

***Amsinckia* Lehmann (Boraginaceae): A Summary Taxonomic Review**

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Abstract

Amsinckia spp., commonly referred to as fiddleneck because of their scorpioid cymes, are toxic plants that cause livestock poisoning from liver disease and associated secondary conditions. A case reporting the death of 15 cows caused primarily by ingestion of *Amsinckia intermedia* published in this issue as a companion paper provided the impetus for this summary taxonomic review. Therefore, an overview of *Amsinckia* as known in the western United States is provided. Because of the confusion and mis-information about the classification of the *Amsinckia* species in general, this review of the taxonomy of this genus is timely and a contribution to the accompanying case report. For this review we have restricted the hundreds of segregate *Amsinckia* species provided in the literature historically to eleven species and an additional half dozen infra specific taxa.

Key words: *Amsinckia*, Boraginaceae, fiddleneck, livestock, poisoning, pyrrolizidine alkaloids, taxonomy

Introduction

Most if not all *Amsinckia* species contain hepatotoxic dehydropyrrolizidine alkaloids (DHPA; Colegate et al., 2013), although poisoning has only been reported from four species *A. lycopsoides*, Lehm, *A. menziesii*, Lehm, *A. intermedia*, Fisch and C.A. Mey, and *A. tessellata*, Gray (Kingsbury, 1964; Burrows and Tyrl, 2013). A recent poisoning case reporting deaths of 15 cows from a herd of 150 ingesting *Amsinckia intermedia* is published as a companion paper in this issue (Panter et al. 2017). Because of this case report and the mis-information in the literature concerning the taxonomic classification of the *Amsinckia* genus, we determined that a summary review of the taxonomy of the genus would also be beneficial to include in this issue subsequent to the case report of poisoning. Therefore, we provide a detailed taxonomic summary review

of the genus.

The *Amsinckia* genus is represented in western North America, endemic in California (Kelley and Ganders, 2012) but is also present in South America (Bolivia, Chile, Patagonia) and is widely distributed elsewhere in North America and other countries in the world through introduction (Macbride, 1917). California is most certainly the center of distribution for the species in North America (Ganders, 1993; Kelley and Ganders, 2012), and supports a series of relatively narrowly restricted endemics including *douglasiana*, *eastwoodiae*, *grandiflora*, *lunaris*, and *vernicaosa*, some of which are considered as rare and one of them, *grandiflora*, regarded as endangered, probably due to interdiction of its habitat by appurtenances of humanity. Distribution of weedy members of the genus

subsequent to arrival of colonists in the American West have allowed some species to expand far beyond their original ranges. While there are no truly adaptive features that allow ease of transport, the four nutlets (actually schizocarps) are of a size to allow limited dispersion by both birds and rodents, and transport through human activity. North American representatives of the genus *Amsinckia*, mainly *lycopsoides* and *menziesii*, are reported as waifs along roadways or railroad rights of way for all states except for South Dakota, Kansas, Minnesota, Iowa, Arkansas, Louisiana, Alabama, Florida, West Virginia, New Jersey, Maryland, Delaware, and Vermont, and are likely to be found in those states ultimately (Welsh, unpublished data). They are also reported from the prairie provinces of Canada—Alberta, Saskatchewan, and Manitoba—and the Yukon and British Columbia (Welsh, unpublished data). Some species are traditionally confined to smaller regions where natural features (isolated mountain ranges, dunes, or islands) have potentially precluded ease of distribution. Certainly the opening of the American West to occupation by humans and their concomitant clearing of land for agriculture and inadvertent introduction of pestiferous weeds have increased propensity of at least some of the *Amsinckia* species to increase their ranges.

Seeds (the nutlet schizocarps) are often about the size of grains of wheat and can easily be harvested and transported with cereal grains in commerce, either with the cereal grains per se or with forage for livestock and feed for poultry. The plants can be included in bales of hay cut from dry-land growing areas, and can thereby be transported over large distances. Possibly through such transport as feed for horses, they were introduced into Alaska, Yukon, and adjacent northern British Columbia (*A. menziesii*, *A. lycopsoides*, and possibly *A. spectabilis*, (Welsh and Moore, 1968) dating from the late 1890s gold rush era and have persisted since that time. Not only were they introduced in the eastern states, but in Europe, and in Australia, where *A. intermedia* is reported to be a common weed in agricultural lands in New South Wales, Victoria, and Queensland. Macbride (1917) cites a report of one species being prevalent as a weed in grain fields in eastern Washington. The Manual of Vascular Plants of Texas (Correll and Johnston, 1970) includes two species represented in collections by specimens per se, i.e., *A. micrantha* Suksdorf and *A. intermedia* Fischer & Meyer (which they call “Rancher’s fireweed), and *A. lycopsoides* Lehmann, based on a report but of which no specimens had been examined. Whether any were indigenous in Texas or represent man-related introductions is not specified. Stevens (1950) reports two species, *A. idahoensis* (= *menziesii*) and *A.*

menziesii, the former taken along railroad tracks at Pembina in 1912 and Rugby in 1918, and the latter at Fargo, North Dakota in 1942. Kaul (1986) indicates that both *A. lycopsoides* and *A. intermedia* are both seldom collected and only occur as waifs in the Great Plains.

Despite having attractive yellow or orange flowers arranged along the axis of a scorpioid cyme that uncoils as the plants mature, the plants are not highly regarded as ornamentals, “but often included in wild flower seed mixtures” (Hitchcock, et al., 1959). Ganders (1993) nevertheless gives an obscure reference to their use as ornamentals, when for *A. grandiflora* is the notification, “In cult”. The scorpioid cyme, uncoiling from the tip (figure 1), is indeed architecturally striking. One need only look at photographs of the various species available on the internet to see how beautiful the flowers can be, but the plants per se offer little in the way of stature or other features to be considered other than drab by comparison with other cultivated ornamentals. Herbarium specimens are anything but beautiful!



Figure 1. *Amsinckia* line drawing and photo of the flower head showing the scorpioid cymes. Drawing by Holly Hyer, Utah State University, photo by K.E. Panter.

Number of Entities

Over the years, the number of species (including infraspecific taxa) thought to exist varies widely. Gray (1878) cited only six species for North America, and two varieties. Macbride (1917), in an attempt to provide an overview of the genus treated some 23 species, six described by him therein as new or previously unmentioned. He noted that “. . . it must be conceded that characters which admit of clean-cut statements are all too few.” The notice by Macbride understates the case. The lack of consistent diagnostic characteristics in

the genus has plagued botanists from the beginning. Intermountain Flora (Cronquist et al., 1984) indicates that there are about 15 species native to western North America and southern South America. Correll and Johnston (1970) note therein that the genus consists of “about 50 species of considerable technical difficulty which centers in western North America.” Wilhelm Nicolas Suksdorf (1850–1932) named 209 species of *Amsinckia* based on minutia of morphology (Suksdorf, 1931), not only taxa per se. He named specimens, not species, and in spite of the great number so named, only uncommonly have any of his *Amsinckia* “species” gained acceptance in modern interpretations of floras. Instead they clog the synonymy of the relatively small number of species known for the genus. A rather detailed biographical account of Suksdorf by Rhoda M. Love is reprinted in Botanical Electronic News (No. 385; December 2007) based on *Wilhelm Nikolaus Suksdorf (1850–1932) Pioneer Botanist of the Pacific Northwest* (Pacific Northwest Quarterly 89(4), 1998).

Members of the genus are made up of self-pollinated and cross-pollinated individuals and strains, and thus lead to formation of both self-perpetuating and hybrid groupings. This can be confusing when attempting to classify this complex genus. In writings on the role of heterochrony in flower development and evolution of self-fertilization of *Amsinckias*, Li and Johnston (2001; 2010) studied 26 flower traits under natural conditions on 3 clades of *Amsinckia*. The evolutionary changes they reported in flower morphology alone is complex and confusing, thus, when all of the plant traits are combined the temptation for taxonomists to expand the genus using minute characteristics is tantalizing. Attempts to make sense out of the resulting genetic interaction have plagued taxonomists from the start, and Suksdorf was apparently baffled by them. What appeared at first to be a rather small grouping of species took on a troublesome system of genetic and phenotypic variability that led Suksdorf to classify species based on an endless number of minor morphological phases (209 species). Suksdorf’s herbarium and writings are at Washington State University. Brand in Report. Sp. Nov. Regni Veg. (volumes 20, 25, and 26; 1925, 1928, and 1929, respectively) named several critical species in the genus, basing his observation on specimens from North America then in European herbaria. None of his half dozen proposals stand at taxonomic rank in contemporary literature. He was apparently baffled by the variation available in this remarkable genus, which was obviously in evolutionary transition when first encountered by botanists, and which is undergoing additional evolutionary changes where it has

encountered habitats not available to it prior to the advent of western civilization.

Morphological Characteristics

Members of the genus attracted the early attention of Botanists as indicated by the naming and classifying of the genus *Amsinckia* by Lehmann (1831), and like many other genera of plants the morphological features are sufficiently plastic and intergrading that few, if any are diagnostic when used solo, and even in combination are difficult to apply. Except for the three taxa with smooth and glossy nutlets, the remainder have nutlets whose surfaces are variously sculpted (some with surface resembling road pavement). Thus, most of the nutlet characteristics used to distinguish entities in the genus are subject to interpretation, and variation within them leaves the investigator often baffled. The sculpturing of the nutlets is not the only source of bafflement i.e. other vegetative features such as degree of hispidity and the positional placement of epidermal trichomes from stem base to apex or less so below than above, or the existence of pilosity in addition to hispidity and its placement, or differences in trichome abundance between lower leaf surface and the upper, where sometimes the trichomes are present only along the midrib, to name a few. Pilosity beneath the hispid hairs on stems (upper only) or on calyx lobes, is also subject to interpretation. There are few or no absolute diagnostic criteria presented that will serve to distinguish one taxon from all others, including heterostyly versus homostyly, features often shared within a given entity.

Staminal filament attachment can be and is often variable, not only in the genus as a whole but in the individual species, the anthers thus produced below, adjacent to, or above the tip of the style, and in some cases, two of the filaments are short and the other three are elongated. Number of veins in the lower portion of the corolla below the staminal attachments, 10 or 20 as the case may be, appear to have taxonomic significance, but is difficult to determine in pressed material. Coalescence of calyx lobes, resulting in two to four apparent lobes (by fusion into sets) apparently has value as a diagnostic feature, but again is difficult to discern, at least in pressed materials. The lobes, whether coalesced, or distinct are hidden in the accompanying mass of elongate, sharp trichomes.

Corolla limb width varies within some species, sometimes not forming a continuum, but as distinctive corolla-size phases. What one would hope to place in a small-flowered taxon often finds placement in another

due to divergent nutlet characteristics, characteristics that are judged to override corolla sizes for taxonomic placement. Kelley and Ganders (2012) for example treats *gloriosa* as a variety of *tessellata*, separating them on corolla size, 12–16 mm long and limb 6–10 mm wide for var. *gloriosa*, and 8–12 mm long and limb 2–6 mm wide for var. *tessellata*. He treated *intermedia* as a variety of *menziesii* again based on flower size, i.e., corolla 4–7 mm long and limb 2–3 mm wide and yellow for var. *menziesii*, and corolla 7–11 mm long and limb 4–10 mm wide and more or less orange for var. *intermedia*.

Plant stature has been used in combination with other features (Ganders, 1993) to distinguish var. *spectabilis* from var. *microcarpa*. They were separated by him on the basis of stems erect, calyx lobes distinct, nutlet 1–1.5 mm long; flowers heterostylous, for var. *microcarpa*, and stems generally decumbent; calyx lobes, 2 or 3 of them half coalesced; nutlet 1.5–2 mm long; flowers heterostylous or not. It is to be noted that in the above cases nutlet size and corolla measurements form a continuum.

Evident lack of genetic incompatibility is recognized by the presence of apparent or actual hybrids between *lycopsoides* and *menziesii*, between vars. *spectabilis* and *microcarpa*, and between vars. *vernica* and *furcata*. Perhaps evidence of intermediacy is obscured, at least sometimes, by lack of actual morphological differentiation.

Still, as pointed out by Hitchcock et al. (1959), “Among our [Northwestern American] species *A. lycopsoides*, *A. spectabilis*, and *A. tessellata* are sharply limited and technically well marked, distinguishable without difficulty.” They also noted that except for *A. spectabilis* “our species are all weedy.” To the list of weedy species can be added *A. menziesii*.

Chromosome numbers and position of stamens with regard to position of stylar tip were determined for eight species by Ray and Chisaki (1957). Where anther placement was equal to the style in position they are regarded as homostylic, but where their position is either above or below the stylar position they are regarded as heterostylic. Determinations by Ray and Chisaki (1957) are as follows: *douglasiana* n = 6 (heterostylic); *furcata* n = 7 (heterostylic and homostylic); *gloriosa* -12 (homostylic); *grandiflora* 6 (heterostylic); *lunaris* 4 (heterostylic and homostylic); *spectabilis* 5 (heterostylic and homostylic); *tessellata* 12 (homostylic); and *vernica* 7 (homostylic). Additional chromosome numbers taken from literature are cited following the species descriptions below.

Ray and Chisaki (1957) note, “In almost every one of the heterostylic species of *Amsinckia*, this heterostyly appears to have been in various ways

replaced by homostyly, which subsequently has led to the appearance of small-flowered, clearly self-pollinated forms.” Thus, their phylogenetic chart reflects the heterostylic, large-flowered *furcata* to homostylic large-flowered *furcata* to small-flowered self-pollinated *vernica* (and the widely disjunct *carinata* as well). *A. tessellata*, both small-flowered and homostylic terminates the line of heterostylic *grandiflora* and *douglasiana* through *gloriosa*. *A. lunaris* displays all heterostylic phases and a small-flowered homostylic phase as well. They show large-flowered homostylic *eastwoodiae* as basal to homostylic smaller flowered *intermedia* and *lycopsoides*, and small-flowered *A. menziesii*.

Coalescence of sepals versus sepals distinct appears to be significant, and has been utilized as diagnostic in separation of the *Amsinckia* species into two rather distinctive groups. However, in at least some instances the first to open flowers on the cyme are reported to have separate sepals even in those entities with all later flowers having coalesced ones. Too, it is difficult to distinguish calyx characteristics in pressed material where that feature is obscured by the thatch of pungent trichomes. The feature of coalesced sepals is most easily discerned in mature plants wherein the cyme has elongated into a unilateral spike and nutlets have been shed or about to be shed. The sepals are then displayed widely separated, and one can check the lobes to determine if two or more main veins are present, or if there is a notch at the tip of the “sepal.”

Taxonomy

Suksdorf (1927) published a paper *Washingtonische Pflanzen IV* in which he wrote a summary treatment for *Amsinckia* in the flora of Washington State. Therein, he recognized three sections (his Abteilung), which were treated as such in the 1931 summary revision, they are *Muricatae* (p. 49), *Tessellatae* (p. 102), and *Vernicosae* (p. 112). Later in his 1931 treatment he recognized a fourth section, i.e., *Microcarpae* (p. 94), whose species had been included in *Muricatae* previously. Largest of the sections is *Muricatae*, in which are included most of the hundred plus species he described as new, and also most of those described by others previously. Smallest of the sections is *Vernicosae*. The sections have been recognized by other workers (see reference section) with some modifications and additions. The following sectional descriptions are translated from the Suksdorf 1927 treatment.

Section *Muricatae* – Calyx lobes five, distinct; corolla tube 10-nerved; nutlets 1.5–3.5 mm long, 4-

angled-ovoid, the dorsal ridge clearly distinct, seldom almost lacking, the transverse ridges at the base of the nutlet approach the hilum at its highest point, or it reaches it not fully, so that a small gap remains (Suksdorf, l.c.;49). In this section (actually Division according to Suksdorf) are included some 155 Suksdorfian species, most of them applicable to *A. intermedia*.

Section *Microcarpae* – [previously, in Suksdorf (1927), included in *Muricatae*]. Calyx lobes five, or mostly 2 or 3 lobes with each other connate; corolla tube 10-nerved; nutlets 1.5–2.5 mm long, 4-angled-ovoid, the dorsal ridged seldom lacking, the transverse ridges touching the hilum on its broadest place or in the center and forming therewith often a right-angled cross.

Included here were 26 Suksdorfian species assignable to *A. spectabilis* and one to *A. lycopsoides*.

Section *Tessellatae* – Calyx mostly 3-lobed, whose broad lobes are 2-toothed, or the calyx lobes are all distinct in the earliest flowers; corolla tube 20-nerved below the stamens (though seldom the axillary nerves can be lacking); nutlets 2.5–4.5 mm long, the back low to flat, the margins 2-angled, straight, the transverse ridges touching the hilum on its broadest place.

Included here are *A. douglasiana* with two segregates, *A. gloriosa* with five segregates, and *A. tessellata* with 27 segregates, three of them not from the United States.

Section *Vernicosae* – Calyx mostly 3-lobed; corolla tube below the stamens 20-nerved; nutlets 2.5–5 mm long, straight, smooth and shiny, 3-angled, the angle sharp; hilum small or entirely hidden; transverse ridges are seldom recognizable.

Included in this section are *A. vernicosa* (n=7), *A. carinata*, and *A. grandiflora* (n=6) and three segregates. However, Ray & Chisaki (1957), did not recognize the Section *Vernicosae*, but placed it, with its small-flowers derived from *furcata*, within Section *Tessellatae* Suksdorf, whose other alliances included *A. grandiflora* (n=6), leading through *douglasiana* (n=6) to *gloriosa* (n=12) with moderate-sized flowers, and ultimately to small-flowered *tessellata* (n=12), along one branch; and to Section *Microcarpae* Suksdorf, including both large- and small-flowered phases of *A. spectabilis* (n=5), but whose lateral branch became a newly proposed Section *Disjunctae* (Ray & Chisaki, 1957) including the solitary species *A. lunaris* (n=4) with both large- and small-sized flowers, and a questionable tie-in with Section *Muricatae* (Suksdorf, 1927), including large-flowered *eastwoodiae* (n=12), to moderately sized flowers of *intermedia* (n=15, 18, 19) and *lycopsoides* (n=15) and finally to small-flowered

menziesii (n=8, 13, 17) of *A. menziesii* (Lehmann) (Nelson and Macbride, 1916). Suksdorf (1927) states that he was forced to omit this species because he did not know it, and further that Gray had never named it. However, in his 1927 paper, Suksdorf keyed it adjacent to *A. lycopsoides* in his Abteilung *Tessellatae*.

Sonoran Desert and Baja California distributions of *Amsinckia* – Both Shreve and Wiggins (1964), Vegetation and Flora of the Sonoran Desert and Wiggins (1980), Flora of Baja California treat species of the genus *Amsinckia* that are widespread elsewhere in North America, i.e., *A. intermedia* and *A. tessellata* in Shreve and Wiggins plus *A. menziesii* and *A. spectabilis* in Wiggins. Neither of those treatments cite synonyms, except indirectly. Certainly none of those plants named on the basis of type material from either Baja or the Sonoran Desert are included at taxonomic rank. Examples named by Suksdorf (1931) include *A. nesophila* Suksdorf, Werenda 1: 93. 1931; Type: “Unterkalifornien: Cedros Island, T. S. Brandegees s.n., 3 April 1897, holotype UC [very likely= *intermedia*]; *A. orcuttii* Suksdorf 1108, “Unterkalifornien: Japa, C. R. Orcutt 1108, 4 July 1884, holotype UC, first cited [very likely *A. tessellata*]; and *A. inepta* Macbride, Contr. Gray Herb. 59: 14. 1917; Type: Lower California, San Martin Island, Anthony 217, sans date, holotype GH, related to *A. eastwoodiae*.

***Amsinckia* Taxonomy–Revised**

***Amsinckia* Lehmann** Index Seminum (Hamburg) 3, 7, 1831 (nom. cons.)

Annual, pungent-bristly, herbaceous plants; stems erect or decumbent with spreading branches, leafy; leaves alternate, linear to ovate, usually veinless; racemes usually ebracteate; calyx cut to base into erect lanceolate or oblong lobes; corolla tubular or salverform or funnellform, heterostyled or not, yellow or orange, tube cylindrical, glabrous, unappendaged; lobes spreading, rounded, imbricate; stamens included, affixed in the tube; filaments very short to elongate; anthers oblong; style obtuse, filiform, included; stigma capitate, emarginate; ovules 4; cotyledons 2-parted; nutlets 4, erect, angulate-ovoid, smooth or rough, unmarginated, strongly keeled ventrally; gynobase pyramidal, ca half the height of the nutlet (n = 4, 6, 8, 13, 15, 17, 19).

1. Leaves often erose-denticulate; calyx with two sepals usually partly united; plants maritime or of inland dunes *A. spectabilis*
- Leaves entire; sepals either reduced in number (3 or 4 by lateral coalescence) or five and distinct; plants seldom maritime 2
- 2(1). Calyx lobes 2–4 by coalescence; corolla tube 20-veined near base; nutlet surface smooth, cobble-stone-like, or round-tuberclad 3

- Calyx lobes 5; corolla tube 10-veined near the base; nutlet surface generally sharp-tubercled, often ridged 7
- 3(2). Nutlets smooth and shining 4
 - Nutlets variously roughened, not shining 6
- 4(3). Scar of nutlet, ca 1 mm plus long, borne on the crest of the ventral keel; corolla tube 10-veined below attachment of stamens; plants known only from Malheur Co., Oregon *A. carinata*
- Scar of nutlet either obscured by ventral groove, and nearly basal or conspicuous and nearly median; corolla tube 20-veined below attachment of the stamens; plants of western Mohave Desert and Coast and Inner Coast ranges, California.... 5
- 5(4). Leaves coarsely and densely pustulate above, sparsely so beneath, hispid-ciliate; scar of nutlet poorly developed, sublineate or forked, nearly basal.... *A. vernicosa*
- Leaves finely and densely pustulate, hirsute above and beneath; scar of nutlet conspicuous, lance-ovate, nearly median *A. grandiflora*
- 6(3). Flowers heterostylic, yellow-orange; calyx densely rusty-hairy and bristly nutlets tessellate..... *A. douglasiana*
- Flowers homostylic, yellow to yellow-orange; calyx and nutlets various 7
- 7(6). Corolla limb 2–4 mm broad, much surpassing the calyx; calyx thinly white-hirsute..... *A. tessellata*
- Corolla limb 8–14 mm broad, also much surpassing the calyx, its tube flaring upward..... *A. gloriosa*
- 8(2). Corolla throat nearly closed by well-developed, hairy fornicies; stamens borne below the middle of the corolla tube *A. lycopsoides*
- Corolla throat not closed by fornicies; stamens inserted above the middle of the corolla tube..... 9
- 9(8). Corolla somewhat asymmetric, the limb with 2 red-orange marks, the tube bent *A. lunaris*
- Corolla limb not marked, the tube straight 10
- 10(9). Stem spreading-hispid and also evidently puberulent or strigose with shorter, softer, more or less retrorse hairs; leaf pubescence tending to be ascending, not widely spreading..... *A. retrorsa*
- Stem spreading-hispid, almost or quite without any shorter, softer pubescence below the inflor-escence 11
- 11(10). Corolla orange yellow, 7–20 mm long, well exerted beyond the calyx; plants usually green; stems hirsute-bristly, but with few or no fine appressed hairs *A. intermedia*
- Corolla pale yellow, 4–7 mm long, little or not at all exerted beyond the calyx lobe; leaves pubescent with appressed or ascending hairs *A. menziesii*

***Amsinckia carinata* Nelson & Macbride**, Bot. Gaz. 62: 145. 1916. [Type: Oregon, Malheur Co., Malheur Valley near Harper Ranch, at 1100 ft, John B. Leiberger, 2234, 10 June 1896, holotype GH; isotypes, NY, UC; OSU (topotype 2232, 8 June 1896, accession no. 155192, photo available on Internet)]

Plants 1-5 dm tall, stems branched above, glabrous to glaucous below, sparsely bristly above; leaves ovate to broadly lanceolate or narrowly oblong, mostly 1–3 cm long, with pustulate-based hairs above and below, some of conspicuous pustules and relatively small setae; spikes to 25 cm long in fruit; sepals (by connation) in pairs or threes (similar to *A. tessellata*), corolla yellow to burnt orange, ca 8 mm long, the limb half to about as wide as tube length, the tube 10-veined below staminal attachment; nutlets lance-attenuate in profile, smooth and shiny, 4–7 mm long, ventral keel prominent, the dorsal one low.

Bouldery and gravelly talus slopes, near Harper, in Malheur County, Oregon, where it is known from a small number of localities, within the northern extension of the Basin and Range Province.

Nelson and Macbride (1916:146) in discussion following the description of *A. carinata* note: “It is surprising indeed to find a representative of this alliance so far north. *A. grandiflora* (A. Gray) Kleeberger ex A. Gray, the species which *A. carinata* so closely simulates in habit, has not been collected north of San Francisco or Monterey. The Oregon species does not seem to differ from *A. grandiflora*, except in its fruit; it is only related to *A. grandiflora* in a general way; its nutlets are radically different from both. Mature nutlets of *A. vernicosa* are bright gray, speckled with black, 4–4.5 mm long, sharply triquetrous (like monster buckwheat grains) and with no obvious scar.” The 10-veined condition of the corolla tube below the staminal attachment is apparently diagnostic for this local endemic from both *A. grandiflora* and *A. vernicosa*. ***Amsinckia douglasiana* A. DC.**, Prodr. 10: 118. 1846. [Type: “In Nova California (Dougl.),” holotype G?, isotype? GH]

Stems erect, 3–5 dm high, simple or branched below, sparingly hispid below, the bristles more spreading above; leaves lance-linear to lanceolate, sometimes spoon-shaped, appressed-hairy and subcinereous, weakly pustulate; spikes elongating with age, often 10–15 cm long; calyx lobes 2–4, 1 or 2 pair connate, 6–12 mm long in fruit; corolla orange, 12–16 mm long, the limb 6–10 mm wide; nutlets ca 4 mm long, broadly ovoid, flattish and tessellate (like cobblestone) on back, the scar ovate (2n=12).

South coast ranges disjunct from the coast, in Monterey and San Benito cos. to n. Santa Barbara and w. Kern cos., California. “Coastal hill country from the region of San Francisco Bay to San Diego County” (Macbride 1917:13). “Scattered localities in the Coast Ranges of California from Monterey County to Ventura County” (Ray & Chisaki 1957: 531). Uncommon. Heterostylous.

Type description: “Caule erecto simplici inferne glabro apice setis pilisque mollibus pubescenti, foliis erectis linearibus acutiusculis pilis basi albotuberulatis patentibus vel in foliis junioribus adpressis hispidulis, racemis demum elongatis, calycibus hispidissimi, lacemiis linearibus obtusis, corolla calycis duplo longior, glabra, staminibus in superiori parte corolla inclusis.

Caulis pedalis? Folia radícula ign. Caulina 1–2 poll longa 1–2 lata, superne praeae ritim, pilosa superiore basi latiore et fere lanceolata, raceme simplices vel bifurcatie, florum sessilibus, secundi, calyces pilis subpatentes, juniores fulvi. Corolla 5–6 lin. longa, lutea, apices infundibuliformis, lobes

tamen brevibus, nuculae 2 lin longae pallidae. Char. Gen non dub." (l.c.)

***Amsinckia gloriosa* Eastwood ex Suksdorf**, Werenda 1: 103. 1931. [*A. tessellata* A. Gray var. *gloriosa* (Eastwood ex Suksdorf) Hoover, Vasc. Pl. San Louie Obispo Co., Calif. 245. 1970; Type: California, Cuyama, White Hills, Alice Eastwood, 1 May 1896, zum Teil, holotype CAS]

Stem 4 dm high, hirsute, branched at the ground; cauline leaves lanceolate, thickly hirsute, gray; calyx 6–7 mm long, the wider ones [sepals] the longer, hirsute; corolla 14 (12–16) mm long 6–10 mm wide, orange; anthers generally below stigma; nutlets 3 mm long, deltoid-ovoid, the point tuberculate, the short margin uneven, not flattened, the hilum lanceolate-rhombic (translated from Suksdorf l.c.). $2n = 24$.

Abundant in the Coast Ranges from Los Angeles County to Monterey and Alameda and Colusa cos (Ray & Chisaki l.c.), and to Ventura Co., California.

In Abrams (1951) *A. gloriosa* is regarded (along with *A. munzii*) as a synonym of *A. douglasiana*, but in Munz (l.c.), this is distinguished from *A. douglasiana* only in the ratio of flower having a ratio of length of style to length of stamens fairly constant and pollen being tetracolporate, not tricolporate as in that species. In Jepson Manual (l.c.), it is regarded as a variety of *A. tessellata*, differing in the corolla being 12–16 (not 8–16) mm long, and the limb 6–10 (not 2–6) mm wide, both measurements are obviously continua!

***Amsinckia grandiflora* (A. Gray) Kleeberger ex A. Gray** in Brewer & Watson, Bot. Calif., 1: 525. 1876. or is it **ex Greene** Bot. Man. Bot. San Francisco 262. 1898. [*A. vermicosa* var. *grandiflora* A. Gray, Bot. Calif [W. H. Brewer] 1: 525. 1876; Type: California, Contra Costa Co., at Antioch, Kellogg & Harford s.n., 16 April, 1869, holotype GH.]

Stems erect, 3–6 dm high, hispid with spreading bristles sparingly hispid below, thinly pilose above and the stiffer hairs weak or represented by their pustulate bases only; leaves linear to narrowly ovate, pustulate on both surfaces but the bristles often not developed; spikes elongating with age, often 10–15 cm long; calyx lobes 3 or 4, with rust-colored bristles that often completely conceal the appressed hairs beneath, to ca 12 mm long; corolla orange, 14–18 mm long, the limb 8–10 mm wide, the tube 20-veined below attachment of stamens; nutlets 3–4 mm long, ovoid, smooth and shining, the scar broadly lanceolate, a little below the middle.

Coast Ranges, Monterey and San Benito cos, to n. Santa Barbara Co and w. Kern Co., Calif. Cited as Endangered and presumed extinct near Antioch, Contra Costa Co., California in Jepson Manual (l.c.: 368).

A recovery plan available on the Internet indicates that the present known distribution consists of two small colonies in Corral Hollow, Alameda and San Joaquin counties, and a second population in western San Joaquin County, all south of Antioch, and southeast of Mt. Diablo.

***Amsinckia intermedia* Fischer & Meyer**, Ind. Sem. Hort. Petrop. 2: 25. 1836. [*A. menziesii* var. *intermedia*, (Fischer & C. Meyer) Ganders, Jepson Man. 368. 1993, nomen illeg., sans basionym; Type: California, Bodega Bay, "circa coloniam

ruthenorum Ross in portu Bodega," Eschscholtz s.n, holotype LE.] Tarweed fiddleneck

Stems simple or much branched, erect to widely spreading, 3–9 dm tall, sparsely bristly otherwise usually glabrous except for a tomentose pubescence near the base of the spikes; basal and lower cauline leaves to 15 cm long and 1 cm wide, linear or linear-lanceolate to nearly ovate, usually clasping at base and acute at apex, thinly hirsute on both sides with spreading, often pustulate hairs; spikes short or usually elongating in fruit, usually leafy-bracteate at base; calyx lobes linear attenuate, ca 5 cm long in flower, 6–12 mm long in fruit, about half as long as the corolla, rufous-hispid on the back, densely white-hirsute on the margins; corolla orange yellow 8–10 mm long, the limb 3–6 mm wide, the throat open; nutlets 2.5–3 mm long, incurved, grayish, narrowly keeled on the back and sharply rugose with the surface between papillate and muricate; scar shape, position? ($n = 17$, Windham & Windham 94–14, BRY!; $n = 15, 17, 19$, Ray & Chisaki 1957; 548; Munz, 1959; Fl. Calif. 589).

Creosote bush, Joshua tree, and other warm desert shrub communities below 1200 m in Box Elder, Davis, Millard, Utah and Washington cos.; Wash., s. to Baja Calif. and e-ward to Ariz., N. Mex., and w. Texas; Parry 68, 1875 ISC!; 30 (xi).

An indication of the difficulty of interpretation of standing for a given proposed entity is to be found in *A. micrantha* Suksdorf, which was cited in synonymy of *A. menziesii* by Ray and Chisaki (l.c.), but was regarded at specific level by Correll & Johnston (l.c.).

The material from north of Washington Co. Utah is apparently somewhat intermediate to *A. tessellata*. Specimens of this species are also reported for Tooele and Rich cos. The plant is known to be poisonous to all classes of domestic livestock, due to pyrrolizidine alkaloids.

However, the seeds are reported in the Internet to be the favorite food of Lawrence's goldfinch in California during the nesting season.

A note in Munz (Calif. Flora; 589) indicates that Suksdorf recognized over 100 segregates! However, Munz recognized only two varieties, as indicated below, but a vastly polymorphic third variety, var. *intermedia*, is automatically understood to exist. And, although *A. intermedia* has been regarded at specific rank for more than seven decades it (they, them) was (were) proposed at varietal rank by Ganders (Jepson Manual; 368) within *A. menziesii*, the proposal lacking citation of the basionym being illegitimate. Ganders does, however, comment that this plant by whatever name hybridizes with *lycopsoides*.

var. ***echinata* (A. Gray) Wiggins, Contr. Dudley Herb. 4: 22. 1950.** [*A. echinata* A. Gray, Proc. Amer. Acad. 10: 54. 1874. "Corolla ut videtur flava, tenuis, lin. 3–4 mm longa, fauce vix ampliata; antherae lineari-oblongae, aut fauciales exserte aut infra medium tubi; calyx rufo-hirsutus; nuculae granulato-rugolosaes vel submuricatae." Type: "Southeastern part of California, [Fort Mohave] Dr. J. G. Cooper s.n., Feb. 1861," holotype GH?]

Nutlets ovoid, ca 2 mm long, the dorsal keel drawn up into a fragile knife-like edge, the surface rough papillate, growing in Creosote Bush Scrub, in the eastern Mohave Desert.

Kearney & Peebles (1942;760) note that, "*Amsinckia echinata*, based on material from near Fort Mohave (*Cooper*

in 1860), is a form having the tuberculations and the dorsal keel of the nutlets elevated, narrow, and fragile. Such plants are frequent in Arizona and adjacent California, but are connected by many transitions to the forms with less prominently roughened nutlets that are typical of *A. intermedia*,” and further, “Suksdorf described various forms of *A. intermedia* as *A. nana*, *A. demissa*, *A. rigida*, *A. arizonica*, and *A. microphylla*, all based on Arizona types” (Johnston, 1953; see also synonyms of *A. intermedia* below).

var. ***eastwoodiae* (J. F. Macbride) Jepson & Hoover**, Fl. Calif. (Jepson) 3: 323. 1943. [*A. eastwoodiae* J. F. Macbride, Contr. Gray Herb. 49: 14. 1917; *A. douglasiana* var. *eastwoodiae* (J. F. Macbride) I. M. Johnston, Bull. S. Calif. Acad. Sci. 17: 66. 1918; Type: “California, near Pollasky, Fresno Co, April 11, 1906, Heller, no 8153,” holotype GH, isotype CAS]

Corolla deep orange, 14–18 mm long, two- to three-times as long as the calyx, its tube flaring, the limb 8–14 mm wide; nutlet rather large (n=12; Ray & Chisaki 1957;548).

Great Valley from Shasta County south, also South Coast Ranges and as far south as Riverside County California.

A. eastwoodiae is regarded at specific rank in Jepson Manual (1993; 368) and by Ray and (Chisaki 1957; 531), but at varietal rank in Abrams (1951;607), based on corolla 15–20 mm long and deep orange. Ganders (Jepson Manual, 1993; Kelley and Ganders, 2012) keeps *eastwoodiae* at specific rank, but comments that it is “Like large-fl. pls of *A. menziesii* var. *intermedia*.”

***Amsinckia lunaris* J. F. Macbride**, Contr. Gray Herb. 49: 12. 1917. [Type: California, San Mateo Co., grassy bank near San Mateo, on the Half Moon Bay Road, Heller 8555, 23 May 1907, holotype GH.]

Stems simple or much branched, erect to widely spreading, 3–9 dm tall, sparsely bristly, otherwise usually glabrous except for a tomentose pubescence [“ad apicem dense retrorso-strigulosus”] near the base of the spikes; basal and lower cauline leaves linear or linear-lanceolate [“circa 3 mm latis 4 cm longis”] to nearly ovate, usually clasping at base and acute at apex, thinly hirsute on both sides with spreading, often pustulate hairs; spikes short or usually elongating in fruit, usually leafy-bracteate at base; calyx lobes 5 [“4–5 mm longis,” or becoming longer at maturity, bristly with gray to rust-colored hairs]; corolla bilateral, red-orange, 7–10 mm long, the limb 5–7 mm wide, with 2 red-orange marks; nutlets 2–4 mm long, [“sublunatis”] tubercled and sometimes ridged (2n = 8).

Scattered localities in the Coast ranges, in the vicinity of San Francisco Bay, and eastward into the great valley of California.

Macbride (l.c.) indicates that this is a segregate of *A. douglasiana*, but “apparently very distinct because of the very pubescent upper leaves and the not at all rugose nutlets.

Munz (1959; 589) notes that this differs from *A. intermedia* in it heterostylic, more or less asymmetric, bilaterally marked flowers the limb with two red-orange marks, and with bent corolla tube.

Two specimens are cited by Suksdorf (l.c.) with the protolog of *A. papillata*, the first cited, i.e., California, Fresno Co., (Julia McDonald) with the notation “kurzgriffelig;” and

the second, California, Tulare Co., Pixley, Eastwood s.n., as “langgriffelig,” i.e., short-styled and long-styled, respectively.

***Amsinckia lycopsoides* Lehman ex Fischer & C. A. Meyer**, Ind. Sem. Hort. Petrop. 2: 2. 1836. [Type: Cultivated plants grown from seed collected by Douglas, “above the rapids of the Columbia,” holotype loc.?]]

Stems erect, 1–7 dm high, simple or few branched, spreading hispid below, the stiff hairs with pustular bases, also with shorter and softer, often retrose hairs above, or throughout; leaves linear to linear-oblong or the upper lanceolate, sessile and clasping basally or the lower ones petiolate, 1.5–8 cm long and 1.5 cm wide, often crowded at the base; spikes elongating with age, to 10 cm long, essentially ebracteate; calyx lobes 5, 6–10 mm long in fruit, ciliate and stiffly hairy; corolla yellow to orange-yellow, marked with vermilion in the throat, 6–9 mm long, the throat marked with red, obstructed (nearly closed) by hairy fornicies, the limb (3–6?) 5–10 mm wide; stamens inserted below the middle of the tube; style ca 2 mm long, the stigma capitate; nutlets 2.5–3 mm long, ovoid, greenish to dark brown, wrinkled and warty dorsally, the dorsal keel poorly or not at all developed, the scar broadly lanceolate, subbasal (2n =30; n = 15, Ray & Chisaki 1957; 543).

Alaska (Attu Island) and B.C. to w. Montana, south to California (west side of the Sierra Nevada) and Arizona.

The presence of hairy fornicies at the opening to the throat of the corolla tube is characteristic of this species. Suksdorf (l.c.; 101) in discussion of the calyx states “3 Lappen mit einander verbunden,” although others have described the five calyx lobes as distinct.

***Amsinckia menziesii* (Lehmann) Nelson & Macbride**, Bot. Gaz. 61: 36. 1916. [*Echium menziesii* Lehmann Ind. Sem. Hort. Petrop. 2: 29. 1836; Type: N. W. coast of America, Menzies, s.n., isotype BM] Menzies fiddleneck

Stems strictly erect, 1.5–8 dm tall, simple or branched, spreading-hairy with stiff, pustular-based hairs, and often more or less cinereous with fine appressed hairs; leaves linear or lanceolate to oblong, hirsute on both sides with ascending or appressed hairs, 1.5–10 cm long, 0.5–2.5 cm wide, stiffly hairy, sessile and clasping basally or the lower ones petiolate; inflorescence of 1 or few, strict, erect or ascending racemes, ebracteate; calyx-lobes 5, distinct, 7–13 mm long, linear or linear-lanceolate, stiffly hairy; corolla light yellow, 4–8 mm long, the limb 2–3 mm wide, the throat open, lacking appendages, glabrous; the tube included or only slightly exerted beyond the calyx lobes; stamens inserted above the middle of the tube; nutlets (2) 2.5–3 mm long, broadly ovoid, wrinkled and warty dorsally, the dorsal keel often prominent, at least in the upper portion; scar lanceolate, subbasal (n = 8, 13, 17; Ray & Chisaki 1957;549).

Mixed desert shrub, pinyon-juniper, sagebrush, mountain brush, and aspen-fir communities at 1400 to 2850 m in Beaver, Box Elder, Cache, Davis, Millard, Morgan, Rich, Salt Lake, Tooele, Utah, Wasatch, Washington, and Weber cos.; Alaska and Yukon, s. to Calif. and Nev., east to the Great Plains; also in S. America and in the Old World.

Typically the leaves are linear and have appressed hairs.

Nelson & Macbride (1916; 36) note that the basionym had not then been included within the genus *Amsinckia*, and made the proper nomenclatural combination. Suksdorf (1: 113. 1931) indicates that he did not know this species.

Ganders (Jepson Manual; 368) who includes *intermedia* in an illegitimate combination within *menziesii* notes “100 + named, mostly indistinct variants; self-pollinated; different variants may grow together and remain distinct but intergrade over their ranges.”

***Amsinckia retrorsa* Suksdorf**, Deutsche Bot. Monatsschr. 18: 134. 1900. [Type: Washington, Klickitat Co., at Bingen, W. N. Suksdorf 994, holotype?, isotype US, UC, GH. *A. hispidissima* Suksdorf, Deutsche Bot. Monatsschr. 18: 133. 1900: Type: Oregon, Hood River, Suksdorf 2316, holotype?, isotype GH]

Stems erect, simple or few-branched, 1–6 dm tall, spreading-hispid, and also evidently puberulent or strigose throughout with shorter and softer, more or less retrorse hairs; leaves hispid-hirsute with hairs mostly ascending, linear to narrowly oblong, sometimes longer, to 12 cm long, seldom over 1 cm wide, the basal ones often crowded and somewhat larger than the others; spikes elongating with age, often 5–12 cm long (need this measurement); calyx lobes 5, about equal, 5–12 mm long at maturity; corolla orange or orange-yellow, 5–8 mm long (not much exerted from the calyx), the limb mostly 1.5–3 mm wide; nutlets 2–3.5 mm long, ovoid, blackish, muricate-tuberculate and somewhat rugose, with a dorsal ridge, and whitish ventral flange, the scar subbasal, ovate-lanceolate (adapted from Pac NW Fl). n = 8, 13, 17

B.C. to n. Idaho, south to Utah and California

Although placed in synonymy of *A. menziesii* by Ray and Chisaki (l.c.), Cronquist (Intermount. Fl. 1984; 276) distinguishes *A. retrorsa* as a distinct species, differing from both *menziesii* and *intermedia* on the basis of the spreading-hispid hairs of the upper stem being subtended by puberulent or strigose shorter and softer hairs, these more or less retrorse. *A. retrorsa* is also regarded at specific rank in Hitchcock et al. (1959; 181). It is, however, included (in synonymy) within *menziesii* var. *menziesii* in both Munz (1959; 589) and Jepson Fl. Calif (1993; 368).

Suksdorf (l.c.;33) notes that “Diese Nummer werde als *A. intermedia* F. M.(?) Abgegeben,” in reference to his number 2007, the type of *A. arvensis* Suksdorf.

Cronquist (l.c.; 277) cites *A. eatonii* Suksdorf, Werenda 1: 64. 1931; Type: Utah, Eaton 251, July 1869, holotype CAS, as possibly belonging with *A. retrorsa* also. However, *A. retrorsa* is included in synonymy of *A. menziesii* in A Utah Flora (2010).

Cited as synonyms of *A. retrorsa* in Hitchcock et al. (1959; 181) are Suksdorfian segregate species, whose types are from either Idaho or Oregon. See Appendix list of synonyms.

***Amsinckia spectabilis* Fischer & C. A. Meyer**, Index Seminum (St. Petersburg) 2: 26. 1836; Type: California, Bodega Bay, [“Portia Bodega (aus Albert Pragers Sammlung),” kurzgriffelig, type? CAS [“Ex herbario horti Petropolatam”]; de Probe von Meyer selbst bestimmt; langgriffelig,” type? UC. fide Suksdorf 1931;97] [*Lithospermum lycopsoides* Lehmann, Stirp. Pug. 2: 28. 1830, not *A. lycopsoides* Lehmann (q.v.); *A. lycopsoides*

var. *bracteosa* A. Gray, Syn. Fl. 2(1): 198. 1978, nom. et stat nov. pro *Lithospermum lycopsoides* Lehmann; *A. scouleri* I. M. Johnson, J. Arnold Arbor. 16: 202. 1935, nom. nov. pro *Lithospermum lycopsoides* Lehmann]

Stems erect or decumbent to prostrate, simple or branched, to 4 dm tall, sparsely to moderately hispid with spreading bristles; leaves at least somewhat succulent, often erose-denticulate, lanceolate to lance-linear, lance-elliptic, or lance-oblong, or the lower ones oblanceolate, to ca 5 cm long and 12 mm wide, sessile except the narrowly oblanceolate basal ones; spikes elongating with age, often 5–12 cm long; calyx lobes 5, 4–8 mm long, two of them generally connate below the middle; corolla orange, 4–8 mm long, the limb 2.5–5 mm wide; nutlets 2–2.5 mm long, ovoid, blackish, somewhat rugose or tuberculate, the scar submedian, narrow (adapted from Pac NW Fl et Munz).

Pacific Coast from northern Baja California northward to Washington and Vancouver Island, B.C., and to Skagway and vicinity, Alaska (Welsh & Moore, 8744, 31 Jul 1968; 8794, 1 Aug 1968, collections previously labeled as *A. menziesii*)

Ray and Chisaki (l.c.) indicate that the homostylous “*A. spectabilis* have spread far north and south on maritime sand dunes along the Pacific coast, but have not penetrated inland more than a few miles anywhere,” and note further that “all the names cited under *A. spectabilis* and its varieties by Hoover are considered synonyms of species in the present interpretation.” Thus, the following cited entities at varietal rank have been variously interpreted.

var. *sancti-nicolai* (Eastwood) Johnston ex Munz, Man. S. Calif Bot. [Munz] 423. 1935. [*A. sancti-nicolai* Eastwood, Proc. Calif Acad. III. 1(3): 109. 1898; *A. intermedia* var. *sancti-nicolai* (Eastwood) Jepson, Man. Fl. Pl. Calif [Jepson] [5]: 844. 1925 (as var. *nicolai*); Type: California, sands, San Nicolas Island, Blanche Trask 58, April 1901, holotype CAS]

Spike bracteate throughout! Endemic to San Nicolas, San Miguel, and San Clemente Islands, California. In synonymy of var. *spectabilis* in Jepson Manual (1993; 368), but maintained as distinct by Abrams (l.c.;606).

var. *microcarpa* (Greene) Jepson & Hoover, Fl. Calif. (Jepson) 3: 326. 1943. [*A. microcarpa* Greene, Erythea 2: 191. 1894; Type: California, sans loc., Coulter 497, holotype GH?] Calyx lobes all distinct to base or only slightly connate; corolla 13–16 mm oblong. Nutlets 1–2 mm long, muriculate, but not usually with a dorsal ridge.

Near the coast, San Luis Obispo and nw Santa Barbara Cos., California.

Stems erect, calyx lobes distinct; nutlets 1–1.5 mm; flowers heterostylous..... var. *microcarpa*

Stems generally decumbent, calyx with 2 or 3 lobes connate below the middle; nutlets 1.5–2 mm; flowers heterostylous or notvar. *spectabilis*

(Key modified from Jepson Manual)

***Amsinckia tessellata* A. Gray**, Proc. Amer. Acad. Arts 10: 54. 1874. [Type: California, “Contra Costa Mountains near Mt. Diablo, W. H. Brewer” 1119, in 1862, holotype GH, isotypes UC!, US] Rough fiddleneck

Stems stout, branched throughout or sometimes simple below, 3–6 dm high, hispid with spreading bristles; leaves

linear-lanceolate, 2–7 cm long, rather thinly hispid, the hairs pustulate at base, sessile except the narrowly oblanceolate basal ones; spikes elongating with age, often 5–12 cm long; calyx lobes (2) 3 or 4, when 4 with 1 broader and notched or 2-lobed at apex, when 3 a little broader and notched at apex, hispid and on the margins densely white-hirsute, 8–13 mm long; corolla orange, 5–10 mm long, the limb 2.5–5 mm wide; nutlets 3–3.5 mm long, ovoid, the back low and usually with a median line, densely tessellate or papillate, and often transversely rugose, the scar lanceolate, basal or nearly so.

Creosote bush, Joshua tree, mixed warm desert shrub, sagebrush, oak, and pinyon-juniper communities at 750 to 1900 m in Box Elder, Davis, Iron, Juab, Millard, Salt Lake, Sevier, Summit, Tooele, Utah, Washington, and Weber cos.; Wash. to Ida., Ariz., and Baja Calif.; 61 (xiii).

Rough fiddleneck is one of three species cited by Hitchcock et al. (l.c.;177) along with *lycopsoides* and *spectabilis* as “sharply limited and technically marked.” Still, from within its variability, Suksdorf and other authors were able to distinguish a great number of apparently inconsequential segregate “species.”

Pac. N.W. Flora (1959; 181) cites three Suksdorf segregate species as synonyms of *A. tessellata*, all from Oregon and Washington.

***Amsinckia vernicosa* Hooker & Arnot**, Bot. Beechey Voy. 370. 1839 (collections of Lay & Collie). [Type: California, Douglas s.n., sans date, GH (type?)]

Stems erect, branched throughout or sometimes simple below, 2–6 dm high, sparsely setose and pustulate, or nearly glabrous; leaves lanceolate to lance-ovate, 4–8 cm long, somewhat clasping at the base, somewhat glaucous and fleshy, abundantly pustulate above; spikes elongating with age, 3–12 cm long; calyx lobes (2) 3 or 4, setose dorsally, the margins pale-ciliate, 9–18 mm long; corolla orange, 10–12 mm long, golden yellow, the limb 3–14 mm wide, the tube 20-veined below attachment of stamens; nutlets 4–6 mm long, ovoid, gray, smooth and shining, the scar lineate “attached at the lower part of the sharp inner angle by a narrow scar, all three faces plane or nearly so” (Gray 1978;197). (2n=14).

Corolla 3–8 mm broad, yellow; nutlets lanceolate in outline with an entire groove..... var. *vernicosa*

Corolla 8–14 mm broad, orange; nutlets ovate-lanceolate, with forked groove var. *furcata*

var. *furcata* (Suksdorf) Hoover in Jepson, Fl. Calif.

(Jepson) 3: 326. 1943. [basionym: *A. furcata* Suksdorf, Werenda 1: 113. 1931; Type: California, Cuyama white hills near the boundary between Santa Barbara and San Luis Obispo counties, Alice Eastwood s.n., 1 May 1896, holotype UC] Forked fiddleneck

Corolla 12–22 mm long, the limb 8–14 mm wide, orange; nutlet scar forked at base (n=14). Plant rare; Inner South Coast Ranges, in San Benito, Fresno, Kings, and San Luis Obispo cos., Calif. (Ray and Chisaki 1957;530, treated as a species); California endemic.

var. *vernicosa* Corolla 8–12 mm long, the limb 3–8 mm wide, yellow; nutlet scar unforked (2n=14). Greenhorn Mts, Kern Co., west side of San Joaquin Valley, and adjacent Coast Ranges from Alameda to San Luis Obispo County and desert

ranges in San Bernardino and Inyo cos. (Ray & Chisaki l.c.) to Monterey and Fresno counties, California, endemic.

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Brand A. 1929. Decas specierum novarum nona. *Repertorium Specierum Novarum Regni Vegetabilis* 26: 168-172. *Amsinckia toussaintii* Brand, based on plants grown in Germany from seeds from Chile!; *A. santae barbarae* Brand, p. 168, “Mediocriter hispida.” Caulis erectus strictus simplex vel parse ramosus 30-70 cm altus. Folia linearia 35-70 mm longa, 7-10 mm lata apice acuta. Cincinni terminaler densi et multiflori basi tantum bracteatei; sepals

- lineari subulata, 4-5 mm long, fulvo-setosa; corolla infundibuliformis 8-10 mm longa 4-7 mm lata; stamina fauci affixa; stylis calyci fructifero 7-8 mm longo subaequilongus vel eo berior. Nuculae brunneae vel fuscae late muricatae, fauci interiore muricatae, utrinque carinatae; cicatrix minima. "Calafornia: Santa Barbara, Elwood (Eastwood no 8. Herb Berlin)," the first cited! Also cited are: "Santa Clara County: Stanford University (Baker no 391, vermisch mit *A. Campestris*). – Blüt im Marz und April."
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