

***HELODEASTER*, A NEW GENUS FOR HAWAIIAN *KEYSSERIA*
(ASTERACEAE: ASTEREAE)**

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ABSTRACT

Keysseria in Hawaii (3 species) differs from putative congeners in Indonesia (9 species, including the type) in fertile disc flowers (vs. sterile in Indonesia) and achene morphology. In addition to the geographic disjunction, the Hawaiian plants are true to rainforest bogs, while the Indonesian ones are restricted to alpine habitats. Particularly because of the direction of evolution in the disc flowers, it is unlikely that the Hawaiian lineage is derived from the Indonesian one, and phylogenetic analyses based on molecular data indicate that the Hawaiian species are most closely related to *Myriactis* (subtr. Asterinae), of Australia, Indonesia, and southeast Asia. Hawaiian *Keysseria* are separated here as ***Helodeaster*** Nesom, **gen. nov.** — ***Helodeaster erici*** (Forbes) Nesom **comb. nov.**, ***Helodeaster helenae*** (Forbes & Lydgate) Nesom **comb. nov.**, and ***Helodeaster maviensis*** (H. Mann) Nesom **comb. nov.**

Keysseria Lauterb. comprises 12 species — 9 (including the type, *K. papuana*) in New Guinea; *K. radicans* also is known from Celebes and *K. gibbsiae* also occurs on Mt. Kinabalu in Borneo (Koster 1966). *Keysseria pickeringii* (A. Gray) Cabrera of Fiji was transferred to the genus *Pytinicarpa* (Nesom 2001). The transfer of three Hawaiian *Lagenophora* species into *Keysseria* (Cabrera 1967) introduced a significant discontinuity into the genus — the Hawaiian species have disc flowers with fertile ovaries (vs. sterile in Indonesia) and essentially beakless or short-beaked cypselae with a glandular apical collar (vs. with a distinct glandular neck or short beak). Based on morphology, Mill (1990) observed that the three Hawaiian species of *Keysseria* apparently are “from one founder,” a hypothesis supported here.

In addition to a geographic disjunction of about 4500 miles from Indonesian *Keysseria*, the Hawaiian plants are true to rainforest bogs at 900–2000 meters, while the Indonesian ones are restricted to alpine habitats at (2400–)3100–4400 meters. “Rainfall in these [Hawaiian] localities varies from 200 to 600 inches per annum with some rain or fog practically every day of the year” (Forbes 1918).

Since Cabrera's transfer, the Hawaiian species have generally been recognized as *Keysseria* (e.g., St. John 1971; Carr 1985; HEAR 2020; USDA, NRCS 2020). Mill (1990), in contrast, maintained them in a broadly conceived *Lagenophora*, with *Keysseria* as a synonym. Swenson and Bremer (1994) also explicitly regarded *Keysseria* as a synonym of *Lagenophora*.

Central American species previously identified as *Lagenophora* have proved to be more closely related to American genera — they are now recognized as the genus *Talamancaster* (Pruski 2017) and placed in subtr. Baccharidinae (Nesom 2020). Hawaiian *Keysseria* are similar to *Talamancaster* in their laterally compressed and 2-ribbed, glandular-collared achenes and particularly to *T. sakiranus*, *T. minusculus*, and *T. andinus*, which have basal rosette and scapose stems.

DNA data, however, place Hawaiian *Keysseria* in close relationship to *Myriactis* Less. sensu stricto (e.g., Brouillet et al. 2009; Jafari et al. 2015). In the most recent complete and pertinent sampling and analysis (Farhani et al. 2018), *Myriactis* is placed as sister to *Dichrocephala* L'Hér. ex DC. (Grangeinae) based on plastid DNA but as most closely related to the genus *Metamyriactis* Nesom of China (Nesom 2020) based on ITS/ETS data. *Myriactis* and *Metamyriactis* are part of subtr. Asterinae.

Indonesian *Keysseria* species have not been sampled, but based on morphology and geography, they apparently belong with subtr. *Lagenophorinae*.

In summary, morphology points to a strong distinction between Hawaiian and Indonesian *Keysseria* and molecular data suggest that they have disparate evolutionary origins. It is improbable that the ancestral Hawaiian lineage would have reverted from sterile disc ovaries to fertile ones. Price and Wagner (2018) have provided numerous examples of Hawaiian taxa derived from those with a Australasian/Indo-Malayan/east Asian distribution, as is the case with Hawaiian *Keysseria*. The latter are treated here as a distinct genus.

HELODEASTER Nesom, **gen. nov.** **TYPE:** *Helodiaster maviensis* (H. Mann) Nesom

Keysseria sect. *Sandwicactis* Nesom, Sida 19: 514. 2001. **TYPE:** *Keysseria erici* (Forbes) Cabrera

Plants similar to Indonesian *Keysseria* in their perennial duration usually from a thickened rhizome, leaves thickened and in a basal rosette, solitary heads on scapose, bracteate stems, reduced ray corollas, laterally compressed, 2-ribbed achenes apically glandular but with glabrous to glabrate faces, and lack of pappus. Different from *Keysseria sensu stricto* in their disc flowers with fertile ovaries, disc corollas with 4–5 lobes, ray corollas often apically lobed, and achenes without a distinct neck or beak but with a glandular apical collar.

Helodeaster erici (Forbes) Nesom, **comb. nov.** *Lagenophora erici* Forbes, Occas. Pap. Bishop Mus. Honolulu 6: 60. 1918. *Keysseria erici* (Forbes) Cabrera, Blumea 14: 307. 1967. **TYPE: Hawaii. Kauai.** Waimea drainage, west side, Alakai swamp, in cushion of sedge, 3 Jul–18 Aug 1917, *C.N. Forbes* 882K (holotype: BISH?; isotype: NY image). The NY sheet is a duplicate distributed from BISH. Endemic to Kauai.

Helodeaster helenae (Forbes & Lydgate) Nesom, **comb. nov.** *Lagenophora helenae* Forbes & Lydgate [as "helena"], Occas. Pap. Bishop Mus. Honolulu 6: 62. 1918. *Keysseria helenae* (Forbes & Lydgate) Cabrera, Blumea 14: 307. 1967. **TYPE: Hawaii. Kauai.** Swamp near Kaholuamano, "1915?," *J.M. Lydgate s.n.* (holotype: BISH image). Endemic to Kauai.

Helodeaster maviensis (H. Mann) Nesom, **comb. nov.** *Lagenophora maviensis* H. Mann, Proc. Amer. Acad. Arts 7: 172. 1867. *Keysseria maviensis* (H. Mann) Cabrera, Blumea 14: 307. 1967. **TYPE: Hawaii. Maui.** "Top of the mountain of West Maui," [1864–1865], *H. Mann & W.T. Brigham* 440 (holotype: GH 9559 image; isotypes: GH 9560 image, K 890160 image). Endemic to Maui and Molokai.

A chromosome number of $2n = 54$ has been reported for *H. helenae* (Carr 1985) and *H. maviensis* (Mill 1990); chromosome numbers have not been reported for the Indonesian species.

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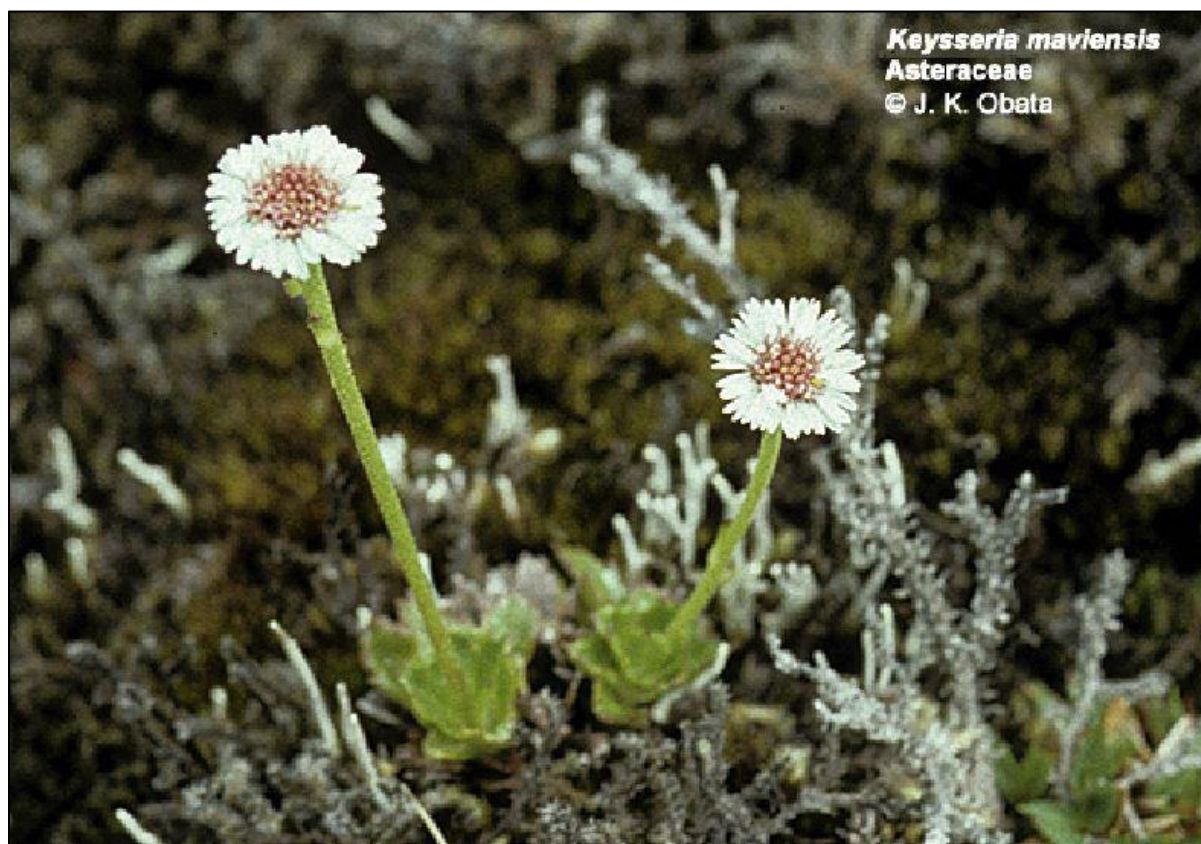


Figure 1. *Helodeaster maviensis*. Photo by J.K. Obata, Hawaiian Native Plant Genera, Univ. of Hawaii Botany Department.



Figure 2. *Helodeaster maviensis*. Photo by J.K. Obata, Hawaiian Native Plant Genera, Univ. of Hawaii Botany Department.



Figure 3. *Helodeaster helenae*. USFWS photo, Wikipedia.



Figure 4. *Helodeaster helenae*. Photo by Oscar Johnson, iNaturalist.