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In This Issue —

Domatia in New Mexico

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The processes of evolution have given plants a seemingly infinite number of ways of adjusting to their environments so as to benefit their survival. Many adaptations are obvious and well-known. Others are quite subtle and infrequently observed. One such unusual adaptation is the formation of domatia. These structures are not uncommon in the tropics, being reported in 277 plant families and more than 2000 species, but are little known and quite uncommon in the United States.

Domatia (singular domatium) are plant structures evolutionarily modified into cavities serving as homes for insects, mites, thrips, even bacteria. There are two types, primary and secondary. Primary domatia derive from normal plant parts. Some plants develop swollen stems, internodes, or petioles which become hollow through tissue decay or are excavated by potential inhabitants. Some plants develop hollow stipular spines or tubers with empty chambers. Ants, wasps, or small bees residing in these sheltered domains fiercely defend the host plants. Plants with primary domatia are mainly tropical. Secondary domatia are atypical structures developed on abaxial leaf surfaces by plants to provide environments for animal symbionts. Most commonly these are tufts of hairs or marsupial-like pouches or a combination of both produced in the axils of vein branches at the bases of leaves or occasionally at other major vein branches farther from the leaf base. In contrast to the obviously intimidating creatures associated with primary domatia, small mites are the predominant occupants of secondary domatia.

The advantages of being defended by ants, wasps , or bees are not difficult to imagine. Mites, on the other hand, would not appear to be the most swashbuckling of defenders. In actual fact, mites living in secondary domatia are carnivorous, fungivorous, or microbivorous. Herbivorous arthropods like aphids, white flies, spider mites, minute pirate bugs, and big-eyed bugs suffer significant predation from carnivorous or parasitic mites living in domatia on leaves. Riverbank grape (*Vitis riparia*) can suffer heavily from grape powdery mildew. Fungivorous mites in leaf domatia have been shown to provide significant biological control of this mildew. Small but mighty. As eloquently stated by David Evans Walter from the University of Queensland in Australia: " Very small or obscure animals fall out of biodiversity inventories, fail to be represented in food web analyses or community studies, and generally escape notice unless they have an effect on their environment disproportionate to their size."

Plants have evolved the ability to produce domatia and pay a price in resources in the process. The presence of mites must provide sufficient benefit to the plants to justify the formation of domatia. Other housing structures like galls differ notably from domatia in

(Continued on page 2, Domatia)

Botanice est Scientia Naturalis quae Vegetabilium cognitiorem tradit.
— Linnaeus

(Domatia, continued from page 1)
that domatia are initiated by the plant while galls are caused by the invading insects. Domatia provide a safe haven for oviposition as well as molting. Parasitization of eggs is also reduced within the domatia. In return, the mites help to control herbivory, parasitization, fungal infection, or disease. In addition, their waste can be absorbed in the domatia for use by the plant.

My first encounter with secondary domatia came in September 2011 on the southwestern flank of the Florida Mountans in Luna County. I ran across a group of dense, thorny shrubs. At each node of the stem a branch and a thorn occurred. Not immediately recognizing it, I collected a few branches to study. Upon close examination of the leaves, I noticed curious pouches in the axils of the veins at the base of the leaves on the abaxial side. After a bit of study and conversation, it became clear that the pouches were domatia. The plant was an unusual morph of *Celtis pallida.* The domatia on *C. pallida* are nicely illustrated in A. Michael Powell's *Trees and Shrubs of the Trans-Pecos and Adjacent Areas,* and can be seen in the photo here. *Prunus virginiana*, *Prunus serotina*, and the above mentioned *Vitis riparia* are other New Mexican plants documented to produce domatia. Domatia do not appear on very young plants.

Domatia are known to occur on some species of *Quercus* and *Acer*, and likely appear in other genera. I shall always look on leaves a bit differently.

Botanical Literature of Interest

Barker, W.R., G.L. Nesom, P.M. Beardsley, and N.S. Fraga. 2012. **A taxonomic conspectus of Phrymaceae: A narrowed circumscriptions for *Mimulus*, new and resurrected genera, and new names and combinations.** Phytoneuron 2012-39: 1–60.

Fregonezi, J.N., L. Brandao de Freitas, S.L. Bonatto, J. Semi, & J.R. Stehmann. 2012. **Infrageneric classification of *Calibrachoa* (Solanaceae) based on morphological and molecular evidence.** Taxon 61(1):120-130.

Hall, M. 2011. **Plants as Persons: A Philosophical Botany.** State University of New York Press, Albany. 235 pp.

Laport, R.G., R.L. Minckley, & J. Ramsey. 2012. **Phylogeny and cytogeography of the North American creosote bush (*Larrea tridentate*, Zygophyllaceae).** Syst. Bot. 37(1):153-164.

Legler, B.S. 2011. ***Phlox vermejoensis* (Polemoniaceae), a new species from northern New Mexico, U.S.A.** J. Bot. Res. Inst. Texas 5 (2):397-403.

Moore, A.J., A. Bartoli, R.D. Tortosa, & B.G. Baldwin. 2012. **Phylogeny, biogeography, and chromosome evolution of the amphitropical genus *Grindelia* (Asteraceae) inferred from nuclear ribosomal and chloroplast sequence data.** Taxon 61 (1):211-230.

Nesom, G.L. 2012. **Taxonomy of *Erythranthe* sect. *Simiola* (Phrymaceae) in the USA and Mexico.** Phytoneuron 2012-40:1-123.

Nesom, G.L. 2012. **Taxonomy of *Erythranthe* sect. *Mimulosma* (Phrymaceae).** Phytoneuron 2012-41:1-36.

Pearman, D.A., C.D. Preston, G.P. Rothero, & K.J. Walker. 2008. **The Flora of Rum: An Atlantic Island Reserve.** publ. by the authors (dpearman4@aol.com). 479 pp. ISBN 9780953811137. [see *A Rum Affair* by K. Sabbagh for the significance of this posting]

Peirson, J.A., A.A. Reznicek, & J.C. Semple. 2012. **Polyploidy, infraspecific cytotype variation, and speciation in goldenrods: The cytogeography of *Solidago* subsect. *Humiles* (Asteraceae) in North America.** Taxon 61(1):197-210.

Reveal, J.L. 2012. **An outline for a classification scheme for extant flowering plants.** Phytoneuron 2012-37:1-221.

Reveal, J.L. & K.N. Gandhi. 2012. **Proposal to conserve the name *Selaginella densa* Rydb. against *S. densa* R. Sim (Selaginellaceae) with a note on *S. apoda*.** Taxon 61(1):253-254.

Romaschenko, K., P.M. Peterson, R.J. Soreng, O. Futorna, & A. Susanna. 2011. **Phylogenetics of *Piptatherum* s.l. (Poaceae: Stipeae): Evidence for a new genus, *Piptatheropsis*, and resurrection of *Patis*.** Taxon 60(6):1703-1716.

Romaschenko, K., P.M. Peterson, R.J. Soreng, N. Garcia-Jacas, O. Futorna, & A. Susanna. 2012. **Systematics and evolution of the needle grasses (Poaceae: Pooideae: Stipeae) based on analysis of multiple chlorplast loci, ITS, and lemma micromorphology.** Taxon 61(1):18-44.

Schuster, T.M., J.L. Reveal, & K.A. Kron. 2011. **Phylogeny of Polgoneae (Polygonaceae: Polygonoideae).** Taxon 60(6):1653-1666.

Smith, G.F. & E. Figueiredo. 2011. **Responsible species description: A change of attitude is needed to facilitate and improve access to biological material.** Taxon 60(6):1549-1551.

Steussy, T.F. & H.W. Lack (eds.). 2011. **Monographic Plant Systematics.** Regnum Vegatabile 153, A.R.G. Gantner Verlag K.G., FL-9491 Ruggell. 222 pp. ISBN 978-3-906166-98-8.

Turner, B.L. 2012. **Taxonomy and distribution of the *Zinnia acerosa* (Asteraceae) complex.** Phytoneuron 2012-19:1-8.

Plant Distribution Reports

New records and significant distribution reports for New Mexico plants should be documented by complete collection information and disposition of a specimen (herbarium). Exotic taxa are indicated by an asterisk (*), endemic taxa by a cross (+). Comments [in brackets] are the editor's.

— Russ Kleinman [25 Oxbow Drive, Silver City, NM 88061]

Medicago minima (Linnaeus) Linnaeus ex Bartalini (Fabaceae, little burclover): Grant County: Silver City, campus of Western New Mexico University, Harlan Hall rear parking lot, in gravel along curb, in full sun, 23 Mar 2012, Russ Kleinman 2012-3-23-1 (SNM). [first report for NM] See photos following.

— Karen Blisard and Russ Kleinman [25 Oxbow Drive, Silver City, NM 88061]

Entodon seductrix (Hedwig) Muller Hal. (Bryophyta, Entodontaceae): Grant County: Black Range, Railroad Canyon about 100 meters upstream from the parking area at the first stream crossing, mixed conifer forest, growing on rock at bottom of north-facing rocky cliff, 7000 ft, 19 Jan 2012, Karen Blisard & Russ Kleinman 2012-1-19-3 (NMCR, SNM). [first report for NM]

Fossombronia sp. (Marchantiophyta, Fossombroniaceae): Grant County: Gila National Forest, approximately 100m south of Hwy 152 on Trail 78, Emory Pass, on the Grant County / Sierra County line, mixed conifer forest, on soil, growing with moss on west-facing slope, with *Pinus scopulorum*, *Abies concolor*, *Pinus strobiformis*, & *Pseudotsuga menziesii*, 13 Oct 2011, Karen Blisard and Russ Kleinman 2011-10-13-6 (SNM). Det by Paul Davison, Univ. North Alabama. Photo illustration at http://www.wnmu.edu/academic/nspages/gilaflora/fossombronia_sp.html. [Identification of species requires spores, which were absent, but this is the first known report of this liverwort family and genus for NM]

— William R. Norris [Dept. Natural Sciences, Western New Mexico University, Silver City, NM 88061]

Carex scopulorum Holm var. ***scopulorum*** (Cyperaceae, Rocky Mountain sedge): Taos County: Sangre de Cristo Mts, Long Canyon Trail about 0.1 mile above Taos Ski Resort parking, N36° 35.79' W105° 26.99', canyon bottom near stream, open seep at trail; spreading rhizomes, within spruce-fir forest, 9700 ft, 20 July 2004, R.D. Worthington 32660 (UNM, UTEP), det by Stanley Jones; Latir Mesa, Latir Lakes, about 30 meters below and east of shore of uppermost lake in seep adjacent to outflow stream, site is at timberline (Krummholz), sedge seep adjacent to stream, standing water sometimes present, densely rhizomatous, 3625 m, 13 Aug 2001, J. McGrath 341, 342, 353, 355 (UNM), det by A. Reznicek. [Also known from the Costilla Massif (Peterson, R. Vegetation of the Costilla Massif, Taos County: http://aces.nmsu.edu/academics/rangescienceherbarium/documents/peterson---costilla-massif.pdf); first reports for NM]

Carex senta Boott (Cyperaceae, swamp carex): Grant County: sandy alluvium at Little Creek Spring, 16 May 1993, Paul Boucher 1164 (SNM), det by A. Reznicek. [validates an earlier but questionable report by M&H]

Carex tenera Dewey (Cyperaceae, quill sedge): Rio Arriba County: 250 meters east-south-east of the Corkin Lodge within 20 meters of the road to Brazos Box, semi-open edge of seepy wetland, soil dark and loamy, with *Carex lanuginosa*, *Eleocharis* sp., *Thermopsis pinetorum*, *Veratrum californicum*, *Populus tremuloides*, *Juncus*

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nevadensis, *Carex stipata*, and *Juncus saximontanus*, 8000 ft, 2 July 1998, Jim McGrath 98 (UNM). Det by Andrew Hipp. [this validates an unsubstantiated report for NM by L. Abrams (An illustrated flora of the Pacific States, Washington, Oregon, and California. 4 vols. Stanford Univ. Press. 1940-1960.)]

— Gene Jercinovic [6285 Algodon Road SW, Deming, NM 88030]

***Stellaria pallida** (Dumortier) Crépin (Caryophyllaceae, lesser chickweed): Luna County: Deming, courtyard of Mimbres Memorial Hospital, lawn and garden area,with lawn grass, *Dichondra micrantha*, *Erodium cicutarium*, 32˚15.589´ N 107˚46.041´, 4347 ft, 20 Feb 2012, E.M. Jercinovic 1202 (UNM, NMC). [first report for NM]

— Tim Lowrey [Museum of Southwestern Biology , MSC03 2020, 1 University of New Mexico, Albuquerque, NM, USA 87131-0001]

Agoseris glauca (Pursh) Rafinesque var. ***dasycephala*** (Torrey & Gray) Jepson (Asteraceae, arctic agoseris): Colfax County: Sangre de Cristo Mountains, Carson National Forest Valle Vidal Unit, 1.3 mi north of corral on Forest Road 1950, west and north to base of Little Costilla Peak, about 10,000 ft, 3 Aug 2002, Ronald L. Hartman 76308 (RM). Otero County: Sacramento Mts, Cox Canyon, 8,000 ft, 3 July 1949, E.F. Castetter and H.J. Dittmer 8732 (UNM). Det R.L. Hartman. Taos County: Gold Hill, south of Red River, 12,300 ft, 13 Aug 1955, E.F. Castetter and H.J. Dittmer 9912 (UNM). [first report of this variety for NM]

— Robert Sivinski [UNM Museum of Southwestern Biology, MSC03 2020, 1 University of New Mexico, Albuquerque, NM, USA 87131-0001]

Epilobium oregonense Haussknecht (Onagraceae, Oregon willow-herb): Rio Arriba County: San Pedro Parks Wilderness, Nacimiento Mountains, near Trail No. 43 in broad wet valley north of Vega Redonda, N36.10765° W106.78006° (WGS84), 9,870 ft, upper part of wet meadow on spongy ground with moss and *Carex aquatilis*, 2 Aug 2011, R.C. Sivinski 8070 with J. Tenorio, C. Keller and J. McGrath (MO, UNM). First reported collection for New Mexico. Peter Hoch identified this collection and says another specimen (A. Brown 59, COLO) from Mora County is also this species.

— Kelly Allred [2015 Jordan Road, Las Cruces, NM 88001]

Astragalus nuttallianus A.P. de Candolle var. ***imperfectus*** (Rydberg) Barneby (Fabaceae, Nuttall's milkvetch): Hidalgo County: Peloncillo Mts, mouth of Weatherby Canyon, 32.01610 -108.92520, 13 April 1986, R.D. Worthington 13962 (NY, UTEP); Animas Valley, along NM Hwy. 338, 12.9 rd. mi south of Animas, roadside and low bluffs, 4900 ft, 21 April 1986, R.D. Worthington 14041 (NY, UTEP). Lincoln County: 5 miles west of Capitan, 33 32 35.00 N 105 39 45.00 W, juniper grassland, roadside gravels, 2 May 1986, R.C. Barneby 18073 (NY). Valencia County: 1 mile south of Seboyeta, 35 12 5.58 N 107 23 20.00 W, rubbly clay, volcanic mesa, 29 May 1983, R.C. Barneby 17941 (NY). [first report of this variety from NM; all specimens determined by R.C. Barneby]

Homomallium incurvatum (Schrader ex Bridel) Loeske (Bryophyta, Hypnaceae): Torrance County: Manzano Mts, Cibola Nat. Forest, along forest road 55, Canon de Tajique, about 2 miles below Fourth of July Campground, N34° 46'00" S106° 21'30", oak woodland with scattered ponderosa pine, on limestone rock outcrops with filtered light, 7500 ft, 17 Aug 2001, James R. Shevock 21146, 21248, with Dan Norris (CA, NMCR). Median and distal leaf cells are elongate-linear, much longer than other *Homomallium* (and similar to *Pylaisia*), but the capsules are nearly horizontal and strongly curved, with reddish brown setae (typical of *Homomallium*). In the U.S., known from Alabama, Arizona, Kentucky, and West Virginia; also Europe, Asia, Australia. First report for New Mexico.

Scleropodium obtusifolium (Mitten) Kindberg (Bryophyta, Brachytheciaceae): Grant County: 8 miles north of Silver City, Pinos Altos Mts, state hwy 15, on soil in stream bed, ponderosa pine forest floor, 7 Nov 1985, L.E. Anderson 24601 (NY). Det L.E. Anderson and verified by Bill Buck First report of this genus and species for NM.

— Richard Worthington [PO Box 13331, El Paso, TX 79913]

Mimosa turneri Barneby (Fabaceae, Turner's mimosa): Otero County: Sacramento Mts, Culp Rim Tank (32 Deg 33.676'N, 105 Deg 45.589'W), 5718 ft, 19 May 2008, R. D. Worthington 35063 (UTEP); Hueco Mts, about 0.5 mi. west of Bassett Ranch Ruins (32 Deg 01.028'N, 105 Deg 58.495'W), 5485 ft, 2 Aug 2008, R. Worthington 35334 (UTEP, NMC, ASU, UCR). Eddy County: near Dry Cave entrance, 4200 ft, 15 June 1971, R. Smartt 215 (UTEP). All determined by R. Barneby. [first report for NM]

— G.L. Nesom [see Nesom 2012, in Botanical Literature of Interest for locality information]

Erythranthe minor (A. Nelson) Nesom (Plantaginaceae/ Phrymaceae): Taos County.

Erythranthe nasuta (Greene) Nesom (Plantaginaceae/ Phrymaceae): Hidalgo, Grant, & Luna counties.

Erythranthe unimaculata (Pennell) Nesom (Plantaginaceae/ Phrymaceae): Doña Ana County.

Botany is the natural science that transmits the knowledge of plants.

— Linnaeus

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