

## ***Dudleya hendrixii* A New, Rare Species From Colonet Mesa, Baja California**

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Source: Madroño, 63(4):359-365.

Published By: California Botanical Society

URL: <http://www.bioone.org/doi/full/10.3120/0024-9637-63.4.359>

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*DUDLEYA HENDRIXII* A NEW, RARE SPECIES FROM COLONET MESA, BAJA CALIFORNIA

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ABSTRACT

*Dudleya hendrixii* S. McCabe & Dodero is a succulent endemic, restricted to a small area of Colonet Mesa (Baja California, Mexico). It is similar to the more widespread *D. blochmaniae* (Eastw.) Moran subsp. *blochmaniae*, which has been placed in subg. *Hasseanthus* (Rose) Moran, and to *D. attenuata* (S. Watson) Moran subsp. *orcuttii* (Rose) Moran, which has been placed in subg. *Stylophyllum* (Britton & Rose) Moran. Both of these other species have much wider ranges. *Dudleya hendrixii* differs from *D. blochmaniae* subsp. *blochmaniae* in having fewer, terete, more upright, and waxier leaves. Unlike *D. attenuata* subsp. *orcuttii*, *D. hendrixii* is summer deciduous, acaulescent, and has much shorter inflorescences.

RESUMEN

*Dudleya hendrixii* S. McCabe & Dodero es suculenta. *Dudleya hendrixii* es endémico a una pequeña porción de la mesa Colonet. Es similar a la *D. blochmaniae* (Eastw.) Moran subsp. *blochmaniae*, que se ha colocado en el subgenera *Hasseanthus* (Rose) Moran, y *D. attenuata* (S. Watson) Moran subsp. *orcuttii* (Rose) Moran, que se ha colocado en el subgenera *Stylophyllum* (Britton & Rose) Moran, las cuales tienen rangos más extensivos. Se distingue *Dudleya hendrixii* de *D. blochmaniae* subsp. *blochmaniae* por la presencia de menos hojas, que son más verticales, cilíndricos, más vertical, y las hojas más cerosas. A diferencia de *D. attenuata* subsp. *orcuttii*, *D. hendrixii* es de hoja caducifolio verano, casi sin tallo, y tiene inflorescencias mucho más cortos.

Key Words: Colonet, Crassulaceae, *Dudleya*, Jimi Hendrix, new species, rare.

The genus *Dudleya* Britton & Rose (1903) consists of approximately 47 species of leaf-succulent perennials, native to California, Oregon, Arizona, Nevada, and Utah, USA, and to Baja California, Baja California Sur, and Sonora, Mexico (Wiggins 1980; Dodero and Simpson 2012; McCabe 2012). *Dudleya* subg. *Hasseanthus* (Rose) Moran, as traditionally treated (Moran 1950, 1951, 1953; Munz 1974; Bartel 1993; McCabe 2012), contains six species (seven taxa total): *D. blochmaniae* (Eastw.) Moran subsp. *blochmaniae*, *D. blochmaniae* subsp. *insularis* (Moran) Moran, *D. brevifolia* (Moran) Moran, *D. crassifolia* Dodero & M.G. Simpson, *D. multicaulis* (Rose) Moran, *D. nesiotica* (Moran) Moran, and *D. variegata* (S. Watson) Moran. Species in subg. *Hasseanthus* are characterized by their drought deciduous leaf duration and hypogeous caudex, and range from San Luis Obispo Co., California to northern Baja California, Mexico.

Small *Dudleya* plants on Colonet Mesa were mentioned in Thomson (1993), Clark et al. (2008), Dodero et al. (2009), and in Harper et al. (2011). One taxon from Colonet Mesa was named *D. crassifolia* Dodero & M.G. Simpson (2012), differing from other members of subg. *Hasseanthus* by having a “thicker

petiole,” (2–3.3 mm thick vs. 0.4–1.7 mm thick in other subg. *Hasseanthus* taxa) and “conspicuous dried leaf bases persisting on the caudex.” Here we describe another form from Colonet Mesa and discuss its possible position within the subgenus. This form of *Dudleya* should be treated as a new species using a taxonomic (morphologic) species concept (Cronquist 1978, 1988), in which species are circumscribed based on the discontinuity of morphological features.

TAXONOMIC TREATMENT

*Dudleya hendrixii* S. McCabe & Dodero, sp. nov. (Figs. 1–3).—Type: MEXICO, Baja California, Colonet Mesa, ca. 18 km miles south-southwest of Colonet, growing in clay soils in a large, shallow depression within a mesa top, between very occasional nearby mounds, the mounds several cm to dm higher, 95 meters elevation, 30°57.608' N, 116°19.449' W, 3 June 1995, M. Dodero s.n. (holotype: SD; isotypes: BCMEX, RSA, SBBG, UC).

*Dudleya hendrixii* is similar to *D. blochmaniae* subsp. *blochmaniae*, differing in having fewer, terete,

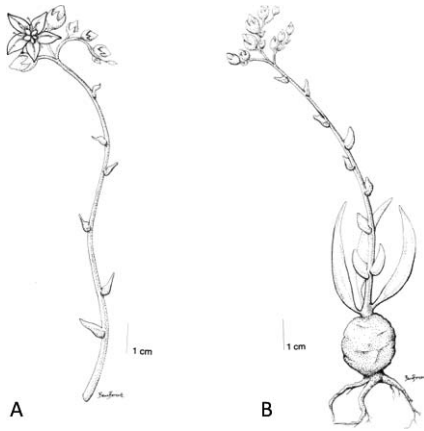


FIG. 1. Illustrations of *D. hendrixii*. A. Inflorescence, showing alternate peduncle bracts and spreading petals of flower. B. Whole plant, showing corm-like structure and basal leaves, this sample with single inflorescence. Line drawings by Becca Berezuk.

more upright, and waxier leaves. It is similar to *D. attenuata* (S. Watson) Moran subsp. *orcuttii* (Rose) Moran [= *D. attenuata* (S. Watson) Moran *sensu* Moran 2001, differences between the subspecies are discussed in McCabe, in prep.], differing in being summer deciduous and acaulescent and in having much shorter inflorescences.

**Plants** unbranched, low, succulent, to ca. 5 cm across. **Caudex** essentially acaulescent, very short, corm-like, spherical to slightly longer than wide, at ground level. **Leaves** in a rosette, usually 3 to 5, summer deciduous, leaf bases not buried, succulent,  $\pm$  circular in cross-section, linear to fusiform, straight or curved, almost always with a medium amount of light gray glaucescence, upright, typically with one leaf curving over the apex of the plant, upper portions of leaves not close to one another, apex acuminate-attenuate, not angled by bud printing. **Inflorescences** 2–4 from caudex, erect to ascending, 10–20 cm tall (up to 25 cm in cultivation), typically with several lateral branches 1–2.5 cm long, peduncle 1–2 mm thick, flecked with barely visible tiny short vertical red lines (previous year's dead peduncles persistent in cultivation and light colored), lowest two bracts often sub-opposite, those above almost always alternate, lower bracts 4–10 mm long, 3–7 mm wide, 3–5 mm thick, pyriform and flattened above, apex attenuate, almost always glaucous (plump in late June in cultivation). **Pedicels** 0–1 mm long. **Flower**. Calyx ca. 3 mm long, sepals red-brown  $\pm$  glaucous especially toward base. Corolla ca. 8 mm long, 3 mm wide, petals spreading to inclined (to 25° above horizontal), in bud pink, at maturity white with pink especially on abaxial side, red along keel, odor not noted in the wild (odor absent in a sample size of four plants in cultivation). **Stamen** filaments ca. 6 mm long, anthers ca. 0.5 mm

long, basifixed, predehiscent anthers red, pollen yellow. **Gynoeceum** 6–7 mm long, pistils white when young, spreading, becoming widely spreading at maturity. **Fruits**. Follicles 3–4 mm long, widely spreading.

Paratype: MEXICO, BAJA CALIFORNIA. Colonet Mesa, ca. 18 km south-southwest of Colonet, 96 meters elevation, 30°57.608'N, 116°19.449'W, 4 August 2009 ex hort., S. McCabe 1237 (BCMEX, UC).

#### DISTRIBUTION, ABUNDANCE, AND HABITAT

There are approximately 5,000–10,000 plants distributed over a few acres of land. Colonet Mesa has a coastal maritime influence. Some of the associated species found near *D. hendrixii* include *Agave shawii* Engelm., *Calochortus splendens* Douglas ex Benth., *Crassula connata* (Ruiz & Pav.) A. Berger, *Cuscuta* sp., *D. ingens* Rose, *Euphorbia misera* Benth., *Ferocactus viridescens* (Torr. & A. Gray) Britton & Rose, *Lasthenia* sp., *Linanthus dianthiflorus* (Benth.) Green, *Lycium brevipes* Benth., numerous lichens, a *Gnaphalium* L. or *Pseudognaphalium* Kirp. (identified from photos), and a few small grasses. *Dudleya hendrixii* occurs within a very large, comparatively flat coastal mesa having some vernal pools. The most common vegetation type away from the pools is referred to as maritime succulent scrub (*mattoral roseto filo costero*) (Harper 2011) or as Martyrian coastal succulent sage scrub (Dodero et al. 2009). *Dudleya hendrixii* is found in a single, large, shallowly concave, slight depression that is, however, not a vernal pool. This depression has a fairly gentle slope that may have surface water flowing into it during heavy rains. Within this shallow depression are low mounds ca. 0.3–1.5 m high. Various drought-adapted species occur on the mounds, including *Agave shawii* subsp. *shawii*, *D. ingens*, and *D. attenuata* subsp. *attenuata*, which are not abundant off of the mounds.

#### PHENOLOGY AND HERBIVORY

*Dudleya hendrixii* flowers in the wild from late May to June. After a brief survey on 23 March 2009, one plant showed signs of damage from the larvae of a moth or butterfly. At that time lower bracts were visible, but no flower buds. In cultivation in a common garden, *D. hendrixii* flowered much later than *D. blochmaniae* subsp. *blochmaniae*.

#### ETYMOLOGY

The specific epithet, *hendrixii*, is named after the famous American guitarist Jimi Hendrix. Music by that artist was playing when the second author first saw the plants.

Suggested common name: Hendrix's Dudleya.

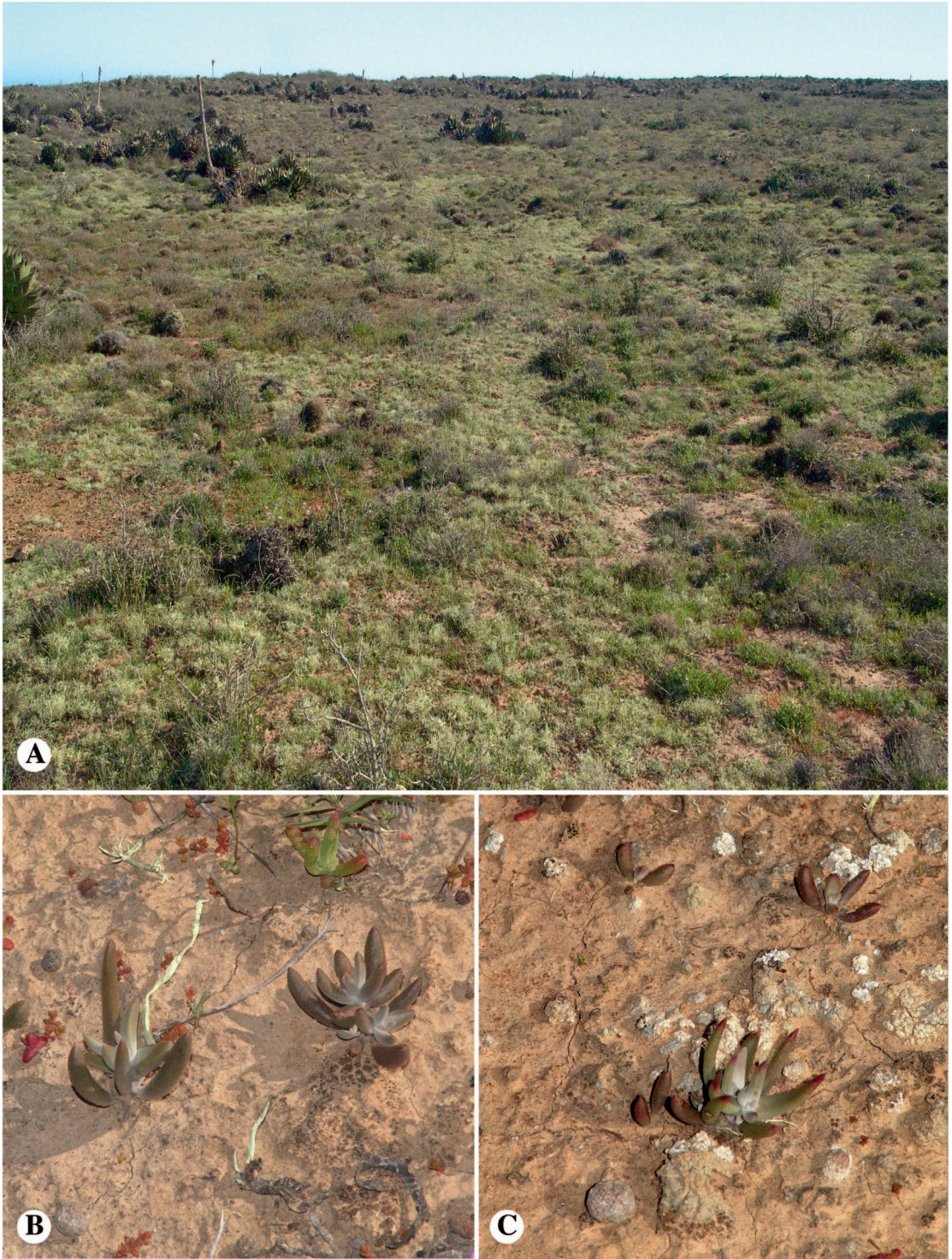


FIG. 2. Photographs of *D. hendrixii* in the field, at Colonet Mesa. A. Vegetation. Note topographically lower areas near foreground with surrounding intermittent mounds. B-C. Individual plants at young stage. Note vegetative leaves arching over young inflorescence.

TABLE 1. Comparison of four *Dudleya* taxa that occur in the Colonet Mesa region.

|   | <i>D. hendrixii</i>  | <i>D. blochmaniae</i> subsp. <i>blochmaniae</i>   | <i>D. crassifolia</i>   | <i>D. attenuata</i> subsp. <i>attenuata</i> (occurs with <i>hendrixii</i> ) and <i>D. a. orcuttii</i> (which occurs elsewhere on the Mesa)   |
|---|--|---|---|--|
| Summer deciduous                                      | Obligate   | Obligate  | Some are not obligate, perhaps some are   | No   |
| Obvious above ground stem?                            | 0  | 0   | 0, base of leaves buried  | Yes  |
| Number of leaves                                      | Usually 3-5  | Usually more than 5   | Usually 5 or more   | More than 5  |
| Conspicuous dried leaf bases persisting on the caudex | Rare or uncommon   | No  | Usually   | Yes, on an above ground stem   |
| Petal color   | White, keel red  | White, keel red   | White, "keel and base maroon, often suffused with maroon throughout." The red of <i>D. hendrixii</i> is the same as the maroon of <i>D. crassifolia</i> | White or yellow, usually with red to brownish-red keel   |
| Leaf attitude   | Lvs ± upright with one often arching over the apex   | Leaves spreading  | Leaves ascending  | Lvs ± upright, with none or one or more arching over the apex  |
| Waxiness of rosette leaves                            | Fairly waxy, greyish-white   | None to slight.   | Variable  | Fairly to very waxy  |
| Leaf color  | Greyish white  | Green to bronze (red-brown) with slight waxiness  | Variable  | Greyish white to white [to purple-grey or purple-red]  |
| Leaf attitude   | Mostly upright, often with one curving over apex   | Spreading to lax, no leaves curving over apex   | Usually ascending, no leaves curving over apex  | Ascending to upright, no leaves curving over apex [or rarely so]   |
| Petiole   | Not twisted ¼ turn as leaf blade bends towards substrate; narrow (1-1.5 mm), upright   | Sometimes twisted ¼ turn as leaf blade bends towards substrate; distinctly narrow (<1mm), lax   | Not twisted ¼ turn as leaf blade bends towards substrate; leaf blade slightly wider than petiole, fairly upright  | Not twisted ¼ turn as leaf blade bends towards substrate; no obvious petiole at lf diameter < 3 mm, i.e. no constriction indicating a distinct petiole, upright                                      |
| Petiole diameter in mm                                | 1.5-2.0  | <1, to 1.0  | [1.5-] 2.0-5.0  | [2.5-] 3-5.5   |
| Inflorescence length                                  | Usually <10 (to 25 cm in cultivation)  | (0.9) 3-12 (-22) cm   | 6-17 cm tall  | 5-25 cm  |
| Leaf shape  | Fusiform and ± falcate   | Long, club-shaped   | Short, club-shaped  | Linear to falcate and terete   |
| Leaf apex   | Acute, pointed, not rounded  | Acuminate, blunt and rounded  | Acuminate, blunt and rounded, (angled by bud printing, at least at first)   | Acute, pointed, not rounded  |
| Habitat   | In a shallow, depression on a mesa, the habitat having the appearance of it being a remnant vernal pool. The depression may have slightly more moisture after rains than surrounding areas. On clay soils near coast. With <i>Lasthenia</i> , but not on the slightly higher ground with <i>Agave shawii</i> , or <i>D. ingens</i> | Various, including sandy flats in <i>Lasthenia</i> flower fields at Colonet Mesa, but often in shallow soils on mesa tops and rocky outcrops. Variable, including with red concretions and on clay soils. | Shallow soils on mesa tops with iron-rich nodules/concretions with little other vegetation.   | Where it is in closest proximity to the <i>D. hendrixii</i> , it is on raised mounds of soil that harbor drier vegetation, including, <i>Ferocactus</i> , <i>Agave shawii</i> , and <i>D. ingens</i> |

TABLE 1. CONTINUED

|                                 | <i>D. hendrixii</i>                              | <i>D. blochmaniae</i> subsp. <i>blochmaniae</i>  | <i>D. crassifolia</i>  | <i>D. attenuata</i> subsp. <i>attenuata</i> (occurs with <i>hendrixii</i> ) and <i>D. a. orcuttii</i> (which occurs elsewhere on the Mesa) |
|---------------------------------|--|--|--|--|
| Rosette flat topped and compact | 0  | 0  | X  | 0  |
| # of rosettes                   | 1  | 1  | 1 to several   | Few to usually many  |
| Length of floral tube           | 0–1 mm   | 3 mm   | 2 mm   | 3 mm   |
| Leaf base                       | Exposed (or only very slightly buried?)          | Exposed (or only very slightly buried)   | Usually buried   | Exposed on above ground stem   |
| Corm-like caudex                | Globose, spherical to slightly longer than wide  | Elongate   | Cylindrical to irregular   | Absent   |
| Lower bracts                    | Almost always very waxy                          | No wax or slightly waxy (more wax in <i>D. b. insularis</i> )  | Waxy or not. Often more waxy at the bases of the bracts than above | Waxy   |
| Flowering                       | May–June (Late June–early August in cultivation) | March–June. Two of four plants in common garden completely finished flowering before any flowers opened on <i>D. hendrixii</i> | Approximately May–June   | Approximately April–June   |
| <i>n</i> =                      | Unknown  | 17, 34, 51   | 34   | 17, 34   |



FIG. 3. Photographs of *D. hendrixii* from cultivated material. Note succulent, fusiform leaves (above) and spreading petals of flowers (below).

DISCUSSION

Taxonomic Relationships

If the subgenera of *Dudleya* continue to be recognized (see Yost et al. 2013 for discussion), then *D. hendrixii* is cautiously placed in the subg. *Hasseanthus* based on its underground corm-like caudex, essentially acaulescent stem habit, widely spreading white petals marked with red or pink on the keels, and widely spreading mature follicles. The new species differs from other taxa in several characters (Table 1). There is another unnamed form or species also occurring on Colonet Mesa, not included in Table 1, that is intermediate in some ways between *D. crassifolia* and *D. attenuata*. Further work is needed to determine if it should be recognized taxonomically.

Although a number of *Dudleya* taxa can be crossed one with the other artificially or in nature (Moran 1978; McCabe unpublished), and presumably the same would be true in *D. hendrixii*, differences in habitat among these taxa might explain why no introgression has been observed in the wild. Other factors might maintain separation between *D. hendrixii* and other species in the wild. Differences in floral morphology between *D. hendrixii*, with widely spreading petals, and *D. ingens*, with upright petals, suggest quite different pollinators may be involved. This may make hybridization uncommon. In cultivation with thousands of other *Dudleya*, most of which do not occur with *D. hendrixii* in nature, open pollinated members of *D. hendrixii* appeared to have produced hybrid offspring (McCabe personal communication). Reproductive isolation between *D. hendrixii* and *D. blochmaniae* subsp. *blochmaniae* is possibly maintained in the wild by some geographic isolation, subtle habitat differences, and differences in phenology. Though the floral morphology of *D. hendrixii* and *D. attenuata* subsp. *attenuata* are similar enough that pollinators may visit both, the differences in habitats, dormancy, and vegetative morphology may prevent the establishment of frequent successful hybrids. There were no obvious

hybrids between *D. hendrixii* and other nearby *Dudleya* taxa observed in the wild.

Conservation and Threats

As of 2015, ongoing expansion of agricultural lands and urbanization potentially threaten the population. Additionally, the planned Port at Colonet could bring approximately 200,000 new people, transforming a barely populated stretch of Baja California to a port built to rival the Los Angeles/

Long Beach Port, at an initial cost of \$4 billion or more (Dickerson 2008). At this time, however, the port proposal has been withdrawn. If the port project goes through in the future, the pressure for railroads, roads, housing, and the accompanying development for a new city would be expected to be intense. Berry farming is also currently expanding in the areas near this species, with elimination of significant areas of native habitat.

TAXONOMIC KEY

A revised key to species of subg. *Hasseanthus*, modified from Dodero and Simpson (2012) and McCabe (2012), is presented below.

- 1. St gen above soil surface, often elongate, often branched; lvs gen evergreen, ± not petioled, petals ascending to erect (remaining *Dudleya* species)
- 1' St gen below soil surface, not elongate, gen simple, unbranched; leaves deciduous, vernal, generally petioled (barely in *D. crassifolia*), petals ascending to spreading (subg. *Hasseanthus*)
  - 2. Corolla consistently yellow; flower odor absent
    - 3. Leaves 4–15 cm long, linear, ± narrowed above base, tip sharply acute; petals basally connate 1–2 mm ..... *D. multicaulis*
    - 3' Leaves 1–7 cm long, oblanceolate to spoon-shaped, strongly narrowed above base (to gen 0.5–3 mm wide), tip acute to obtuse; petals basally connate 0.5–1 mm ..... *D. variegata*
  - 2' Corolla white to white-maroon (rarely pale yellow in *D. brevifolia* and *D. nesiotica*); flower odor musky-sweet or absent in *D. hendrixii*
    - 4. Leaf blade only slightly wider than petiole (ratio 1.2–1.4), petioles 2–3.3 mm thick; caudex with conspicuous, dried leaf bases persisting from multiple, previous seasons. .... *D. crassifolia*
    - 4' Leaf blade two to more than four times as wide as the petiole (ratio 2.1–4.7), petiole 0.4–1.7 mm thick; caudex lacking conspicuous, dried leaf bases from previous seasons
      - 5. Petals ascending, 7–14 mm, 3.5–5.5 mm wide, fused 1–2 mm; fruit ascending; lf base 3–12 mm wide. .... *D. nesiotica*
      - 5' Petals spreading, 5–10 mm, 2–4 mm wide, fused gen <1 mm; fruit spreading; lf base 1–4 mm wide
        - 6. Lower bracts <1.5x longer than wide; lvs 7–15 mm, ± spheric to spoon-shaped; petiole narrow ..... *D. brevifolia*
        - 6' Lower bracts gen >2x longer than wide; lvs 10–60 mm, ± oblanceolate to club-shaped, to fusiform; petiole ± narrow
          - 7. Lvs 3–5, linear to fusiform, apex acute, not rounded. .... *D. hendrixii*
          - 7' Lvs. usually >5, oblanceolate to club-shaped, apex rounded ..... *D. blochmaniae*
          - 8. Lvs gen < 12, not to ± glaucous, 3–8 mm wide ..... subsp. *blochmaniae*
          - 8' Lvs gen > 15, glaucous or ± so, 2–7 mm wide. .... subsp. *insularis*

ACKNOWLEDGMENTS

We thank Alan Harper, Sula Vanderplank, Reid Moran, Becca Berezuk, Gonzalo Rodríguez, Jarmila Pittermann, Brett Hall, Jim Velzy, and José Delgadillo Rodríguez. Brenda and Scott McMillan, and Kim Marsden helped with initial fieldwork. We also thank Bob Mangan, greenhouse manager at San Diego State University, for supporting the study of *Dudleya* over the years. Finally, we thank Jimi Hendrix for the inspiration of the name of this new species.

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