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New naturalization records for *Amaranthus* in the Hawaiian Islands

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Amaranthus L. is a genus of ca. 74 species mostly found in subtropical and tropical regions worldwide (Waselkov *et al*. 2018). The genus is of major economic importance, containing grain species, ornamentals, species used as pot herbs and medicine, and notorious agricultural weeds capable of C4 photosynthesis and rapid reproduction. Study of this genus in Hawai‘i has been minimal, partly due to the relatively small collection at BISH, as most material was lost on loan (Wagner *et al*. 1990). The last substantial work on the genus in Hawai‘i was by Wagner *et al*. (1990) but, as noted, their treatment was incomplete due to undercollection.

Between 2022 and 2023 all *Amaranthus* material in the BISH, PTBG, and HAW herbaria were examined as part of this taxonomic revision. A special effort was also made to collect unusual *Amaranthus* during fieldwork across the islands, and 44 new specimens were made. The following additions and corrections to Hawaiian naturalized *Amaranthus* are reported herein: 12 new island records, 5 island-level corrections, and 4 new state records. A new key was also prepared for naturalized *Amaranthus* species in Hawai‘i. All identifications were made by the authors unless otherwise stated. All voucher specimens cited for this paper have been deposited at the Herbarium Pacificum (BISH).

Amaranthus albus L. **New state record**

Amaranthus albus, commonly called “white amaranth” or “tumbleweed amaranth” (Mosyakin & Robertson 2003), has now been found naturalized on O‘ahu and questionably naturalized on Maui. On O‘ahu, *A. albus* was found in the vicinity of Mānoa growing from a yard. This site has been revisited by the author multiple times and the population has persisted from May 2021 to June 2023. One plant was found in 2021, disappeared in early 2022, and expanded to about 20 plants in 2023. *Amaranthus albus* was also collected in a vegetable garden on Maui by Forest & Kim Starr, where it may have been introduced as a contaminant in potting soil. *Amaranthus albus* has also been found as a contaminant in birdseed and may have been introduced via that route (Oseland *et al*. 2020).

Amaranthus albus has a broad climatic niche and is found in ruderal communities up to 1000 ft in elevation. It has a preference towards medium- or coarse-textured soils and away from heavy clays (Costea & Tardif 2003). Tumbleweed amaranth is so-named as it is one of several species of Amaranthaceae that break off at the base and form windblown

tumbleweeds. *Amaranthus albus* is native to western North America (Waselkov *et al*. 2018) and has become widely naturalized across almost the entirety of the Northern Hemisphere, along with Argentina and Uruguay in the Southern Hemisphere (POWO 2023). It is of little practical use (Costea & Tardif 2003) and has been associated with agricultural losses in assorted row crop systems (Vizantinopoulos & Katranis 1994; Costea & Tardif 2003).

The following description is taken from Mosyakin & Robertson (2003: 434):

> "Plants annual, glabrous or glabrescent or viscid-pubescent. Stems usually erect, ascending proximally, rarely almost prostrate, much-branched, bushy (large plants forming tumbleweeds), 0.1–1 m. Leaves: petiole 1/2 as long as blade, or longer in young proximal leaves; blade obovate to narrowly spatulate, mostly 0.5 × 0.5–1.5 cm, early proximal leaves to 8 cm, base tapering, narrowly cuneate, margins entire, plane (or ± distinctly undulate), apex obtuse, with whitish or yellowish, subspinescent mucro. Inflorescences axillary glomerules, green, whitish green, or yellowish. Bracts of pistillate flowers subulate to linear-lanceolate, narrow, 2–3 mm, 2 times as long as tepals. Pistillate flowers: tepals 3, narrowly ovate to linear, slightly unequal, 1–1.5 mm, thin, apex acute; style branches erect; stigmas 3. Staminate flowers intermixed with pistillate; tepals 3; stamens 3. Utricles ellipsoid-ovoid, 1.5 mm, equaling or exceeding tepals, smooth proximally, coarsely rugose distally, dehiscence regularly circumscissile. Seeds dark reddish brown to black, lenticular, 0.6–1 mm diam., shiny."

Figure 1: *Amaranthus albus* seen at the Mānoa population.

Material examined. **O‘AHU:** Mānoa, intersection of Kalie and Kalele Rd, from gravel yard of residence, sunny area, one individual seen, low-growing herb to 20 cm, somewhat spiny, 21.291103, -157.816297, 08 May 2021, *K. Faccenda 1771*; *loc. cit.* ~5 plants seen, 12 m, 21.290980, -157.816348, 22 Nov 2022, *K. Faccenda 2851*. **MAUI:** Olinda, Hawea Pl, veggie garden, lone individual in weedy section of garden, may have been a contaminant in potting soil, 2700 ft [820 m], 15 Nov 2021, *F. Starr & K. Starr 211115-01*.

Amaranthus arenicola I.M. Johnst. **New state record**

Amaranthus arenicola is now known to be naturalized on West Maui at Honolua Bay, where plants of an indeterminate population size were found in 2004 by Hank Oppenheimer. It may have been introduced by dirty footwear by tourists as the area is a popular snorkeling spot, or from plantings at a nearby homestead (H. Oppenheimer, pers. comm.). This specimen had been misidentified, as the previous determiners had evidently overlooked that it is entirely female. *Amaranthus arenicola* is known from only this collection in Hawai‘i, and the current extent of the population is unknown.

Amaranthus arenicola is native from the midwestern United States south into Mexico (Sauer 1955) and has been introduced into Korea and has spread into eastern and western states of the U.S. (POWO 2023). It can be identified by its dioecious habit and obtuse tepals with weakly or non-excurrent midveins. In its native range, *A. arenicola* grows in sandy habits, including lake or river margins and sand hills, along with disturbed areas and agricultural fields (Mosyakin & Robertson 2003).

The following description is taken from Mosyakin & Robertson (2003: 419):

> “Plants glabrous or nearly so. Stems erect, usually branched or occasionally ± simple, 0.4–1.5(–2) m; branches sometimes ascending. Leaves: petiole shorter than or rarely ± equaling blade; blade mostly narrowly ovate, obovate, elliptic, or lanceolate, 1.5–8 × 0.5–3 cm, thin and soft, base cuneate to nearly rounded, margins entire, plane or irregularly undulate, apex subacute to obtuse, with terminal mucro. Inflorescences mostly terminal, spikes to panicles, erect to nodding, rarely with axillary clusters in proximal part of plant. Bracts: of pistillate flowers with short, excurrent midrib, (1.5–)2–2.5 mm, equaling tepals or nearly so, apex acute or acuminate; of staminate flowers with prominent midribs, 2–3.5 mm, shorter than tepals, apex acute. Pistillate flowers: tepals spatulate, 1.5–2.5 mm, apex obtuse, with terminal mucro; style branches ± erect; stigmas 2–3. Staminate flowers: tepals 5, equal or subequal, 3 mm, apex obtuse to subacute; inner tepals with apex indistinctly mucronulate; stamens 5. Utricles light brown to brown, subglobose, 1.5–2 mm, shorter than tepals, walls thin, usually smooth. Seeds dark reddish brown, (0.9–)1–1.2 mm diam., shiny.”

Material examined. **MAUI:** West Maui, Honolua Bay, shady, alien forest seaward of highway, 2 m tall shrubs, 21°0′51″N, 156°38′6″E, 25 Aug 2004, *H. Oppenheimer H120407*.

Amaranthus blitum L. subsp. ***emarginatus*** (Salzm. ex Uline & Bray) Carretero, Muñoz Garm. & Pedrol **Nomenclatural note**

Previously referred to as *Amaranthus lividus* subsp. *polygonoides* in Hawai‘i (Wagner *et al*. 1990), this taxon is now best referred to using the name *Amaranthus blitum* (Costea *et al*. 2001). All material in Hawai‘i has also been identified to *A. blitum* subsp. *emarginatus*. This taxon is naturalized on Midway, Kaua‘i, O‘ahu, Moloka‘i, Maui, and Hawai‘i (Imada 2019; Faccenda & Daehler 2024).

Amaranthus dubius Mart. ex Thell. **Correction**

Amaranthus dubius was previously published as occurring on Kauaʻi, Oʻahu, Lānaʻi, Maui, and Hawaiʻi (Imada 2019). However, all these specimens at BISH were dubiously identified and upon critical review were reidentified as *A. retroflexus* or *A. hybridus*. Serendipitously, new collections of authentic *A. dubius* were made by the authors on Oʻahu in Honolulu, confirming that the species is in fact naturalized, despite all herbarium material examined being misidentified.

Material examined. **Oʻahu**: Honolulu, Puʻuhale Rd, growing in a weedy area along an industrial road, ca 5 plants observed, 4–5 m, 21.192572, -157.531702, 28 Jan 2023, *M.C. Ross 1882*; Honolulu, Kahana Stream (tributary to Makiki Stream), completely channelized area N of Wilder Ave, full sun, moist substrate, common, 21.307317, -157.839019, 12 Jun 2021, *K. Faccenda 1967*; Honolulu, Nuʻuanu Stream, growing along stream banks adjacent to Liliʻuokalani Botanical Garden, 4–5 plants seen, 11–12 m, 21.191083, -157.512044, 05 July 2023, *M.C. Ross 1959*.

Amaranthus graecizans L. **Correction**

Amaranthus graecizans was previously reported as naturalized on Oʻahu by Herbst *et al*. (2004) based on a single specimen (*J. Lau 1304*). This specimen was examined and found to represent *Amaranthus tricolor*, a cultivated species used for its edible leaves. As the specimen was described as growing in a lawn, it was likely a volunteer from a cultivated plant and should not be considered naturalized unless more material is found. The plant also had red spots on the leaves, which is typical for *A. tricolor*, and bracts longer than would be expected on *A. graecizans*. As such, *A. graecizans* should be removed from the naturalized checklist.

Amaranthus hybridus L. **New island record**

Amaranthus hybridus is now known to be naturalized on Kauaʻi, where it was found as a weed in the National Tropical Botanical Garden. At least 20 plants were seen on a weedy edge of the canoe plants section. Prior to this specimen, *A. hybridus* was only known from cultivation in Lāwaʻi, and has evidently escaped. *Amaranthus hybridus* is now known to be naturalized on Kauaʻi, Oʻahu, Molokaʻi, and Maui (Wagner *et al*. 1990; Faccenda & Daehler in press).

Material examined. **Kauaʻi:** Kalāheo, National Tropical Botanical Garden, weed along fence near Canoe Plants Garden, moist, partly sunny area, common, seen near *Amaranthus spinosus*, 36 m, 21.906826, -159.508472, 01 Jun 2022, *K. Faccenda 2445*; Koloa Distr, Lāwaʻi, cultivated in garden, Akema Rd, leaves eaten as pot herb, 01 Oct 1990, *T. Flynn 4255*.

Amaranthus palmeri S. Watson **New state record**

Amaranthus palmeri, commonly known as "Palmer's amaranth," is now known from several recent collections on Oʻahu. This species is one of only two dioecious amaranths known to be naturalized in Hawaiʻi. It is native to the southwestern United States and northern Mexico, but has become a widespread weed across much of the world (Mosyakin & Robertson 2003). In its natural range it often grows near streams in silt or in sandy or gravelly soils (Sauer 1955). However, the species also favors ruderal habitats, especially outside of its native range (Sauer 1955). Palmer's amaranth is considered to be one of the weediest of all dioecious amaranths (Steckel 2007), and with its rapid spread to the eastern U.S. and overseas to Europe, Asia, and Australia this view is well supported (Mosyakin & Robertson 2003). Due to several invasive traits possessed by this species it has become

a serious agricultural pest (Steckel 2007; Oseland *et al*. 2020). The rapid seed production and unusually high photosynthetic rates, which are amongst the highest recorded for C4 plants, make it highly competitive with many row crops (Steckel 2007; Oseland *et al*. 2020). This species also has a tendency of developing resistance to many common herbicides, including glyphosate and many others (Steckel 2007; Heap 2017). It is unknown if the Hawaiian plants are herbicide resistant.

It is not known at this time how *Amaranthus palmeri* arrived in Hawai‘i, but at least one population seen near a construction site in urban Honolulu may have been introduced from the sand that was brought as fill to the site. Another collection from a disturbed area in Kaimukī could represent an introduction from birdseed since it was found growing in an area where birdseed is frequently cast. The species is a well known birdseed contaminant so it is possible that it is being spread this way (Oseland *et al*. 2020; Sauer 1955). Considering the weediness of Palmer's amaranth, it is unusual, yet fortunate, that the populations observed consisted of only a few plants. It may be possible that larger populations of this species exist on O‘ahu or other islands and have not yet been discovered.

Amaranthus palmeri can be distinguished from other dioecious amaranths by the acuminate tepals with midveins that extend as rigid spines, and pistillate bracts that exceed the tepals in length (Figure 2).

The following description is from *Flora of North America* (Mosyakin & Robertson 2003: 418).

> "Plants glabrous or nearly so. Stems erect, branched, usually (0.3–)0.5–1.5(–3) m; proximal branches often ascending. Leaves: long-petiolate; blade obovate or rhombic-obovate to elliptic proximally, sometimes lanceolate distally, 1.5–7 × 1–3.5 cm, base broadly to narrowly cuneate, margins entire, plane, apex subobtuse to acute, usually with terminal mucro. Inflorescences terminal, linear spikes to panicles, usually drooping, occasionally erect, especially when young, with few axillary clusters, uninterrupted or interrupted in proximal part of plant. Bracts: of pistillate flowers with long-excurrent midrib, 4–6 mm, longer than tepals, apex acuminate or mucronulate; of staminate flowers, 4 mm, equaling or longer than outer tepals, apex long-acuminate. Pistillate flowers: tepals 1.7–3.8 mm, apex acuminate, mucronulate; style branches spreading; stigmas 2(–3). Staminate flowers: tepals 5, unequal, 2–4 mm, apex acute; inner tepals with prominent midrib excurrent as rigid spine, apex long-acuminate or mucronulate; stamens 5. Utricles tan to brown, occasionally reddish brown, obovoid to subglobose, 1.5–2 mm, shorter than tepals, at maturity walls thin, almost smooth or indistinctly rugose. Seeds dark reddish brown to brown, 1–1.2 mm diam., shiny."

Material examined. **O‘AHU**: Honolulu, Algaroba St, near intersection with Makahiki Way, growing in sandy soil near sidewalk, only one plant observed, 3–4 m, 21.173503, -157.494117, 12 Dec 2022, *M.C. Ross 1860*; Honolulu, Kapi‘olani Community College, near NW corner of Koa Building, growing underneath large *Ficus virens* tree in weedy area near dumpster, not irrigated, partial sun, area regularly weed whacked, feral chickens present, 3 plants observed (1 male and 2 female plants), 66–67 m, 21.162037, -157.484949, 23 Mar 2023, *M.C. Ross 1917*; *loc. cit*., 2 additional female plants observed, 28 Mar 2023, *M.C. Ross 1921*; Kaimukī, intersection of Keanu St and 15th Ave, weed spotted along sidewalk, dry sunny area, 2 plants seen, bracts conspicuously distichous, 35 m, 21.282325, -157.794101, 04 Mar 2023, *K. Faccenda 3053.5*; Kaimukī, Pukalani Pl, weedy roadside, dry, sunny, single plant seen, 92 m, 21.286645, -157.793066, 04 Mar 2023, *K. Faccenda 3054*.

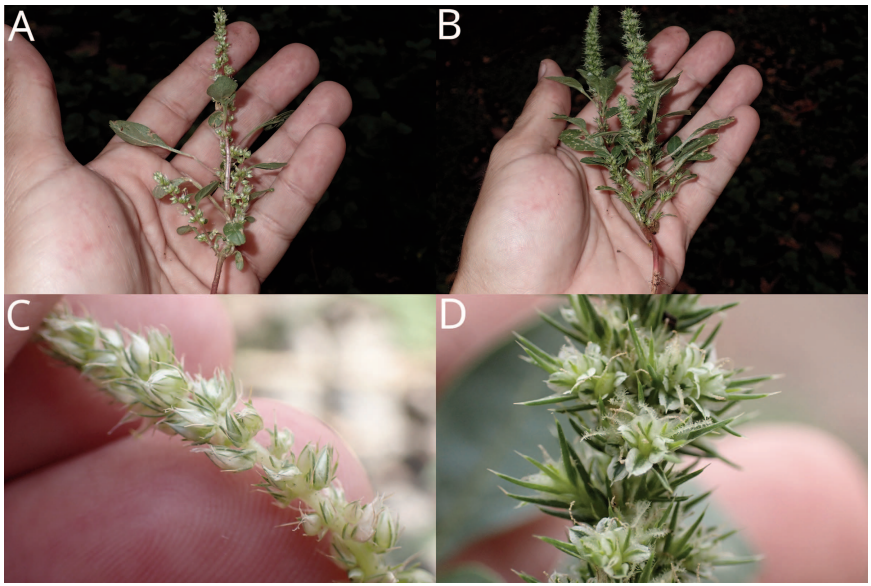

Figure 2: *Amaranthus palmeri* as seen in Honolulu. **A**, male plant; **B**, female plant; **C**, staminate inflorescence; **D**, pistillate inflorescence.

Amaranthus polygonoides L. **New island record**

Amaranthus polygonoides, previously reported as naturalized on Oʻahu (Frohlich & Lau 2020; Ross & Faccenda 2023), is now known on Kauaʻi, where one plant was found at Port Allen along a roadside. Another observation of this species on Kauaʻi, by iNaturalist user sea-kangaroo was made in 2018 at Punahua Point, showing that this species has been naturalized on Kauaʻi for over 5 years (https://www.inaturalist.org/observations/17587272).

Material examined. **KAUAʻI:** Port Allen, Aka Ula St, industrial area near petroleum station and solar park, roadside, dry sunny area near parking lot, leaves bluish green with white chevron centered on leaf, one plant seen, rare, 21.899865, -159.586693, 03 Jun 2022, *K. Faccenda 2477.*

Amaranthus powellii S. Watson **New state record**

Amaranthus powellii is now known in Hawaiʻi from two collections from Maui at both Kula and Pukalani made in the 1980s by Bob Hobdy. These specimens were only identified as *A. powellii* during the course of this research. The current status of the species in the state is unknown, but it has likely persisted, given that this is a famously weedy species.

Amaranthus powellii is native to Mexico and much of the western and southwestern United States and has become naturalized across much of the world (POWO 2023). Across North America it is found in disturbed sites, including agricultural fields, roadsides, railroad tracks, and river margins (Mosyakin & Robertson 2003). *Amaranthus powellii* is an aggressive agricultural weed that can incur major crop losses when uncontrolled (Costea *et al*. 2004). It has also developed herbicide resistance to several herbicides (Costea *et al*. 2004).

Amaranthus powellii is morphologically similar to most other species in the *A. hybridus* complex, but differs in having larger bracts and inflorescence branches that tend to be stiffer. The key below should help distinguish these plants.

The following description is taken from Mosyakin & Robertson (2003: 424):

> "Plants glabrous or moderately pubescent toward inflorescences, becoming glabrescent at maturity. Stems usually erect, green or sometimes reddish purple, branched, mainly in inflorescences, to nearly simple, 0.3–1.5(–2) m, stiff. Leaves: petiole mostly equaling or longer than blade; blade rhombic-ovate to broadly lanceolate, 4–8 × 2–3 cm, occasionally larger in robust plants, base cuneate to broadly cuneate, margins entire, apex cuneate to obtuse or indistinctly emarginate, with mucro. Inflorescences mostly terminal, usually with spikes at distal axils, erect and rigid, green to silvery green, occasionally tinged red, leafless at least distally. Bracts lanceolate to linear-subulate, 4–7 mm, 2–3 times as long as tepals, rigid. Pistillate flowers: tepals usually 3–5, not clawed, unequal; outer tepals narrowly ovate-elliptic or elliptic, 1.5–3.5 mm, apex aristate; style branches spreading, shorter than body of fruit; stigmas 3. Staminate flowers clustered at tips of inflorescence branches; tepals 3–5; stamens 3–5. Utricles subglobose or compressed-ovoid, 2–3 mm, equaling or shorter than tepals, smooth or lid slightly rugose or minutely verrucose, dehiscence regularly circumscissile. Seeds black, subglobose to lenticular, 1–1.4 mm diam., smooth, shiny."

Material examined. **MAUI:** East Maui, Kula, roadside weed, 2400 ft [730 m], 19 Jun 1986, *R. Hobdy 2572*; Pukalani, along roadside 11 Jul 1982, *R. Hobdy 1418*.

Amaranthus retroflexus L. **New island record**

After careful curation of the *Amaranthus* specimens at BISH, it was discovered that many specimens which truly represent *Amaranthus retroflexus* had been misidentified as other species by previous workers. In the field, it appears that *A. retroflexus* is currently the third most common species of weedy amaranth, following *A. spinosus* and *A. viridis*. Previously, *A. retroflexus* had only been reported on Hawai'i Island (Wagner *et al*. 1997), but is now known from Midway, Kaua'i, O'ahu, Lāna'i, Maui, and Hawai'i.

MIDWAY: Sand Island, weed in lawn in Cable Co. compound, 15 Dec 1962, *C.H. Lamoureux 2228* (HAW); *loc. cit.* weed in lawns in housing area 17 Dec 1962, *C.H. Lamoureux 2306* (HAW). **KAUA'I:** Grounds of Pacific Tropical Botanical Garden, 20 Dec 1983, *W.L. Wagner 5141*; Kalāheo, National Tropical Botanical Garden, weed along fence near Canoe Plants Garden, moist, partly sunny area, common, seen near *Amaranthus spinosus*, 36 m, 21.906826, -159.508472, 01 Jun 2022, *K. Faccenda 2445.5*. **O'AHU:** Pali Highway, vicinity of Akamu Pl, crack between sidewalk and wall, sunny exposed area, from crack in sidewalk next to a wall, partially shaded from sun. rare, only one individual seen, 21.331092, -157.843517, 29 May 2021, *K. Faccenda 1930*; Kawainui Marsh, east edge of park near Kailua Rd, open sunny area which had recently been cleared, 3 m, 21.389881, -157.748572, 09 Jan 2022, *K. Faccenda 2190*; Kapolei, Campbell Industrial Park, Olai St. between Kalaeloa Blvd and Hanua St, roadside weed, rare, only one plant seen, growing next to *Amaranthus spinosus*, 3 m, 21.299340, -158.099211, 17 Jan 2023, *K. Faccenda 2994*; Wai'anae, Lualualei Homestead Rd, at entrance to farmland about 200 m SW of Kuwale Rd, roadside weed in dry area, rare, only 3 plants seen, 17 m, 21.440779, -158.152237, 16 Jan 2023, *K. Faccenda & M. Ross 2991*; *Batis* meadow west of Barbers Point deep draft harbor, 01 May 1990, *E. Funk 416*; Base of Hau'ula mountain range along jeep trail, passing the third gate, near soya bean and papaya cultivated area, 22 Aug 1972, *T. Herat 212*; Makakilo, landfill area, 01 Dec 1987, *M. Leu 73*; Mānoa campus, Univ. Hawai'i, 03 Jan 1976, *J.T. Swarbrick H-11*; At entrance to Sacred Falls State Park near main highway, 21 Mar 1978, *C. Corn s.n.* (BISH 668186). **LĀNA'I:** Keōmoku, NE shore of island, occasional

roadside weed in arid disturbed *Prosopis* thicket, 5 ft [2 m], *D. Herbst 4022* (HAW); Kaumalapau Harbor, Young Brothers shipping terminal, rocky soil on edge of road, full sun, about 20 plants seen, only seen in this area, 20.787740, -156.990730, 19 Jun 2023, *K. Faccenda 3121*. **MAUI:** West Maui, Kahakuloa, 04 Jun 1934, *E.S. Handy 34.15*; Pu‘u o Kali, 1000 ft, 20° 43′ -156° 24′, 27 May 2004, *F. Starr 040527-1*.

Key to *Amaranthus* in Hawai‘i

This key is principally based on the treatment of the genus by Mosyakin & Robertson (2003). The fruit in *Amaranthus* is an utricle; if the utricle is dehiscent, it will split latitudinally into two parts, revealing a (typically) shiny seed.

1. Leaves with pink markings or solid bronze purple [species not yet known to be naturalized, but occur in cultivation and may yet escape]
   2. Leaves green with pink markings; inflorescences mainly axillary .... *A. tricolor* [in part]
   2′. Leaves solid-colored purple; inflorescences mainly terminal ..... *A. cruentus*

1′. Leaves green or occasionally marked with white
   3. Paired spines present in leaf axils ..... *A. spinosus*
   3′. Plants without any spines in leaf axils
      4. Inflorescences of axillary clusters
         5. Pistillate flowers with 4–5 tepals, tepals fused at basal ⅓ ... *A. polygonoides*
         5′. Pistillate flowers with 3 tepals, tepals free to base
            6. Utricle indehiscent, leaf blade emarginate at tip .... *A. blitum* subsp. *emarginatus* [in part]
            6′. Utricle dehiscent, leaf blade not emarginate at tip
               7. Leaves varying shades of green ..... *A. albus*
               7′. Leaves with bright red or pink coloration ..... *A. tricolor* [in part]
      4′. Inflorescence mainly terminal
         8. Plants dioecious
            9. Longest (outer) tepal acute or acuminate, midvein excurrent into a rigid point; pistillate bracts and outer tepals longer than inner tepals; staminate bracts equaling outer tepals ..... *A. palmeri*
            9′. Tepals obtuse or retuse, midveins excurrent slightly or not at all; pistillate bracts and outer tepals ± equaling inner tepals; staminate bracts shorter than tepals ..... *A. arenicola*
         8′. Plants monoecious
            10. Utricle indehiscent; plants often weak, flowers often spaced apart from each other making the inflorescence appear thin
               11. Utricles smooth or weakly rugose, leaf apex emarginate .... *A. blitum* subsp. *emarginatus* [in part]
               11′. Utricles rugose, leaf apex emarginate or not
                  12. Leaves ovate to rhombic ..... *A. viridis*
                  12′. Leaves narrowly lanceolate [supposedly extinct] ..... *A. brownii*
            10′. Utricle dehiscent; plants generally robust, flowers usually densely compacted (*Amaranthus hybridus* complex)
               13. Tepals of pistillate flowers with an obtuse apex ..... *A. retroflexus*
               13′. Tepals of pistillate flowers acute or acuminate at apex

14. Bracts <2 mm long, shorter than tepals; tepals 1.5–2.0 mm long .... *A. dubius*

14′. Bracts >2 mm long, equalling or surpassing tepals; tepals 1.5–3.5 mm long

15. Bracts 4–7 mm long, inflorescence usually stiff, with erect branches ..... *A. powellii*

15′. Bracts 2–4 mm long, inflorescence usually soft and lax, with spreading branches ..... *A. hybridus*

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