

A Reassessment of *Cyrtandra kealiae* and *C. limahuliensis* (Gesneriaceae)¹

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In the most recent treatment of Hawaiian *Cyrtandra* (Wagner *et al.*, 1990), 2 species were recognized with unique long calyces, lobed 1/4 to rarely more than 2/5 their length that enclose the fruit until it swells at maturity, splitting the calyx. Both occur on the island of Kaua'i. In the 1990 revision *Cyrtandra kealiae* was considered a taxon known from scattered localities in mesic valleys and diverse mesic forest, 275–450 m, in Hanapēpē and Olokele valleys, Wahiawa Mountains, and Ha'upu Ridge characterized by its urceolate calyx. The other taxon of this alliance was referred to as *Cyrtandra limahuliensis*, which grows in generally more southern and western areas of Kaua'i, from the Hoary Head Range to Makaweli Valley but occurs at lower elevations in the Wahiawa area where both species grow, and is characterized by a tubular-funnelform calyx. Soon after the 1990 revision was published Tim Flynn (pers. comm.) pointed out that the type locality of *C. kealiae*, near Keālia was well within the range of the taxon called *C. limahuliensis*. Subsequent examination of the types confirmed that they were conspecific, showing clearly that the name *C. limahuliensis* was misapplied when 2 taxa were recognized in the 1990 treatment.

We here adopt the name *Cyrtandra kealiae* for the plants with the tubular funnelform calyx. St. John (1987, 1988) described a number of other Kaua'i species including 7 others that we here refer to *C. kealiae* as synonyms. During the past decade many new collections of both taxa have been collected, including a number of new localities. Study of them has shown these 2 taxa to be more closely related and harder to distinguish than previously thought. Thus, in describing the taxon with urceolate calyx currently lacking a name, we have concluded that it is more reflective of the variation pattern to recognize 1 species with 2 largely geographically allopatric subspecies. Examination of the types of all 8 names has shown that all of them apply to the taxon currently known as *C. limahuliensis*, leaving the taxon known as *C. kealiae* without a name. Examination of numerous collections over the past decade has shown these 2 taxa to be very closely related, suggesting to us that they are best treated as subspecies of a single species, *C. kealiae*. The taxon formerly known as *C. kealiae* is here described as *C. kealiae* subsp. *urceolata*.

Cyrtandra kealiae Wawra subsp. *kealiae* New synonymy

Cyrtandra kealiae Wawra, Flora 55: 565. 1872. TYPE: Hawaiian Islands (U.S.A.). Kaua'i: near Kealia, 1869–1870, *H. Wawra 2192* (W [photocopies BISH], 2 sheets), holotype).

Cyrtandra limahuliensis St. John, Phytologia 63: 489. 1987, *syn. nov.* TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Limahuli Valley, wet dripping pali, 565 m, 27 Sep 1978, *S. Perlman & C. Wichman 223* (BISH-520623!), holotype).

Cyrtandra alaustri St. John, Phytologia 63: 487. 1987, *syn. nov.* TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Wainiha, *B. C. Stone 1489* (BISH, not located, holotype). Apparently St. John intended his epithet to be spelled "claustri". The collection *Stone 1498* (BISH-19700!) may represent the missing holotype as it was collected in Wainiha Valley (near dam) at 800 ft, on 26 Dec 1956, and is a specimen of *C. kealiae*; thus the citation of *1489* may represent a transposition of numbers.

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Cyrtandra henanthe St. John, *Phytologia* 63: 488. 1987, *syn. nov.* TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Wainiha Valley, side gulch on west side, 1.2 km upstream, 850–1100 ft, 1 Jan 1934, *H. St. John & F. R. Fosberg 13977* (BISH-520595! and BISH-520596!, holotype, mounted on 2 sheets; BISH! 4 sheets, ISOTYPES).

Cyrtandra lumahaiensis St. John, *Phytologia* 63: 490. 1987, *syn. nov.* TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Lumaha'i Valley, *C. Christensen 207* (BISH-520607!, holotype; BISH! 2 sheets, isotypes). The collection number in the protologue was given as 204, which is in error since St. John clearly labelled 207 as the holotype and *Christensen 204* is a collection of *Cyanea* according to Christensen's field notes on file at BISH.

Cyrtandra runae St. John, *Phytologia* 63: 491. 1987, *syn. nov.* TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Anahola Stream, 240 m, 14 Apr 1970, *R. Hobdy 188* (BISH-520487!, holotype).

Cyrtandra spissa St. John, *Phytologia* 63: 492. 1987, *syn. nov.* TYPE: Hawaiian Islands (U.S.A.). Kaua'i: Waipā Valley, middle of 3 upper streams, 290 m, 2 Jul 1977, *C. Christensen 238* (BISH-520562!, holotype).

Cyrtandra septentrionalis St. John, *Phytologia* 65: 199. 1988, *syn. nov.* TYPE: Hawaiian Islands: Kaua'i: Wainiha Valley, wet *Metrosideros* forest, 1000 ft., 26 Dec 1956, *H. St. John 25991* (BISH-526694!, holotype; BISH!, US! isotypes).

Shrubs up to 1.5 m tall; stems apparently few-branched or unbranched; leaves opposite, borne on upper 3–6 nodes, those of a pair slightly unequal and somewhat asymmetrical, chartaceous, broadly elliptic to broadly elliptic-ovate or elliptic, (10–)15–30 cm long, 5–12 cm wide, upper surface moderately pilose, lower surface with veins raised, moderately to densely velvety pilose, the hairs yellowish brown, margins serrulate or denticulate, apex acuminate, base cuneate, sometimes subtruncate, petioles 1.5–10 cm long; flowers solitary in the leaf axils, densely villous throughout, peduncles 3–6 mm long, pedicels 0–3 mm long, bracts narrowly elliptic-ovate to elliptic-lanceolate, 6–14 mm long; calyx nearly actinomorphic, tubular-funnelform, 16–25 mm long, cleft ca. 1/4–2/5 its length, densely villous, the lobes narrowly deltate to linear-deltate, usually somewhat unequal, 4–10 mm long; corolla (only 1 seen) white, tube cylindrical, slightly curved, 16–18 mm long, ca. 4–5 mm in diameter medially, scarcely exerted from calyx, densely villous, externally, upper lobes lanceolate, ca. 3.5–4 mm long, ca. 1.5–2 mm wide, lower lobes narrowly ovate, ca. 4–4.5 mm long; ovary glabrous; berries (only a single smashed one seen) ca. 2 cm long, apparently enclosed by but eventually splitting from the persistent calyx.

DISTRIBUTION: Occurring along streams and from gulches in stunted wet forest at elevations from 240–900 m from the eastern half of Kaua'i, from the northern side in Limahuli along the eastern side to Wailua valleys to the Wahiawa Mountains on the southern side of Kaua'i.

Material examined. KAUA'I: Kōloa Dist, Wahiawa Mts, along ridge N of microwave relay towers, 915 m, *Flynn et al. 2231* (PTBG [2]), *Flynn et al. 2232* (PTBG); NW of Wahiawa Bog, along tributary of Wahiawa Stream, 650–730 m, *Kiehn et al. MK-890719-1/10* (PTBG); along ridge ESE of Pu'u Kolo to summit, in gulch on S side of ridge, 365–540 m, *Flynn & Lorence 3163* (PTBG, US); Wahiawa Mts, in shaded areas on windward side of ridge between relay towers and Mt Kāhili, *Flynn 1123* (PTBG); Wahiawa Mts, *Forbes 222.K* (BISH); ridge to Mt Kāhili, flat gully on SW side above microwave relay station, near the summit, 870 m, *Herbst et al. 2485* (BISH), *Herbst et al. 2858* (BISH), *Hobdy 25* (BISH), *Hobdy 26* (BISH); first N fork of Wahiawa Stream, NW of Wahiawa Bog, dense wet forest with moderate *Psidium* growth, 710 m, *Wagner et al. 6056* (BISH), *Wagner et al. 6057* (BISH); Wahiawa Stream, 'ōhi'a dieback and *Dicranopteris* understory, 680 m, *Wagner et al. 6079* (BISH). Līhu'e Dist, Līhu'e-Kōloa Forest Reserve, Ii'iiliula drainage, S of Kamanu and Kalalea, 550–625 m, *Wood & Perlman 3589* (PTBG); Līhu'e -Kawaihau Dist. boundary, headwaters

of N fork of Wailua River, "Blue Hole", 680–700 m, *Lorence et al. 5336* (PTBG), *Lorence et al. 7259* (PTBG); E of Wai'ale'ale summit just under the pali of Wai'ale'ale ("Blue Hole"), *Kiehn et al. 9008232/5* (US), *Kiehn et al. 9008232/6* (US), *Kiehn et al. 9008232/12* (US), *Wagner et al. 6360* (US). Kawaihau Dist., Lihue-Kōloa Forest Reserve, along unnamed tributary of N fork Wailua River, 1400–1950 ft, *Flynn et al. 4794* (BISH, PTBG, US); Makaleha Mts, heading NW to Kekoiki Peak, 750 m, *Lorence et al. 7353* (PTBG); Makaleha Mts, central plateau ESE of Makaleha Peak and N of Makaleha Stream, 840–914 m, *Lorence et al. 7396* (PTBG). Hanalei Dist., Wai'oli Valley, 470–530 m, *Wood et al. 2053* (PTBG); Wai'oli Valley, back of valley above mist falls, 720–824 m, *Wood et al. 2292* (PTBG); Wai'oli Valley, E side of upper valley between Wai'opa and Hihimanu, 335–427 m, *Wood & Lorence 2534* (PTBG); Wai'oli Valley, N face of Namolokama Mt, hanging valley above main waterfall, 740–820 m, *Lorence et al. 7292* (PTBG); W side of Lumahai Valley, N of Pu'u Iliahi, 182 m, *Christensen 209* (BISH), *Christensen 211* (BISH [2]); Wai'oli Valley, Hanalei, *Degener 21709* (BISH, NY); Lihue-Koloa Forest Res., Powerline Trail from Wailua to Princeville, 330–580 m, *Flynn et al. 2054* (BISH, US); Limahuli Valley, W side of ridge separating Limahuli and Hanakāpī'ai Valleys, low elevation rain forest, 490–625 m, *Flynn et al. 2645* (PTBG), *Flynn et al. 2649* (BISH, PTBG), *Flynn et al. 2650* (BISH, PTBG [2]); Wai'oli, back of valley, 300–370 m, *Wood et al. 1502* (BISH, PTBG).

Cyrtandra kealiae Wawra subsp. *urceolata* W. L. Wagner & Lorence, subsp. nov.

TYPE: Hawaiian Islands (U. S. A.). Kaua'i. Lihue District. Hoary Head Range [Hā'upu], NNW side of range from canefield up to Omo'e, secondary vegetation dominated by *Psidium*, *Aleurites*, *Rhodomyrtus*, *Lantana*, *Cordyline*, *Cyrtandra*, *Freycinetia*, *Hedyotis*, *Hibiscus*, *Cyanea*, *Diplazium*, and *Blechnum*, 207–396 m, 19 Nov 1991, *T. Flynn & E. Nelson 4723* (PTBG-011228, holotype; BISH, MO, SING, US, isotypes).

Haec subspecies a subspecie typica limbo calycino urceolato distinguitur.

Shrubs 0.6–2.5 m tall; stems branched; leaves opposite, those of a pair subequal to unequal, nearly symmetrical, chartaceous, elliptic to elliptic-obovate, (4.5–)11–28 cm long, (1.7–) 5–9.2 cm wide, upper surface with veins somewhat impressed, sparsely to moderately pilose, lower surface with veins raised, moderately to densely velvety pilose, the hairs yellowish brown, margins serrulate or denticulate to subentire and very slightly revolute, apex acuminate, base attenuate to cuneate, petioles (0.8–)3–5(–8) cm long; flowers solitary in the leaf axils, peduncles 0–6 mm long, pedicels 4–5 mm long, bracts inconspicuous, lanceolate, 4–7 mm long; calyx slightly zygomorphic, urceolate, 14–25 mm long, cleft ca. 1/4(–2/3) its length, both surfaces very densely shaggy villous, the lobes linear-subulate to narrowly deltate, ca. 3–7 mm long; corolla white, tube cylindrical, 14–20 mm long, probably ca. 4 mm in diameter, very densely shaggy villous, upper lobes lanceolate, ca. 5 mm long, 2.5–3 mm wide, lower lobes lanceolate, ca. 5 mm long, ca. 2–2.5 mm wide; ovary glabrous; style ca. 3 mm long, glabrous; berries broadly ovoid-ellipsoid, 1–1.2 cm long, puberulent, enclosed by the persistent calyx that splits when fruit matures; seeds unknown.

DISTRIBUTION: *Cyrtandra kealiae* Wawra subsp. *urceolata* is known at least historically from scattered localities in diverse mesic to wet forest, 210–450 m, rarely to 820 m in the Wahiawa Mountains, from the northern end of the Hoary Head Mountains [Hā'upu] in the southeastern part of Kaua'i, westward in the Wahiawa Mountains, and to Hanapēpē and Olokele valleys.

Material examined. KAUA'I: Lihue'e-Kōloa District, Lihue'e-Kōloa Forest Reserve, along ridge ESE of Pu'u Kolo to summit, gulch on S side of ridge, 506 m, *Flynn & Lorence 3163* (PTBG); Lihue'e-Kōloa Forest Reserve, N of main Wahiawa Stream along unnamed tributary from "dam" towards ridge connecting Hulua and Kapalaoa Peaks, 610–710 m, *Lorence et al. 6661* (PTBG, US); Lihue'e-Kōloa Forest Reserve, NW of Wahiawa Bog, along tributary of Wahiawa Stream, NW of stream and SE of Hulua, 650–730 m, *Flynn et al. 2985* (PTBG); Ku'ia Stream at base of Wahiawa Stream on windward side, 317 m, *Flynn et al. 1943* (PTBG), 350 m, *Flynn et al. 1941* (PTBG);

Lihu'e-Kōloa Forest Reserve, Wahiawa Stream, ESE of main stream heading up 2 unnamed gulches to ridge connecting Kāhili and Kapala'oa Peaks, 730–820 m, *Lorence et al. 6691* (BISH, PTBG, US); Wahiawa Mts, *Lydgate s. n.* (BISH). Lihu'e District. Hoary Head Range, E of Omo'e, 102–260 m, *Flynn et al. 2897* (PTBG); Hoary Head Range, NNW side of range from canefield up to Omo'e, 270 m, *Flynn & Nelson 4721* (BISH, F, MO, PTBG, US); Hi'i Mts, *Forbes 633.K* (BISH); *Forbes 655.K* (BISH); Hā'upu Range, right hand side of Kupu Kai Gap, *Forbes 745.K* (BISH); Kōloa, ridge 3/4 mi N of La'aukahi, NW facing slope, wooded gulch, 300 m, *St. John et al. 23025* (BISH [2]); Hā'upu (Hoary Head Mts), Kīpū steep wooded slope, 300 m, *St. John & Fosberg 13627* (BISH [2]); Hoary Head Range, E of Omo'e, gulch, 210 m, *Wagner & Imada 6003* (BISH [2]); Waimea Dist. Ridge W of Hanapēpē River, *Heller 2543* (BISH, NY); Olokele, *Rock 13053* (BISH [2]); Waimea, Olokele Canyon, *Skottsberg 1051* (BISH); Olokele Ditch Trail, Makaweli, moist gulch 2 mi beyond ditch house, 445 m, *St. John 23076 et al.* (BISH [2]).

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