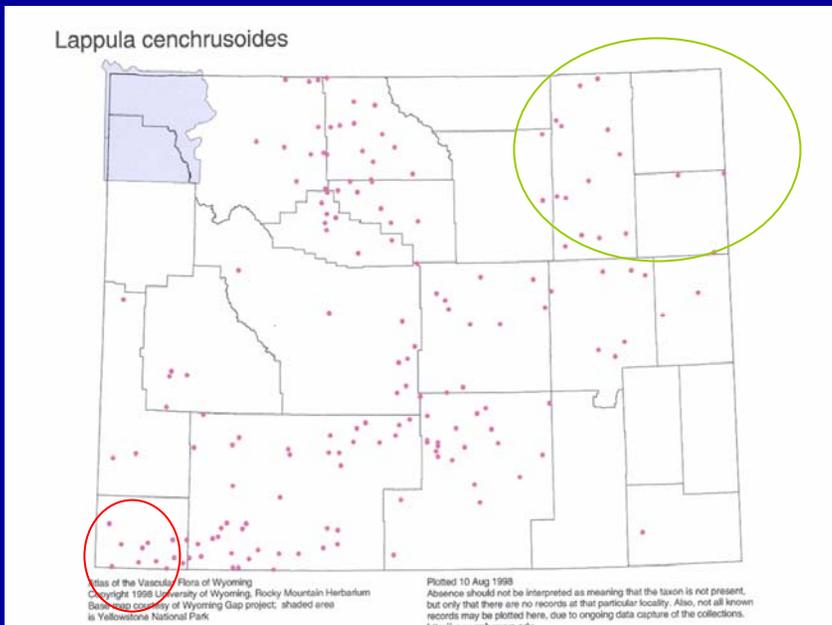
Steve showing *L. squarrosa* growing in Richland County, MT, mid-July 2003

North Unit Theodore Roosevelt National Park

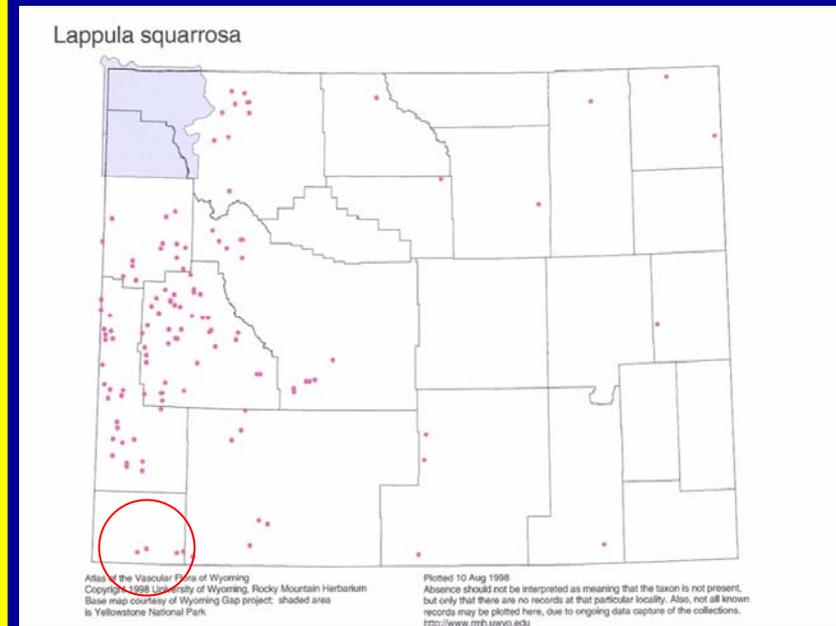


# Variation observed in Wyoming

- ✓ Statewide distribution?
- ✓ Primarily in basins

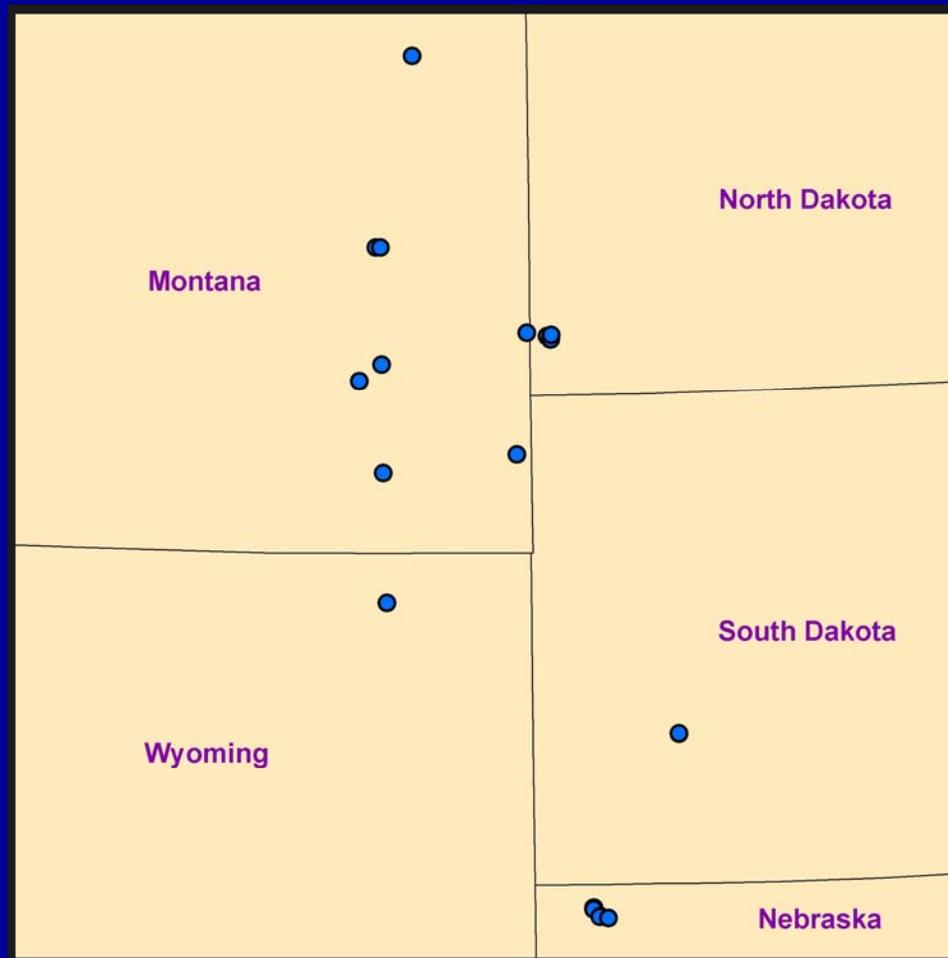
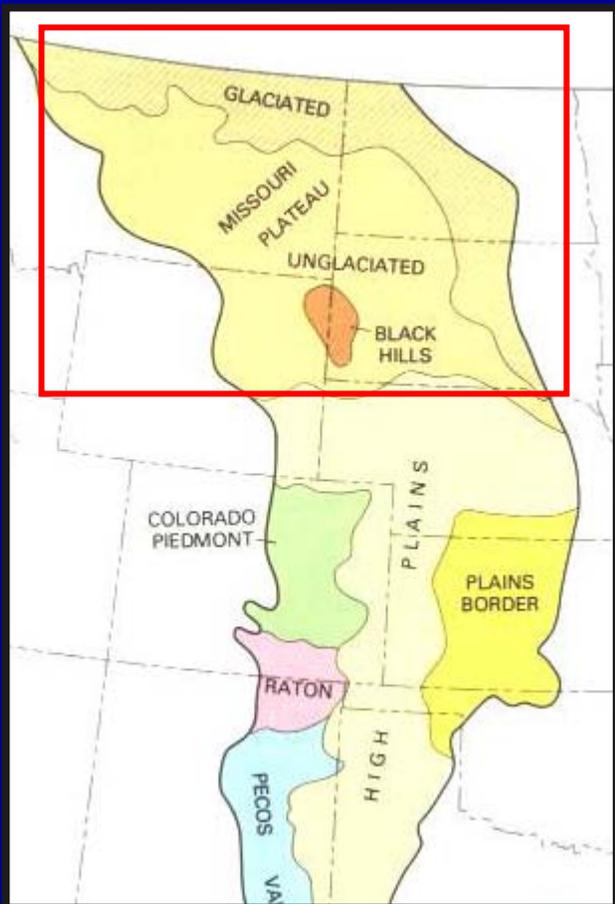


- ✓ Higher elevation
- ✓ Western part of state



# Known Distribution of *L. fremontii*(Torr.)Greene in the Great Plains

Populations sampled in 2003-2004



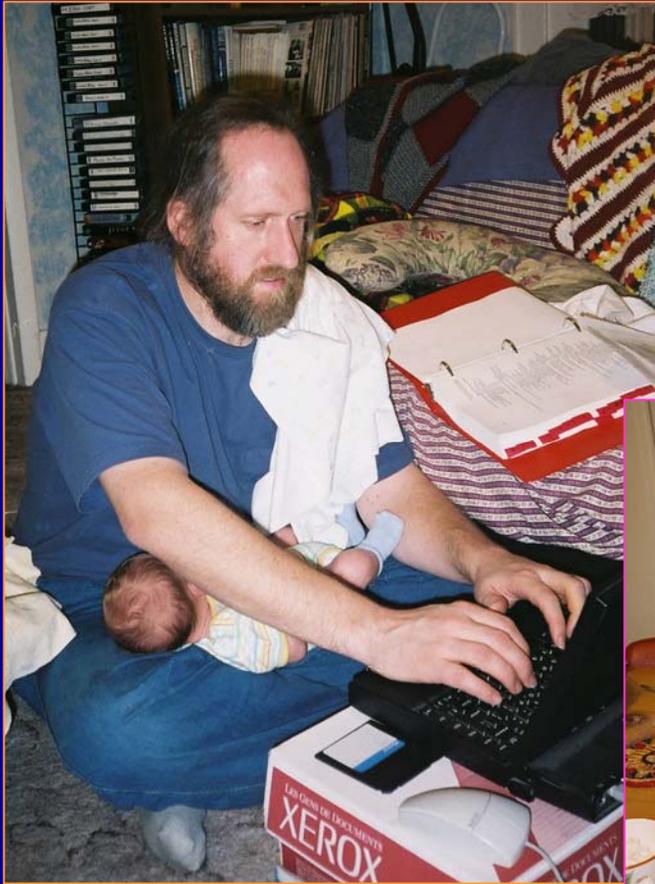
-from Trimble, Donald E. The Geologic  
Story of the Great Plains. 2001

# Public Lands where *L. fremontii* has been observed

- Oglala National Grassland
- Little Missouri National Grassland
- Makoshika State Park
- Terry Badlands BLM
- Buffalo Gap National Grassland
- Thunder Basin National Grassland



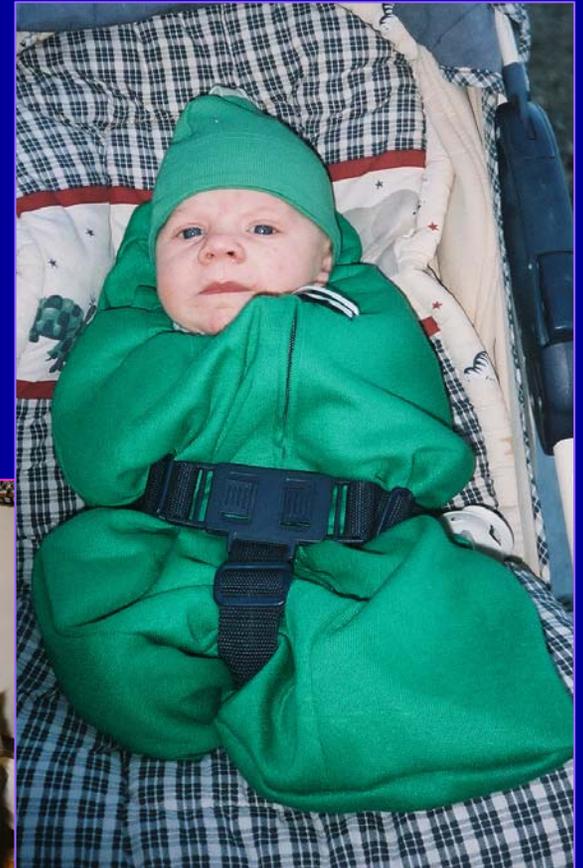
# A New Distraction from Field Work



Steve hard at  
work on labels



Christoph Frederick  
Roflsmeier and Macall



Reason why  
Steve is not  
here today.

# Acknowledgements

- Chadron State College Research Institute
- Dr. Ronald R. Weedon for logistical support and administering the research grant
- New York Botanical Garden for loan of *Echinosperrum fremontii* Torr. specimens
- Rocky Mountain Herbarium for loan of the type specimens of *Lappula cenchrusoides* A. Nelson and *Lappula erecta* A. Nelson
- Ronald McGregor Herbarium and Rocky Mountain Herbarium for locality data