

MIMULUS CARDINALIS Douglas ex Bentham (SCARLET MONKEY FLOWER), AND WHERE IN THE CALIFORNIA COAST RANGES DID DAVID DOUGLAS FIND THE CLOSELY RELATED MIMULUS LEWISII Pursh?

By David Rogers

Due to its salient corollas, *Mimulus cardinalis* is one of the most conspicuous (and thus most well known) of the native wildflowers that occur in wet or moist habitats in western North America. Although this species is most often encountered along perennial streams, it can also be found at springs, seeps, and in other kinds of wet or perpetually moist habitats, such as in hanging gardens on seepy cliffs, or at the bases of cliffs where water from a overhanging seep drips.

The first scientific specimens of *Mimulus cardinalis*, along with the seeds by which it was introduced into European gardens, were collected by David Douglas, the famous botanical explorer of western North America, during his extended stay in California in the early 1830s. In a letter to his mentor, Sir William Jackson Hooker, datelined "Monterey, Upper California, Nov. 23rd, 1831," Douglas noted that "To *Mimulus* I have added several, among them the magnificent *M. cardinalis*."¹ Douglas was then on his second expedition to western North America on behalf of the Horticultural Society of London, to which he sent his collections of plant specimens and seeds; Douglas also made duplicate collections, which he sent to Hooker in Scotland. On the receiving end in London there were two gentlemen who, like Sir William Jackson Hooker, rank amongst the most famous botanists of the 19th century: George Bentham, the secretary of the Horticultural Society, and John Lindley, the assistant secretary.

The first published description of *Mimulus cardinalis* was on page 28 of George Bentham's *Scrophularineae Indicae: A synopsis of the East Indian Scrophularineae contained in the collections presented by the East India Company to the Linnaean Society of London, and in those of Mr. Royle and others; with some general observations on the affinities and subdivisions of the order*; Bentham's text was published in 1835. This text also included the first published descriptions of a number of other plants that Douglas had recently sent from California, such as *Penstemon centranthifolius* (Scarlet Bugler), *Keckiella cordifolia* (Heart Leaf Penstemon), *Castilleja exserta* (Common Owl's Clover), *Castilleja densiflora* (Strait Beaked Owl's Clover) and *Triphysaria eriantha* (Johnny Tuck or Butter and Eggs). The



David Douglas (1799-1834), as portrayed in volume two of *The Companion to the Botanical Magazine* (1836). At an early age Douglas exhibited a keen interest in nature, which increasingly became focused on plants as he matured. It was while he was a student at the Glasgow Botanic Garden (in 1820 or 1821) that he met Sir William Jackson Hooker, and according to Hooker, Douglas was "A diligent attendant at the botanical lectures given by the Professor of Botany in the hall of the garden." Douglas became Hooker's "Favorite companion" on his botanical outings to the Scottish highlands and islands (Hooker was then working on his *Flora Scotica*), and according to Hooker, Douglas's "Great activity, undaunted courage, singular abstemiousness, and energetic zeal, at once pointed him out as an individual eminently calculated to do himself credit as a scientific traveler." Hooker felt very privileged to recommend Douglas as a botanical explorer to the Horticultural Society of London, and Douglas departed for London in the spring of 1823.² In the same year Douglas made an expedition to eastern North America, and in 1824 and 1829 he began two much more ambitious and lengthy expeditions to western North America. Douglas died in Hawaii in July of 1834; his mangled body was found in a pit trap for feral cattle.

text for *Mimulus cardinalis* in *Scrophularineae Indicae* is as follows:

8. *M. CARDINALIS* (Dougl. MSS), *villous, foliis amplexicaulibus ovatis margine eroso-dentatis, pedunculis folio longioribus, calycibus amplis inflato-tubulosis vix plicatis, dentibus aratis acutis, antheris villosus*.—California, Douglas.

In a number of botanical and horticultural texts dating to the mid 1800s, the authorship of *Mimulus cardinalis* is Douglas ex Lindley, for in the later part of the year in which Bentham's text was published, John Lindley wrote an apparently more widely read English language description of the species, and it was assumed that Lindley's text was the first to be published. Lindley's text, in volume two of the second series of the *Transactions of the Horticultural Society of London*, is as follows:

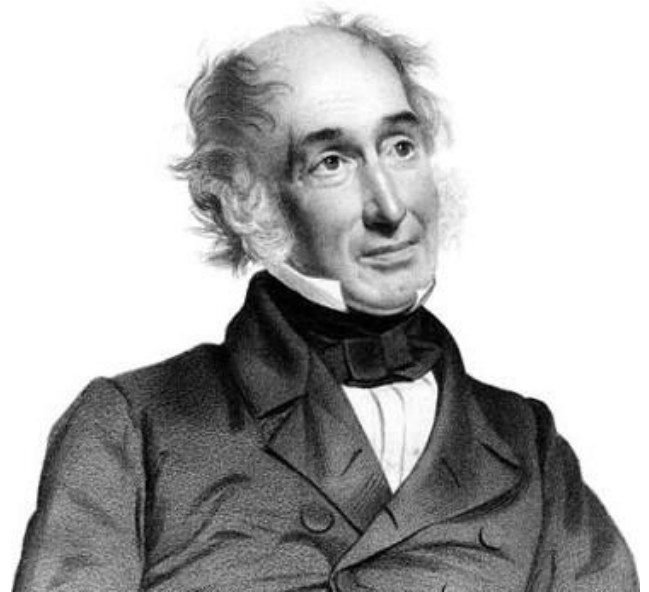
XI. Note upon *Mimulus cardinalis*: a new, hardy, herbaceous plant. By John Lindley, Ph. D., F. R. S. &c. &c. Assistant Secretary.

Read Nov. 4th, 1835.

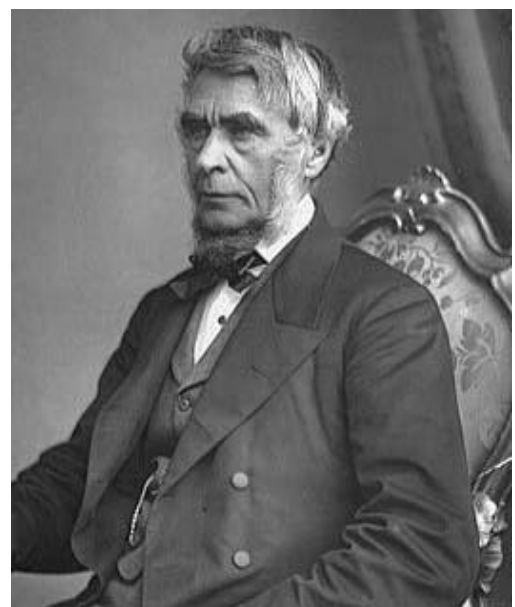
From the Californian seeds most lately received by the Society from Mr. Douglas, has been raised an apparently hardy herbaceous plant, the beauty of which is so remarkable as to have induced the Council to direct a figure of it to be prepared for publication in the *Transactions*.

This is a species of *Mimulus*, to which the name of *cardinalis* was added by its lamented discoverer [Douglas died in Hawaii in July of the previous year], in consequence of the brilliant scarlet of its blossoms. Its stems are from one and a half to two feet high, erect, loosely branched, and covered with long delicate hairs. The leaves, which are of a pale yellowish green, are also hairy, of an obovate figure, with regular toothings, and connate at their base, which is their narrowest part. The flowers grow singly in the axils of the leaves, which are shorter than the hairy peduncles. The calyx is strongly ribbed, obliquely five-toothed, soft and hairy. The corolla is internally of the brightest scarlet, but of a pale reddish yellow on the outside; its border is divided into four rather convex lobes, all of which are oblong and notched at the end, and the lowermost is the widest. Along the base of each segment passes a short, deep, reddish brown line, which loses itself in the tube.

Cultivated in the open ground, this plant flowered abundantly from July to the end of September. It appeared to prefer a moist rich soil, and did not suffer at all from the ardent sun to which it was exposed at the foot of a south wall. It produced seeds in some quantity, and stuck so readily from cuttings, that there is little doubt of its becoming a common ornament of the gardens.



Sir William Jackson Hooker (1785-1865), one of the most prominent and prolific botanists of the 19th century, was the Regius Professor of Botany at the University of Glasgow from 1820 to 1841, and the director of Royal Botanical Gardens at Kew from 1841 until his death in 1865. Hooker was also the founder of a number of journals, such as *Exotic Flora* (3 vols, 1822-1827), *The Journal of Botany* (a.k.a, *The London Journal of Botany*, 20 vols, 1830-1857), *The Companion to the Botanical Magazine* (2 vols, 1835-36), *Icones plantarum* (10 vols, 1837-1854), and *Species filicum* (5 vols, 1846-1864), and was the editor of *Curtis's Botanical Magazine* from 1827 to his death in 1865. Hooker's many other botanical texts include *Victoria Regia* (1851), *Genera filicum* (1842), *Flora Boreali Americana* (1840), and with G. A. W. Arnott, *The Botany of Captain Beechey's Voyage* (1841).



George Bentham (1800-1884). Botany students worldwide soon become familiar with Bentham's name (the abbreviation in Benth.), for it is attached, in one way or another, to an immense

The accompanying plate has been prepared from a drawing by Miss Drake, and exhibits as near an approach to the brilliancy of the original as the power of water colors will produce.

Over the next several years *Mimulus cardinalis* was frequently noted in European botanical and horticultural journals, and a number of these featured full page chromolithographic plates of the species. At that time there was an obsession among European gardeners in ornamental plants that had been recently introduced from other parts of the world, and particularly so in England, where a large number of highly illustrated periodicals arose to meet the demand for depictions and information about such plants. Such journals include *Curtis's Botanical Magazine*, *Edward's Botanical Register*, *Paxton's Magazine of Botany and Register of Flowering Plants*, *The British Flower Garden*, *Lodiges Botanical Cabinet*, *The Botanist*, *The Floricultural Cabinet and Florist's Magazine*, *The Botanic Garden*, *The Botanist's Repository*, *The Floral Cabinet and Magazine of Exotic Botany*, *The Floricultural Magazine and Miscellany of Gardening*, *Exotic Flora*, *The Florist and Pomologist*, and so on.

NOTE: words in blue, such as "FOLLOWING PAGE" below, indicate that a hyperlink exists to an online document or to a high resolution image of an illustration. By clicking on the word, the document or image can be downloaded for viewing. Left click the images to see them in full size; if you want to save a copy, right click the image and select "Save picture as."

FOLLOWING PAGE: the plate that accompanied Lindley's text on *Mimulus cardinalis* in the *Transactions of the Horticultural Society of London*. The delineator, Sarah Anne Drake (1803-1857), was not only one of the most gifted botanical illustrators of her time, but also one of the most prolific. Drake illustrated about 1,150 plates that were published in *Edward's Botanical Register* between the years 1831 and 1847, and was also a major illustrator for a number of other classic botanical texts, such as James Bateman's *Orchidaceae of Mexico and Guatemala*, John Lindley's *Genera and Species of Orchidaceous Plants* and *Sertum Orchidaceum*, and George Bentham's *The Botany of the Voyage of H. M. S. Sulphur*.

number of plant species. Although Bentham had no formal education in botany, he had the capacity to become totally concentrated on any subject that drew his attention, and the inheritance that he received from his father, Sir Samuel Bentham, along with that of and his uncle, the philosopher Jeremy Bentham, allowed him devote most of his life to the study of plants. Bentham was the secretary of the Horticultural Society of London from 1829 to 1840, and was the president of the Linnean Society of London from 1861 to 1874. In 1854 he donated his herbarium of more than 100,000 specimens to the Royal Botanical Garden at Kew, and in the following year, yielding to the persuasion of Sir William Jackson Hooker and John Lindley, he joined the staff at Kew, where he continued his botanical research for the rest of his life. His numerous botanical texts include *Labiatum genera et species* (1836), *Plantas hartwegianas* (1839-1857), *The Botany of the Voyage of H. M. S. Sulphur* (1844), *Handbook of the British Flora* (1858), *Flora Hongkongensis* (1861), *Flora Australiensis* (7 vols., 1863-1878), and, with Sir Joseph Dalton Hooker, *Genera Plantarum* (1883; Hooker was the son of William Jackson Hooker. and one of primary collaborators with Charles Darwin in the theory of evolution).



John Lindley (1799-1865), the foremost orchidologist of the 19th century (*Lindleyana*, the scientific journal of the American Orchid Society, is named in his honor), became the assistant secretary of the Horticultural Society of London in 1822, and the first professor of botany at University College (now the University of London) in 1829. In the same year he became the editor of *The Botanical Register* (which he renamed as *Edward's Botanical Register* in honor of its founder, Sydenham Edwards), and in 1841 he co-founded the very successful *Gardener's Chronicle*, which he edited for nearly 25 years. His numerous botanical texts include *An Introduction to the Natural System of Botany* (1831), *Genera and Species of Orchidaceous Plants* (1835), *Sertum Orchidaceum*, (1838), *Flora Medica* (1838), and *Elements of Botany* (1841).



Mimulus Cardinalis.



Mimulus cardinalis.

[*Mimulus cardinalis*](#) as illustrated in volume one of *The Botanist*, 1837. The accompanying text, by Benjamin Maud or John Henslow, stated that "Of all the species of *Mimulus* introduced of late years, this has, unquestionably, excited the greatest interest amongst floriculturists. The flowers possess much beauty, and their color is by no means a common one in the garden." The numbered figures were explained as: "1, The calyx opened (after the corolla has been withdrawn), showing the germen [ovary] and style. 2, Corolla opened, to shew [show] the stamens attached thereto. 3, The anther, unopened. 4, An anther after the discharge of its pollen. 5, One of the glandular spines, magnified, that grow on the anthers."



MIMULE CARDINAL
Mimulus Cardinalis.

Lanvin sc.

[Mimulus cardinalis](#) as illustrated in the third volume of *Annales de Flore et de Pomone, ou Journal des Jardins et des Champs* (a. k. a. *Journal et Flore des Jardins*), 1835-1836.



Mimulus Cardinalis.

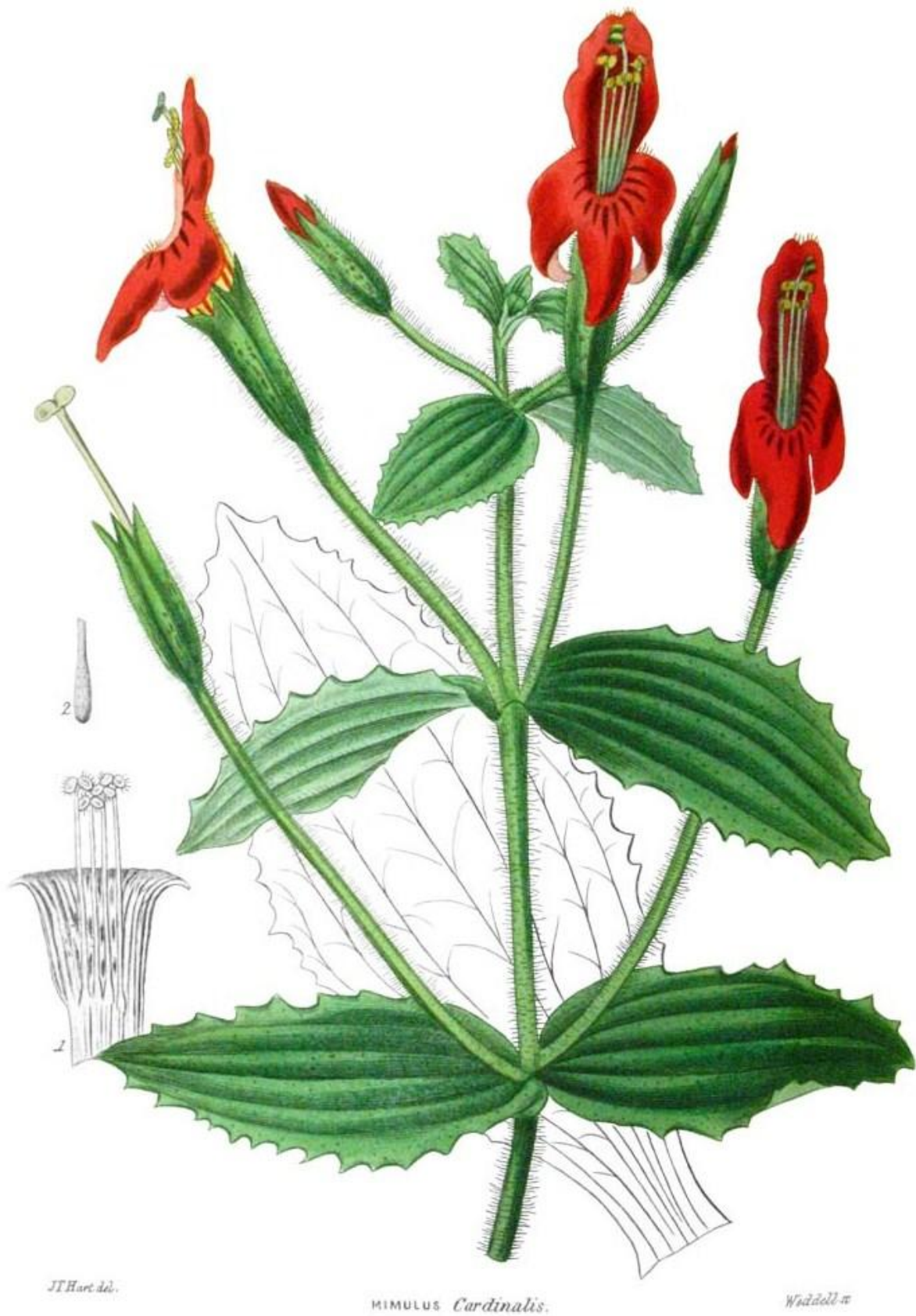
Holden, det. Smith, et al.

CCF R&B

[*Mimulus cardinalis*](#) as illustrated in volume three of *Paxton's Magazine of Botany and Register of Flowering Plants*, 1837. The editor, Sir Joseph Paxton, noted that the "Singularly formed and pretty bright scarlet blossoms... elegantly contrast with the pale yellowish-green leaves, which produce an effect that cannot but prove a valuable accession to our flower-garden ornaments."



Mimulus cardinalis as illustrated in volume 64 of *Curtis's Botanical Magazine* (1837, t. 3560). In the accompanying text Sir William Jackson Hooker noted that "Of the several species of *Mimulus* discovered by Mr. Douglas on the fertile shores of N. W. America, this was among the last, as it certainly is the most beautiful, of the whole."



Mimulus cardinalis as illustrated in volume 7 (or new series vol. 4) of *The British Flower Garden* (1838, t. 358), and in volume 2 of *The Ornamental Flower Garden and Shrubbery* (1854, t. 99). In the text that accompanied the illustration in *The British Flower Garden*, David Donn noted that "This splendid species is another of Mr. Douglas's Californian discoveries, and although but very recently introduced it has already become a common ornament of the flower border, from the faculty with which it is increased both by cuttings and seeds."

A DISSATISFACTION

Sir William Jackson Hooker, in volume 64 of *Curtis's Botanical Magazine* (1837, t. 3560), noted that the beauty of *Mimulus cardinalis* "Is somewhat diminished by the reflexed [backwardly turned] position of the scarlet lobes of the corolla." A similar opinion was expressed by Benjamin Maund or John Henslow, for in volume one of *The Botanist* (1837) it was noted that *Mimulus cardinalis* "May be reproached with reflexing its petals [corolla lobes] unduly," and one of the horticultural journals of that time, *The Floricultural Cabinet and Florist's Magazine*, went so far as to depict this species with spreading corolla lobes:



Mimulus cardinalis as illustrated in volume 4 of Joseph Harrison's *The Floricultural Cabinet and Florist's Magazine* (1836). Although Harrison made no mention of the erroneous nature of his depiction, he did note that *Mimulus cardinalis* "Is a most beautiful flowering plant, and a very great acquisition to the flower garden, and merits a place in every one, both on account of its fine scarlet blossoms, as well as its continuing to blossom from early to late in the season."

Although it is unknown how widespread this dissatisfaction with *Mimulus cardinalis* was at that time, it is known that plant breeders soon began producing hybrids between this species and its nearest relative, *Mimulus lewisii*, which has spreading corolla lobes.

Like *Mimulus cardinalis*, *M. lewisii* was also first introduced into European gardens from seeds that David Douglas collected in California. Douglas applied the name *Mimulus roseus* to the plants that he found in California in 1831, but his name was invalid, for the species had already been named. *Mimulus lewisii* was first named and described by Frederick Pursh (1774-1820), in volume two of his *Flora Americae Septentrionalis, or a Systematic Arrangement and Descriptions of the Plants of North America*, which was published in 1814 (the plants that

Douglas found in California represent the Sierra Nevada race of *M. lewisii*; the Rocky Mountain race occurs in the Cascade and Rocky Mountains, from western Canada to Utah and Colorado). Pursh named the species in honor of Meriwether Lewis of the Lewis and Clark Expedition, who collected the type specimen "On the head springs of the Missouri, at the foot of Portage hill." Sir William Jackson Hooker, in volume 2 (part 9) of his *Flora Boreali Americana* (1838), reduced *M. lewisii* to a variety of *M. roseus* (var. *glabrior*), and it was George Bentham, in volume 10 of De Candolle's *Prodromus Systematis Naturalis Regni Vegetabilis* (1846), who first reduced *M. roseus* to a synonym of *M. lewisii*.

AND WHERE IN THE CALIFORNIA COAST RANGES DID DAVID DOUGLAS FIND *MIMULUS LEWISII*?

In California *Mimulus lewisii* is known to occur only in the Cascades and the Sierra Nevada, from Tulare County northward, and at elevations ranging from about 1,200 to 3,100 meters (4,000 to 10,000 ft.), and thus far beyond the regions of the state that are known to have been explored by David Douglas. As Mr. Douglas's journal was lost when his "Canoe was dashed to atoms" in rapids on the Fraser River (in British Columbia) in June of 1833, information regarding his stay in California is limited to that contained in letters he sent to Sir William Jackson Hooker and to others in Great Britain, and from historical documents related to the early history of California, in which Mr. Douglas was mentioned. The extent of Douglas' exploration in California is, however, fairly certain, for in one of his letters to Hooker, Douglas stated that in his previous letter (from Monterey) that he had "Detailed to you the extent of my travels in that territory, and the progress of my collections, as well as gave you a brief notice of the country" (*Companion to the Botanical Magazine* 2: 151-152, 1836).

David Douglas arrived at Monterey on December 22, 1830, and spent the next three months negotiating his stay with the territorial government (at that time California was a territory of Mexico). While awaiting his passport Douglas made one excursion beyond the vicinity of the Monterey Peninsula, when, in February of 1831, he accompanied William Hartnell, a Monterey merchant, to Mission San Juan Bautista. From there Douglas proceeded, with an armed escort, to the missions of Santa Clara and Santa Cruz, and he had returned to Monterey by the second day of March.

After receiving his passport on April 20th, Douglas headed south, and by April 25th he had reached the mission at Soledad. Two days later he was at Mission San Antonio, and he reached Mission San Miguel by May 1st, Mission San Luis Obispo by May 3rd, Mission La Purisima by May 5th, Mission Santa Ynez on May 6th, and the Santa Barbara Mission by the middle of the month. After "A short stay" at Santa Barbara, Douglas returned to Monterey via "The same route," but it took him much longer to get back, for he was "occasionally penetrating the mountain valleys which skirt the coast." Douglas got back to Monterey in late June, where he remained until at least July 15th.

Douglas then "Started for San Francisco," and on this excursion he also visited San Jose, Santa Clara, Sonoma, Fort Ross, and Mount Diablo, where he collected the rare Mount Diablo



Miss Drake, del.

Pub. by J. Ridgway 169 Piccadilly June 1. 1838.

J. Walton

[Mimulus roseus](#) (*lewisii*) as illustrated in volume 19 of *Edward's Botanical Register*, 1833; the study was a plant that had been raised from seeds that were collected by David Douglas in California in 1831.

Fairy Lantern (*Calochortus pulchellus* Douglas ex Bentham).

Douglas had returned to Monterey by August 25th of 1831, and on some date between then and November 23rd he sent his first shipment of California plant specimens and seeds to England, which included his *Mimulus roseus* (*lewisii*) specimens and seeds. In his description of *Mimulus roseus*, John Lindley noted that:

This beautiful Monkey-flower was sent by Mr. Douglas from Northern California in 1831. In his letter to the Horticultural Society he spoke of it as extremely rare, and the most striking object he had met with in that country. A very few grains of seed were all that reached England; and from those a small number of plants were obtained (*Edwards Botanical Register* vol. 19, tab. 1591, 1833).

Douglas almost certainly found *Mimulus lewisii* at a relatively high elevation, for a study of reciprocal transplants across the elevation ranges of *M. cardinalis* and *M. lewisii* in the Sierra Nevada showed that the mortality rate of both species increased when planted beyond their natural elevation ranges, and for the lowest plantings of *M. lewisii*, only a few individuals survived their first year, and all of these died during the following winter.³

For the remainder of Douglas' stay in California he was in "Constant dread of a vessel arriving, and sailing without me," and thus he "Could not venture to be absent more than fifteen or twenty days at a time from the coast" (i.e., the port of Monterey). Douglas mentioned the location of only one of his later excursions, which was to the Santa Lucia Mountains in March of 1832, where he encountered *Abies bracteata* (Santa Lucia Fir) and *Pinus lambertiana* (Sugar Pine) in the vicinity of Cone Peak. As Douglas stated that he saw *Pinus lambertiana* for only his second time in the Santa Lucia Mountains in 1832 (his first encounter with this species was in southern Oregon in 1826), this rules out his finding *Mimulus lewisii* in a number of higher elevation Coast Range localities in 1831.

To the north of San Francisco Bay *Pinus lambertiana* is widespread in the southern Mayacmas Range, which includes Mount Saint Helena (1324m/4343') and Cobb Mountain (1439m/4720'), and *Pinus lambertiana* is common at higher elevations in the outer Coast Range north of Fort Ross. In the Santa Lucia Mountains *Pinus lambertiana* occurs on Junipero Serra Peak (1787m/5862') and on the Coast Ridge in the vicinity of Cone Peak (1571m/5155'), and in the San Rafael Mountains of central Santa Barbara County the species occurs from the vicinity San Rafael Mountain (2010m/6593') and eastward to Big Pine Mountain (2081m/6828') and Madulce Peak (1992m/6536').

The higher mountain ridges and peaks within the region that Douglas explored, and where *Pinus lambertiana* is absent, include Mount Diablo (1173m/3849'), and although this peak is less than 4,000 ft. (1219m), it is not uncommon for montane species to occur at lower elevations in the Coast Ranges than they do in the Sierra Nevada. Further southward in the Diablo Range, Mount Hamilton (1284m/4213') and its nearby summits are of sufficient height, and across the Santa Clara Valley the highest peaks in the Santa Cruz Mountains are Loma Prieta (1160m/3806') and Mount Umunhum (1063m/3486').

On his return to Monterey from Santa Barbara, Douglas could have passed through the Santa Lucia Mountains via the route of the Portola Expedition of 1769, as did Theodore Hartweg in 1847⁴ (Hartweg was also a plant collector for the Horticultural Society of London). This route was through the canyon of San Carpoforo Creek, and although the pass is only about

762 meters (2500'), Three Peaks is a short distance to the northwest, the highest point of which is 1030 meters (3379').

It is also possible that Douglas ventured to the San Benito Mountain region of the Diablo Range, which has an extensive area above 1219 meters (4000') that includes Sampson Peak (1421m/4,663'), San Carlos Peak (1477m/4845'), San Benito Mountain (1597m/5241'), Santa Rita Peak (1574m/5165') and Condon Peak (1515m/4970'). There are also a number of other peaks in this section of the Diablo Range that are of sufficient elevation, such as Rock Spring Peak (1229m/4033'), Bucks Peak (1266m/4153'), Tucker Mountain (1247m/4092'), Hepsedam Peak (1368m/4487') and Center Peak (1382m/4535').

The highest mountains and peaks in San Luis Obispo County are all in the La Panza Range, and the highest point of this range is Machesna Mountain (1238m/4063').

The San Rafael Mountains in central Santa Barbara County, west of San Rafael Mountain (where *Pinus lambertiana* is present), include a number of peaks and ridges above 1219 meters (4000'), such as Zaca Peak (1323m/4341'), Ranger Peak (1414m/4640'), Cachuma Mountain (1431m/4696'), Figueroa Mountain (1685m/5528') and McKinley Mountain (1884m/6182'). To the south of the San Rafael Mountains there are also prominences in the upper watershed of the Santa Ynez River above 1219 meters (4,000'), such as Little Pine Mountain (1373m/4506') and Alexander Peak (1252m/4107'), and to the north of the San Rafael Mountains the Sierra Madre Mountains also have many areas above 1219 meters, such as Miranda Pine Mountain (1256m/4120'), Timber Peak (1452m/4764'), McPherson Peak (1752m/5749'), and Peak Mountain (1781m/5843').

Douglas had to cross the Santa Ynez Mountains twice while going to and returning from Santa Barbara, and had to have taken one or both of the routes between the missions of Santa Barbara and Santa Ynez. To the east of the summit of Refugio Pass (687m/2254'), the crest of the Santa Ynez Mountains includes areas above 1219 meters, such as Santa Ynez Peak (1310m/4298') and Broadcast Peak (1228m/4028'). To the east of the summit of San Marcos Pass (678m/2224'), the crest of the Santa Ynez Mountains includes an extended area above 914 meters (3000'), which includes La Cumbre Peak (1215m/3985').

When keeping in mind that Douglas spent about six weeks returning to Monterey from Santa Barbara in 1831, it seems most probable that he found *Mimulus lewisii* somewhere between Santa Barbara and Monterey, and my hunch is that it was somewhere in Santa Barbara County.

THE EARLY HORTICULTURAL HYBRIDS BETWEEN *MIMULUS CARDINALIS* AND *MIMULUS LEWISII*.

The first published description of a hybrid between *Mimulus cardinalis* and *M. roseus* (*lewisii*) was in the September, 1837 edition of *Paxton's Magazine of Botany* (vol. 4, February 1837 to January 1838). Sir Joseph Paxton named the hybrid *Mimulus harrissonia*, but failed to mention who the plant was named for. It was produced in the nursery of Messrs. Low and Co., Clapton, and flowered for the first time in June of 1837. Another hybrid between *M. cardinalis* and *M. roseus* (*lewisii*), *Mimulus roseo-cardinalis* Henslow, was first described and illustrated in volume two of *The Botanist* (1838). The hybrid was the creation of Mr. Hodson, the director of the Botanic Garden of Bury St. Edmonds, and it flowered for the first time in the summer of 1837. Both of these hybrids were produced from the seeds of a *Mimulus roseus* plant that had been fertilized with pollen from a *Mimulus cardinalis* plant.



[*Mimulus harrisonia*](#) as illustrated in volume six of *The Floricultural Cabinet and Florist's Magazine*, 1838 (in the upper right), and in volume four of *Paxton's Magazine of Botany and Register of Flowering Plants*, 1838.



Mimulus roseo-cardinalis.

M^{rs} Withers, del.

[Mimulus roseo-cardinalis](#) as illustrated in volume two of *The Botanist*, 1838. The numbered figures were explained as “1, The corolla laid open, shewing [showing] the four didynamous [paired] stamens attached to its lobes. 2, The Pistil.”



[*Mimulus roseo-cardinalis*](#), and a flower of *M. cardinalis*, as illustrated in volume one of the second series of *Herbier General de l'Amateur*, 1839.

In the early 1840s another hybrid between *Mimulus cardinalis* and *M. roseus* (*lewisii*) was described and illustrated in a number of texts. In 1839 the original plants (from which the seeds were widely distributed) were raised by John Maclain, of Herald's Cross, near Dublin, Ireland, for whom the hybrid was named. Maclain produced these plants by breeding the *Mimulus harrisonia* hybrid between *M. cardinalis* and *M. roseus* with *M. cardinalis*. The seeds were product of placing *M. cardinalis* pollen on the stigmas of the *harrisonia* hybrids, and thus the plants were more closely related to *M. cardinalis* than to *M. roseus*. Although the authors who mentioned the name of the breeder were in agreement in that he was from Herald's Cross, there was a disagreement as to the spelling of his name. This factor, in combination with erroneous translations of the breeder's name into botanical Latin (and perhaps typographical errors), resulted in a variety of spellings for the name of this hybrid.

The following series of chromolithographic plates illustrate this variously named hybrid, which was said to have had larger corollas than that of its parents, and the throat was said to be deep red, as shown. Your guess is as good as mine as to why some of these illustrations depict this hybrid with generally spreading corolla lobes, while others depict it with reflexed corolla lobes.

In the early 1890s another horticultural variety of *Mimulus cardinalis* was produced in Germany. The hybrid, which was named *Mimulus cardinalis pictus* Hort., was described and illustrated in volume 40 of *Gartenflora*, 1891, and in volume 16 of *Wiener Illustrierte Garten Zeitung*, 1891. The name of the other parent was not stated. The corollas were golden yellow with a purplish-red throat.



Mimulus cardinalis pictus as illustrated in volume 16 of *Wiener Illustrierte Garten Zeitung*, 1891.



Mimulus Macleanii.

Printed by J. R. Johnson

Mimulus "macleanii" as illustrated in volume six of *The Floricultural Magazine and Miscellany of Gardening*, 1841.



W. Fitch del^d

Pub. by S. Curtis Glazenwood Essex Feb^y 1. 1842

Scut. Sc.

Mimulus roseus var. "maclainianus" as illustrated in volume 68 of Curtis's *Botanical Magazine*, 1842. In the accompanying text Sir William Jackson Hooker stated that "Beautiful as are the now well known species of *Mimulus* from California, *M. roseus* and *M. cardinalis*, this, we think, exceeds them both in the size and rich coloring of the flower; and we cannot doubt but when it shall be in more general cultivation, it will become a great favorite."



Mimulus "macclainianus" as illustrated in volume nine of *Paxton's Magazine of Botany*, 1842. In the accompanying text Sir Joseph Paxton stated that "*M. roseus* is stated to be one of the parents, and there can be little question that *M. cardinalis* is the other."



The [Mimulus plate](#) in volume two of Jane Loudon's *The Ladies' Flower Garden of Ornamental Perennials*, 1844. *Mimulus* "maclaiana" is in the upper center, *M. cardinalis* is in the upper left, and *M. roseus* (*lewisii*) is in the lower left. The plant in the center actually represents two species, *M. guttatus* (the Common or Seep Monkey Flower of western North America) and *M. luteus* (which is a native of temperate South America). These species, which at that time were considered to be varieties of the same species, are distinguished by their corolla throats. In *M. luteus* the throat is open (as depicted in the flowers to the right), while in *M. guttatus* the throat is nearly closed due to the upwardly swollen palate (as depicted in the flowers to the left). *Mimulus smithii*, which is illustrated on the right, was a cross between the *rivularis* and *variegatus* varieties of *Mimulus luteus*.



According to the accompanying text, in volume four of *The British Florist* (1843), this illustration represents varieties of *Mimulus cardinalis*.

Natural hybrids between *Mimulus cardinalis* and *Mimulus lewisii* occur at intermediate elevations in the Sierra Nevada, where the ranges of these species overlap. A plate of photographs depicting a flower of a typical *M. cardinalis* plant, a flower of a typical *M. lewisii* plant, and the flowers of ten intermediate plants, is featured in Schemske & Bradshaw's "Pollinator preference and the evolution of floral traits in monkeyflowers (*Mimulus*)," *Proceedings of the National Academy of Sciences (PNAS)* 96 (21): 11910-11915, 1999, which is online at:

<http://www.pnas.org/content/96/21/11910.full>

This article represents one of many published scientific papers that discuss the *Mimulus* section of *Erythranthe*, to which *M. cardinalis* and *M. lewisii* belong, for it has become a model system for evolutionary, ecological and genetic research.

The color and the shape of the flowers of *Mimulus cardinalis* and *M. lewisii* represent evolutionary adaptations that aid in attracting their preferred pollinators. The flowers of *M. cardinalis* are typical for plants that prefer hummingbirds, for they are red in color and are rich

in nectar, and since hummingbirds hover while feeding, there is no need to provide a landing pad (and hence the reflexed corolla lobes). The stigma and anthers are situated at just the right place above the corolla tube so that they come in contact with the bird's forehead while it is feeding, and the deposits of pollen thereon are thus often transmitted to other plants of the same species. It is believed that hummingbirds learn to associate red flowers of particular shapes with large rewards of nectar (insects tend to ignore red flowers). Other typical hummingbird pollinated species include Hummingbird Sage (*Salvia spathacea*), Hummingbird's Trumpet or California Fuchsia (*Epilobium canum*), and the various paintbrushes (*Castilleja*). The flowers of *Mimulus lewisii* are also well adapted for their preferred pollinators, bees, and since bees do not hover while feeding, the spreading corolla lobes provide an excellent landing pad.

TAXONOMY

Unlike the taxonomical history of too many plant species, that of *Mimulus cardinalis* is relatively simple. In 1840 the French botanist Edouard Spach (1801-1879) placed *M. cardinalis* into a genus which he named *Erythranthe*,⁵ and although this genus failed to gain acceptance by other botanists, *Erythranthe* eventually became the name for the section of *Mimulus* to which *M. cardinalis* and its relatives are now placed. In 1857 the French botanist Johannes Groenland (1824-1891) assigned *M. cardinalis* to the genus *Diplacus*,⁶ but he appears to have remained alone in his opinion. In 1909 Edward Greene named three varieties of *M. cardinalis*, but these were soon reduced to synonyms *M. cardinalis* by his contemporary botanists. These varieties were *griseus*, based on a specimen that was collected on Santa Catalina Island, *rigens*, based on a plant collected in the vicinity of San Bernardino, and *exsul*, based on a specimen that was collected on Cedros Island, off the coast of Baja California.⁷ Edward Lee Greene (1843-1915), the first faculty botanist at the University of California (at that time there was only one campus: UC Berkeley), was much ridiculed by his contemporary botanists for excessively naming and splitting taxa. In spite of this, a very large number of Greene's taxa have stood the test of time, as evidenced by his authorship of three of the seven *Erythranthe* species.

ERYTHRANTHE

According to the results of the research of Beardsley, et. al. (2003),⁸ the *Mimulus* section of *Erythranthe* is comprised of seven species that originated from insect pollinated ancestors, and hummingbird pollination preference evolved twice within this group.*

The earliest development of hummingbird pollination preference in *Erythranthe* evolved into the *M. verbenaceus*, *eastwoodiae*, *nelsonii* and *rupestris* clade, which further developed into two divisions; one is represented by *M. verbenaceus* and *M. eastwoodiae*, and the other by *M. nelsonii* and *M. rupestris*.⁹ *Mimulus verbenaceus* E. Greene occurs along streams and at isolated springs and seeps from the Grand Canyon region of northern Arizona to the Sierra Madre Occidental in the Mexican states of Chihuahua and Sinaloa, and *Mimulus eastwoodiae* Rydberg is a primarily a seepy cliff dwelling species of southwestern Colorado, southeastern Utah, north-

* This paper is online at:

http://rydberg.biology.colostate.edu/seminarPDFs/Beardsley_May_7.pdf

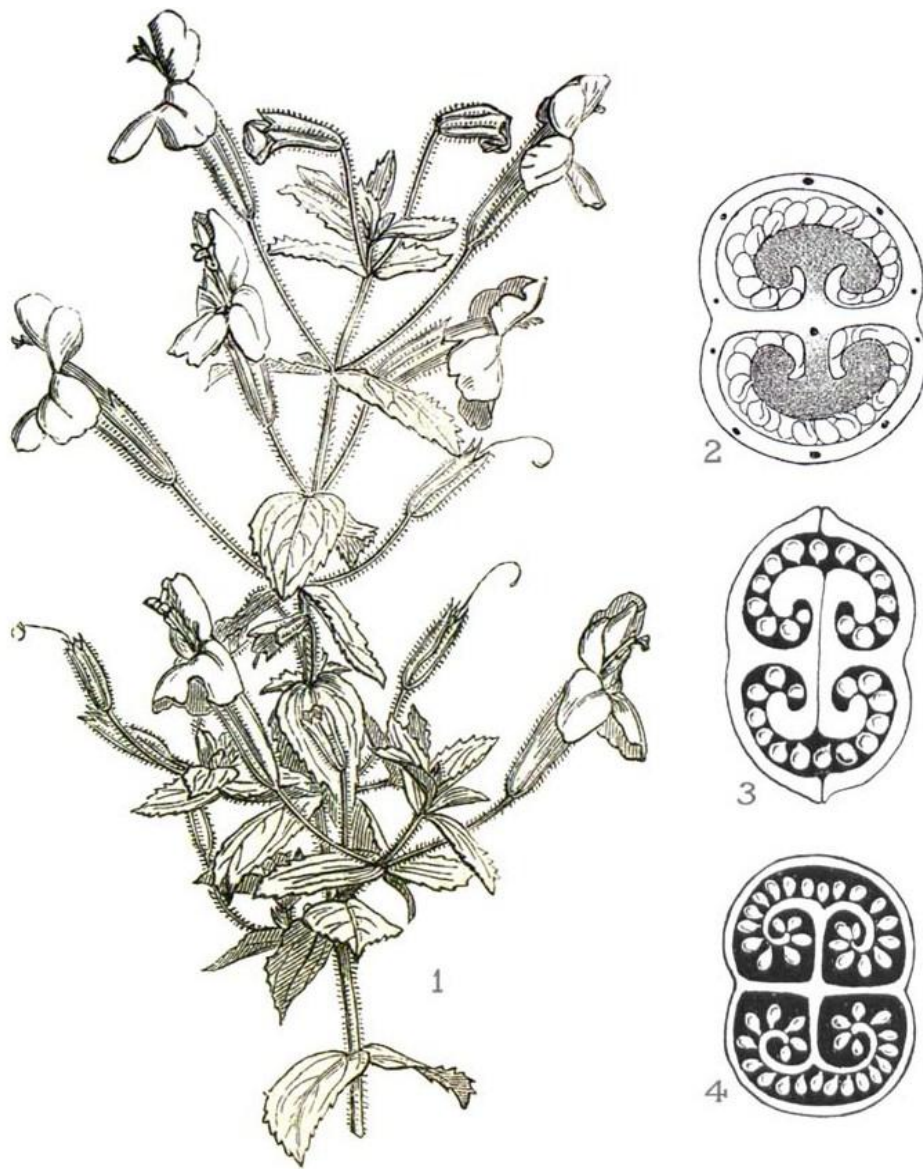


Fig. 59. — *Diplacus cardinalis*.

1, "*Diplacus*" (*Mimulus*) *cardinalis* as illustrated in volume six of the fourth series of *Revue Horticole*, 1857; 2, a cross section of a *Mimulus cardinalis* fruit as illustrated in Richard Wettstein's *Handbuch der Systematischen Botanik*, 1935; 3, a cross section of *Mimulus aurantiacus* fruit as illustrated in Adele Grant's "A Monograph of the Genus *Mimulus*," *Annals of the Missouri Botanical Garden* 11: 99-388, 1924; 4, a cross section of a *Mimulus guttatus* fruit, which is also from Grant's monograph. ***Diplacus*** was a genus created by Thomas Nuttall (1786-1859), in which he placed a number of thus far named taxa of the *Mimulus aurantiacus* complex (the sticky or bushy monkey flowers of the California Floristic Province). According to Nuttall, "The generic name alludes to the splitting of the capsule, attached to each valve of which is seen a large placenta, and under its edges are found the slender subulate seeds" (re., "On Two New Genera of Californian Plants," (*Taylor's*) *Annals of Natural History; or, Magazine of Zoology, Botany, and Geology* 1: 136-139, 1838). Although Nuttall's *Diplacus* did become widely accepted, it was eventually reduced the section of *Mimulus* that includes the *M. aurantiacus* complex and *M. clevelandii*.

western New Mexico and northern and southern Arizona. *Mimulus nelsonii* A. Grant is a stream and cliff dwelling species with linear leaves that occurs in the Sierra Madre Occidental in the Mexican state of Durango, and *M. rupestris* E. Greene is a wet cliff dwelling species that is apparently known from only one location in the Mexican state of Zacatecas, near the town of Morelos.

The other *Erythranthe* clade retained a common insect pollinated ancestor for some time, and at some point *Mimulus parishii* evolved from this line. *Mimulus parishii* E. Greene is an insect pollinated annual herb of sandy stream beds that occurs from the southern Sierra Nevada and desert mountains of California and southwestern Nevada, to the Transverse and Peninsular ranges of southern California and northern Baja California. Later on within this *Erythranthe* clade hummingbird pollination preference evolved for the second time, resulting in *Mimulus cardinalis*, and the *Mimulus lewisii* line further developed into two races, the Sierra Nevada and Northern or Rocky Mountain forms¹⁰ (the latter occurs in the Pacific Northwest and the Rocky Mountains).

DISTRIBUTION

Although specimens of *Mimulus cardinalis* have been repeatedly collected in Yakima County in the state of Washington, one of which dates to August of 1895, it appears that the consensus at the University of Washington is that this species is not native to that state.¹¹

To the south the native distribution of *Mimulus cardinalis* begins in the southern watershed of the Willamette River in western Oregon, and extends southward, through the mountains of California (and in adjacent mountains of far western Nevada), to the Sierra de San Pedro Matir in northern Baja California. *Mimulus cardinalis* also occurs on some of the islands off the coast of southern California and northern Baja California, and in mountainous regions of Arizona, southwestern Utah and northwestern New Mexico.

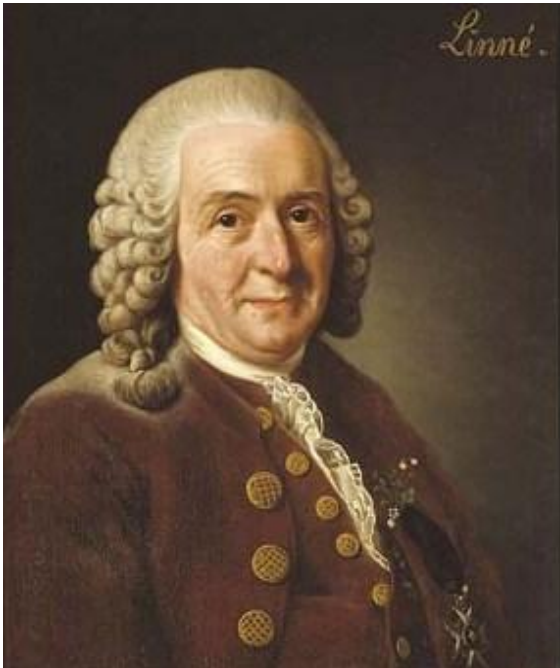
According to a number of online sources, such as Wikipedia, the USDA's Natural Resources Conservation Service Plants Database, and the USDA's Germplasm Resources Information Network (GRIN), the distribution of *Mimulus cardinalis* extends southward into the Mexican states of Sonora, Sinaloa and Chihuahua. This is due to an acceptance of *Mimulus verbenaceus* as a variety of *Mimulus cardinalis*, or to the reduction of *M. verbenaceus* to a synonym of *M. cardinalis*. As stated earlier, genetic studies have shown that *Mimulus verbenaceus* and *M. cardinalis* belong to different clades within *Erythranthe*, and the name *Mimulus cardinalis* var. *verbenaceus* (E. Greene) Kearney & Peebles is listed as a synonym of *Mimulus verbenaceus* by both IPNI (The International Plant Name Index) and Tropicos. *Mimulus verbenaceus* was first named and described by Edward L. Greene in 1909 (*Leaflets of Botanical Observation and Criticism* 2: 2-3), and was first reduced to a variety of *Mimulus cardinalis* by Thomas H. Kearney and Robert H. Peebles in 1939 (*Journal of the Washington Academy of Sciences* 29: 491). Kearney and Peebles retained *Mimulus verbenaceus* as a variety of *Mimulus cardinalis* in their *Arizona Flora*, which was first published in 1951.



Mimulus verbenaceus as illustrated in volume five of Mary Vaux Walcott's *North American Wild Flowers*, 1925. Although the accompanying text states that this is an illustration of *Mimulus cardinalis*, the pedicels are much longer than the subtending leaves, the corolla tubes greatly exceed the length of the calyces, and the lower corolla lobes are spreading. These features clearly correspond to *Mimulus verbenaceus*. According to Walcott, this is an illustration of a plant that she encountered at Indian Gardens, along the Bright Angel Trail in the Grand Canyon, where *Mimulus verbenaceus* is known to occur.¹²

MASKED MIMIC FLOWERS

As for the name Monkey Flower, this is a misnomer that was based on an assumption by English botanists that the generic name was derived from the Greek word for a monkey, and it was further assumed that the name referred to either the appearance of the flowers or to that of the seeds. The genus *Mimulus* was first named and described by Linnaeus (Carl von Linne, 1707-1778), in the first edition of his *Species Plantarum* (1753), and the name was based on the appearance of the flowers of the type species, *Mimulus ringens*, which is native to eastern North America. On page 182 of his *Philosophia Botanica* (1755), Linnaeus defined *Mimulus* as "*Mimus personatus*;" *Mimus* is a Latin word for a mimic actor, and *personatus* is Latin word for a mask. As *ringens* is a Latin word for gaping, Linnaeus thought that the flowers of *Mimulus ringens* resembled gaping masked mimics. In Austria plants of this genus somehow became known as Juggler Flowers.¹³



To the left, a portrait of Linnaeus, the founder of the binominal system of nomenclature, and to the right, *Mimulus ringens* flowers, as illustrated in volume 8 of The Botanical Magazine, 1794.

MIMULUS IN PHRYMACEAE

Linnaeus placed the genus *Mimulus* in *Scrophulariaceae*, the Figwort Family, and there it remained in botanical literature until the mid 1990s, when, due to the findings of genetic research, the Figwort Family was greatly dismembered. *Mimulus* was placed in *Phrymaceae*, the Lopseed Family, which now consists of eleven genera and about 190 species. *Mimulus* is comprised of about 120 species, and about 99 are endemic to western North America and Mexico. About 10 species occur in temperate South America, and the remainder occur in eastern North America (2 species), Australia (4 species), the Himalayan region (4 species), Madagascar (2 species) and South Africa (1 species).¹⁴



Mimulus cardinalis flowers as photographed along Tassajara Creek, near the confluence of Oryoki Creek, in late June of 2009. Oryoki Creek is the perennial stream that enters Tassajara Creek from the west between Tassajara Hot Springs and the confluence of Tassajara and Church creeks (Tassajara Creek is located in the Santa Lucia Mountains of Monterey County, California).

DESCRIPTION

Mimulus cardinalis is a perennial herb from creeping rhizomes (generally horizontal root stalks that send stems upwards and roots downward). The erect or ascending stems range from about 2 to 8 dm. tall (plants growing in deeply shady places tend to have widely sprawling stems), and, except for the corollas, the entire plant is covered with a dense coat of soft translucent hairs. The serrately margined oblong to obovate leaves are opposite, palmately three to five veined, about 2 to 8 cm. long, and gradually become reduced in size upwards on the stems (the bases of the upper leaves often clasp the stem). The bisexual flowers (i.e., flowers that have both pollen producing stamens and pollen receiving styles) are usually produced in opposite pairs in the upper axils of the leaves, in a branching racemose inflorescence, and are on pedicels that range from about 5 to 8 cm. long. The tubular calyces, which are about 2 to 3 cm. long and not much shorter than the tubes of the corollas, have five outstanding veins that terminate in pointed lobes. The tube and throat of the strongly bilabiate corollas are about 4 to 6 cm. long, and the lobes are laterally very strongly reflexed. The upper lip is comprised of two entire lobes, and the lower lip is comprised of three lobes that are two lobed at the apex. The corollas are scarlet red on the front side and a very light shade of reddish or yellowish brown on the back side, and red or yellow hairs occur in the throat and irregularly so on the margins; the marginal hairs mostly occur at and near the bases of the lobes, but sometimes occur along tops of the upper lobes. The singular pistil and the four

stamens are well exserted, and the former arises from a superior ovary. The fruit is a narrow and many seeded two celled capsule about 16 to 18 mm. long.



A [*Mimulus cardinalis*](#) flower as photographed along Tassajara Creek, near the confluence of Oryoki Creek, in late June of 2009.

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- ¹ Hooker, Sir William Jackson. "A Brief Memoir of the Life of David Douglas, with Extracts from His Letters," *Companion to the Botanical Magazine* 2: 79-182, 1836. The note about *Mimulus cardinalis* is on page 150.
- ² *Ibid.*, page 82.
- ³ Angert, A. L., and D. W. Schemske. "The Evolution of Species' Distributions: Reciprocal Transplants Across the Elevation Ranges of *Mimulus cardinalis* and *M. lewisii*." *Evolution* 59 (8): 1671-1684. 2005.
- ⁴ Hartweg, Theodore. "Journal of a Mission to California in Search of Plants," part 4. *The Journal of the Horticultural Society of London* 3: 226. 1848.
- ⁵ *Histoire Naturelle des Vegetaux Phanerogames* 9: 313, 1840.
- ⁶ *Revue Horticole* series 4, vol. 6: 137, 1857.
- ⁷ *Leaflets of Botanical Observation and Criticism* 2: 2, 1909.
- ⁸ Beardsley, Paul M., Alan Yen & Richard G. Olmstead. "AFLP Phylogeny of *Mimulus* Section *Erythranthe*, and the Evolution of Hummingbird Pollination." *Evolution* 57 (6): pp. 1397-1410, 2003.
- ⁹ *Ibid.*
- ¹⁰ *Ibid.*
- ¹¹ *Contributions of the U. S. National Herbarium* 11: 508, 1906, and the online database of herbarium specimens at the University of Washington's Burke Museum of Natural History and Culture.
- ¹² *Annals of the Missouri Botanical Garden* 11: 143, 1924, and *Great Basin Naturalist* 54: 213, 1994.
- ¹³ *Wiener Illustrirte Garten Zeitung* 16: 479-480, 1891.
- ¹⁴ Beardsley, P. M., and R. G. Olmstead. "Redefining *Phrymaceae*, the placement of *Mimulus*, tribe *Mimuleae*, and *Phryma*." *American Journal of Botany* 89 (7): 1093-1102. 2002.