



## A new species of stonecrop (*Sedum* section *Gormaniana*, Crassulaceae) from northern California

PETER F. ZIKA

WTU Herbarium, Box 355325, University of Washington, Seattle, WA 98195-5325, USA.

Email: [zikap@comcast.net](mailto:zikap@comcast.net)

### Abstract

*Sedum citrinum* is described as a narrow endemic from three populations on ultramafic bedrock in the Klamath Mountains of southern Del Norte County, California, in the United States. It is distinguished from *Sedum obtusatum* subsp. *boreale* by its flattened inflorescence with elongate lower branches, as well as its deep yellow flowers and yellow anthers.

**Key words:** serpentine, succulent plants

### Introduction

*Sedum* Linnaeus (1753: 430) sect. *Gormaniana* (Britton in Britton & Rose 1930: 29) R. T. Clausen (1942: 29) is a group of six perennial stonecrop species with stout flattened rosette leaves, paniculate inflorescences, and basally fused corollas. The section was summarized by Clausen (1975), Denton (1979a, 1979b, 1982, 1993), and more recently by Ohba (2007, 2009) and Denton and Boyd (2012). The species of *Sedum* sect. *Gormaniana* are distributed in California, western Nevada, and Oregon, and are restricted to western North America. Traditional herbarium-based research can be difficult with fragile dried plants such as stonecrops. Like many succulent genera, when handled, dried *Sedum* falls apart over time, important colors are rarely preserved in the lengthy drying process, seldom noted on labels, and the preserved flowers show few useful characters without special preparation. Taxonomic study is enriched by examining the fresh flowering plants in the field, and using color photographs to show such characters as the glaucous epidermis of sepals, corolla and stamen colors, as well as the aspect of the fresh foliage. Other useful morphological features are difficult to examine on dried specimens, such as nectary shape, petal fusion, width, or angle. When integrating these features, it is clear that sect. *Gormaniana* is in need of further research and revision.

Extensive field work on the perennial stonecrops of *Sedum* sect. *Gormaniana* of northern California was instigated by the United States Forest Service in the Shasta-Trinity National Forest, and involved more than a dozen botanists. It indirectly led to the discovery of a new stonecrop in the southern mountains of Del Norte County, California, described below.

### Methods

Dried specimen preparation is challenging with *Sedum* because they store so much water in their foliage. The succulent tissue must be treated before drying in a press. Use of a microwave for the 2012 gatherings resulted in the quick wilting of the specimens, and they were easily, if slowly, dried over low heat. However, the resulting specimens were inadequate for DNA testing. Herbarium collections cited below from 2013 were frozen and then dried, to accommodate the possibility of subsequent molecular work. Some flowers and leaves were separated from the plants for photography, dried separately, and placed in fragment packets, where they can be easily sampled by

curators and staff of the following herbaria facilitated loans and access to their collections, including types: BH, CAS, CU, DBN, DS, F, GH, JEPS, MO, NY, ORE, OSC, POM, RSA, UC, US, WILLU, and WTU. Finally, I would like to thank Curtis Björk and an anonymous reviewer for their suggestions and improvements to the manuscript.

## References

- Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., Rosatti, T.J., & Wilkin, D.H. (eds.) (2012) *The Jepson manual: Vascular plants of California*, 2nd ed. University of California Press, Berkeley. 1568 pp.
- Bentham, G. (1849) *Plantas Hartwegianas imprimis Mexicanas adjectis nonnullis Grahamianis enumerat novisque describit*. Gulielmus Pamplin, Londini. 393 pp.  
<http://dx.doi.org/10.5962/bhl.title.437>
- Berger, A. (1930) Crassulaceae. *Die natürlichen Pflanzenfamilien*, ed. 2, 18a: 352–483.
- Brackenridge, W.D. (1854) Botany. Cryptogamia. Filices, including Lycopodiaceae and Hydropterides. In: Wilkes, C. *United States Exploring Expedition. During the years 1838, 1839, 1840, 1841, 1842. Under the command of Charles Wilkes, U.S.N.* Vol. 16: 1–357.
- Britton, N.L. & Rose, J.N. (1903) New or noteworthy North American Crassulaceae. *Bulletin of the New York Botanical Garden* 3: 1–45.
- Buckley, S.B. (1862) Description of plants. —No. 3. *Proceedings of the Academy of Natural Sciences of Philadelphia* 14: 88–100.
- de Candolle, A.P. (1828) *Prodromus Systematis Naturalis Regni Vegetabilis*, vol. 3. 494 pp.  
<http://dx.doi.org/10.5962/bhl.title.286>
- Clausen, R.T. (1942) Studies in the Crassulaceae—III. *Sedum*, subgenus *Gormaniana*, section *Eugormaniana*. *Bulletin of the Torrey Botanical Club* 69: 27–40.
- Clausen, R.T. (1975) *Sedum of North America North of the Mexican Plateau*. Cornell University Press, Ithaca. 742 pp.
- Denton, M.F. (1978) Two new taxa of *Sedum* section *Gormaniana* (Crassulaceae) endemic to the Trinity Mountains in California. *Brittonia* 30: 233–238.  
<http://dx.doi.org/10.2307/2806658>
- Denton, M.F. (1979a) Factors contributing to evolutionary divergence and endemism in *Sedum* section *Gormaniana* (Crassulaceae). *Taxon* 28: 149–155.  
<http://dx.doi.org/10.2307/1219570>
- Denton, M.F. (1979b) Cytological and reproductive differentiation in *Sedum* section *Gormaniana* (Crassulaceae). *Brittonia* 31: 197–211.  
<http://dx.doi.org/10.2307/2806176>
- Denton, M.F. (1982) Revision of *Sedum* section *Gormaniana* (Crassulaceae). *Brittonia* 34: 48–77.  
<http://dx.doi.org/10.2307/2806401>
- Denton, M.F. (1993) *Sedum*. In: Hickman, J.C. (ed.), *The Jepson manual: Higher plants of California*. University of California Press, Berkeley, pp. 531–534.
- Denton, M.F. & Boyd, S. (2012) *Sedum*. In: Baldwin, B.G., Goldman, D.H., Keil, D.J., Patterson, R., Rosatti, T.J., & Wilkin, D.H., *The Jepson manual: Vascular plants of California*, 2nd ed. University of California Press, Berkeley, pp. 674–676 .
- Eaton, D.C. (1878) *The Ferns of North America*, vol. 1. S. E. Cassino, Salem, Massachusetts. 352 pp.
- Evans, J.G. (ed.) (1984) Geological and geophysical studies of chromite deposits in the Josephine Peridotite, northwestern California and southwestern Oregon. *U. S. Geological Survey Bulletin* 1546: 1–86.
- Foster, R.C. (1936) A new *Iris* from California. *Rhodora* 38: 199–201.
- Gray, A. (1868) Characters of new plants of California and elsewhere, principally of those collected by H. N. Bolander in the State Geological Survey. *Proceedings of the American Academy of Arts and Sciences* 7: 327–401.
- Gray, A. (1878) *Synoptical Flora of North America*, vol. 2, part 1. American Book Company, New York. 402 pp.  
<http://dx.doi.org/10.5962/bhl.title.10847>
- Greene, E.L. (1891) *Flora Franciscana: an Attempt to Classify and Describe the Vascular Plants of Middle California*, part 2. Curbey & Co., San Francisco. Pp. 129–280.  
<http://dx.doi.org/10.5962/bhl.title.7689>
- Greene, E.L. (1893) Novitates occidentales—IV. *Erythea* 1: 147–153.
- Hooker, W.J. & Arnott, G.A.W. (1840) *The Botany of Captain Beechey's Voyage Comprising an Account of the Plants Collected by Messrs. Lay and Collie, and Other Officers of the Expedition, During the Voyage to the Pacific and Behring's Strait, Performed in His Majesty's Ship Blossom, Under the Command of Captain F.W. Beechey ... in the Years 1825, 26, 27, and 28*. H. G. Bohn, London. 485 pp.  
<http://dx.doi.org/10.5962/bhl.title.246>
- IUCN (2013) The IUCN red list of threatened species, version 2013.1. IUCN Red List Unit, Cambridge U.K. Available from: <http://www.iucnredlist.org/> (accessed: 3 October 2013).

- Kellogg, A. (1870) California Academy of Sciences. *Scientific Opinion* 3: 52.
- Lambert, A.B. (1832) *A description of the genus Pinus, with directions relative to the cultivation, and remarks on the uses of the several species: also, descriptions of many other new species of the family of Coniferae*, 2nd ed., vol. 2. H. Weddell, London. 124 pp.
- Lellinger, D.B. (1968) A note on *Aspidotis*. *American Fern Journal* 58: 140–141.
- Lemmon, J.G. (1892) Notes on cone-bearers of North-west America.—1. *Garden and Forest* 5: 64–65.
- Linnaeus, C. (1753) *Species Plantarum*. Laurentii Salvii, Stockholm. 1200 pp.
- Loudon, J.C. (1838) *Arboretum et fruticetum Britannicum; or, The trees and shrubs of Britain, native and foreign, hardy and half-hardy, pictorially and botanically delineated, and scientifically and popularly described; with their propagation, culture, management, and uses in the arts, in useful and ornamental plantations, and in landscape-gardening; preceded by a historical and geographical outline of the trees and shrubs of temperate climates throughout the world*, vol. 4. James Ridway and Sons, London. 2694 pp.
- Nakamura, G. & Nelson, J.K. (eds.) (2001) *Illustrated field guide to selected rare plants of northern California*. University of California Division of Agriculture and Natural Resources Publication 3395: 1–370.
- Nuttall, T. (1818) *The genera of North American plants*, vol. 2. D. Heart, Philadelphia. 254 pp.
- Ohba, H. (2007) Fourteen new combinations in *Sedum* (Crassulaceae). *Journal of the Botanical Research Institute of Texas* 1: 889–890.
- Ohba, H. (2009) *Sedum*. In: Flora of North America Editorial Committee (eds.), *Flora of North America North of Mexico*, vol. 8, *Magnoliophyta: Paeoniaceae to Ericaceae*. Oxford University Press, New York, pp. 199–222.
- Paris, C. (1991) *Adiantum viridimontanum*, a new maidenhair fern in eastern North America. *Rhodora* 93: 105–122.
- Peck, M. 1937. Some new species and varieties of Oregon plants. *Proceedings of the Biological Society of Washington* 50: 121–123.
- Peck, M. (1941) *A Manual of the higher plants of Oregon*. Binfords and Mort, Portland, Oregon. 866 pp.
- Pursh, F.T. (1813) *Flora Americae septentrionalis; or, a systematic arrangement and description of the plants of North America*, vol. 1. White, Cochrane, and Co., London. 358 pp.  
<http://dx.doi.org/10.5962/bhl.title.6122>
- Ruprecht, F.J. (1845) *Distributio cryptogamarum vascularium in Imperio Rossico*. Buchdruckerei der Kaiserlichen Akademie der Wissenschaften, St. Petersburg. 56 pp.
- Scribner, F.L. (1901) New or little known grasses. *Circular, Division of Agrostology, United States Department of Agriculture* 30: 1–8.
- Torrey, J. (1857) Explorations and surveys for a railroad route from the Mississippi River to the Pacific Ocean, route near the thirty-fifth parallel, explored by lieutenant A. W. Whipple, topographical engineers, in 1853 and 1854. Report on the botany of the expedition. *Pacific Railroad Survey Report* 4: 59–182.
- Vasey, G.S. (1892) Monograph of the grasses of the United States and British America. Part 1. *Contributions from the United States National Herbarium* 3: 1–89.
- Wagner, D.H. (1979) Systematics of *Polystichum* in western North America north of Mexico. *Pteridologia* 1: 1–64.
- Watson, S. (1882) Contributions to American botany. *Proceedings of the American Academy of Arts and Sciences* 17: 316–382.  
<http://dx.doi.org/10.2307/25138655>
- Watson, S. (1885) Descriptions of some new species of plants, chiefly from our western territories. *Proceedings of the American Academy of Arts and Sciences* 20: 352–372.  
<http://dx.doi.org/10.2307/25138655>
- Zika, P.F., Kuykendall, K. & Wilson, B. (1998) *Carex serpenticola* (Cyperaceae), a new species from the Klamath Mountains of Oregon and California. *Madroño* 45: 261–270.