

THE GOLDENASTERS OF CALIFORNIA, *HETEROTHECA* (COMPOSITAE: ASTEREAE): NEW NAMES AND COMBINATIONS

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ABSTRACT

Extensive field work and herbarium specimen studies on the goldenasters of California indicated that a number of new names and combinations are required. The following new names and combinations are proposed: *Heterotheca sessiliflora* (Nutt.) Shinnery ssp. *bolanderi* (A. Gray) Semple, *H. sessiliflora* ssp. *echioides* (Benth.) Semple, *H. sessiliflora* ssp. *echioides* var. *bolanderioides* Semple, *H. sessiliflora* ssp. *echioides* var. *camphorata* (Eastwood) Semple, *H. sessiliflora* ssp. *fastigiata* (E. Greene) Semple, *H. sessiliflora* ssp. *fastigiata* var. *sanjacintensis* Semple, *H. villosa* (Pursh) Shinnery var. *scabra* (Eastwood) Semple, *H. villosa* var. *shevockii* Semple.

KEY WORDS: *Heterotheca*, Compositae, Astereae, California, Goldenasters

The following new combinations and names are required for use in the forthcoming *The Jepson Manual, Higher Plants of California* (J.C. Hickman, ed. 1993). Justification for the nomenclatural changes and additions will be presented in full elsewhere. Nomenclatural changes are based on examination of hundreds of herbarium specimens, field work conducted over a ten year period, and multivariate morphometric analyses of the *Heterotheca sessiliflora* and *H. villosa* complexes. All specimens cited below, including types, were examined during the course of the study.

Heterotheca sessiliflora (Nutt.) Shinnery ssp. *bolanderi* (A. Gray) Semple, *comb. et stat. nov.* BASIONYM: *Chrysopsis bolanderi* A. Gray, Proc. Amer. Acad. Arts 6:543. 1866. *Chrysopsis villosa* (Pursh) Nutt.

var. *bolanderi* (A. Gray) A. Gray, *Syn. Fl. N. Amer.* 1(2):123. 1884. *Heterotheca bolanderi* (A. Gray) Harms, *Brittonia* 26:61. 1974. TYPE: U.S.A. California: Oakland Hills near San Francisco, 1863, *Bolander* 2466 (HOLOTYPE: GH; Isotypes: K,US).

***Heterotheca sessiliflora* (Nutt.) Shinnery ssp. *echioides* (Benth.) Semple, comb. et stat. nov.** BASIONYM: *Chrysopsis echioides* Benth., *Bot. Voy. Sulphur* 25. 1844. *Chrysopsis villosa* (Pursh) Nutt. var. *echioides* (Benth.) A. Gray, *Syn. Fl. N. Amer.* 1(2):123. 1884. *Heterotheca echioides* (Benth.) Shinnery, *Field & Lab.* 19:71. 1951. TYPE: U.S.A. California: Bodegas, *Hinds s.n.* (HOLOTYPE: K).

***Heterotheca sessiliflora* (Nutt.) Shinnery ssp. *echioides* (Benth.) Semple var. *bolanderioides* Semple, var. nov.** TYPE: U.S.A. California: Contra Costa Co., Charles Tilden Reg. Park, Vollmer Peak. Scattered population along ridge top, in rocks and loose gravel in grassy area between shrubs, 16 Aug 1990, $2n = 36$, Semple, Suroto, & Ahmed 9339 (HOLOTYPE: UC; Isotypes: CAN,CAS,MO,NY,RSA,WAT).

Heterotheca sessiliflora (Nutt.) Shinnery ssp. *echioides* (Benth.) Semple var. *echioides accedens* sed foliis intermediisque interdum dense strigosibus longibus, involucris grandibus, capitulescentiis corymbiformibus compactibus.

Perennial from stout woody taproots, the stems several to many, ascending-erect, 17-45 cm tall, sparsely to densely strigose-hispid, the hispid hairs fewer than the shorter appressed ones, sometimes becoming more glandular and sparsely pubescent above. Lower stem leaves oblanceolate, 15-45 mm long, 4.5-10. mm wide, subpetiolate to sessile, cuneate, acute, mucronate, moderately to densely hispid-strigose on both surfaces; margins entire, strigose, longest hispid hairs near base, not undulate. Upper stem leaves lanceolate to elliptic, sessile, slightly reduced upward, 11-35 mm long, 3.5-7.5 mm wide, sparsely to densely villous-strigose (5-80 hairs/mm²), moderately to densely glandular (7-40 glands/mm²), acute to obtuse, mucronate. Capitulescence cymose-paniculiform, heads (1-)4-16; peduncles as upper stems to more glandular, bracts few, lower ones oblanceolate, like leaves, sometimes reduced upward to < 5 mm, those immediately below head 4-11 mm long, 0.8-4.0 mm wide. Involucres cylindrical to campanulate when fresh, campanulate-hemispheric upon drying, (7-)8-11(-12) mm tall; phyllaries in 4-5 imbricate series, outer 1/4-1/3 length of inner, narrowly triangular; mid series lanceolate, sparsely

to moderately glandular, sparsely to moderately strigose, margins hyaline, fimbriate-ciliate apically; inner ones similar. Ray florets 7-16, strap yellow, 4.5-10. mm long, 0.7-2.4 mm wide. Disc florets 28-70, yellow, glabrous, corolla barely ampliate, 5.5-7.5 mm long, lobes 0.4-1.0 mm long, sparsely strigose, hairs 0.3-0.7 mm long. Achenes 3-4 mm long, moderately to densely strigose; pappus off white, double, outer whorl of a few linear scales 0.25-0.50 mm long, inner whorl of 35-45 barbellate bristles 5.5-8.0 mm long. Chromosome number: $2n = 36$.

PARATYPES: U.S.A. California: Santa Clara Co.: Page Mill Rd. NE of CA-35, 21 Sep 1987, *Semple & Chmielewski 8915* (WAT). Marin Co.: San Geronimo, grass covered rocky ridge N. of golf course, common on slope above and below Nicasio valley road, large number of plants, 15 Aug 1990, *Semple, Suropto, & Ahmed 9333* (WAT). Santa Cruz Co.: W of Palo Alto, CA-35 17.5 km SE of CA-84, *Semple & Chmielewski 8918* (WAT); CA-35 NW of Saratoga, high elevation, *Semple & Semple 5670* (JCS-personal herbarium, MO,MT,UC,USF,WAT). [Additional duplicates to be distributed].

Variety *bolanderioides* is endemic to serpentine soils mostly on hill and mountain tops surrounding San Francisco Bay. As the name indicates, it is similar to ssp. *bolanderi* in which most collections of the taxon have been placed in the past. Individuals of var. *bolanderioides* can be similar in indument to diploid (rarely tetraploid) var. *camphorata*, which has relatively few hairs (for the ssp.) on its upper stem and rameal leaves, and to diploid var. *echioides*, which usually has a leaf indument of dense hispid and strigose hairs obscuring the underlying glands and smaller involucres. It is uncertain whether var. *bolanderioides* is a tetraploid derivative of var. *echioides* or whether it may be an allopolyploid involving ssp. *echioides* and ssp. *bolanderi*.

Heterotheca sessiliflora (Nutt.) Shinnars ssp. *echioides* (Benth.) Semple var. *camphorata* (Eastwood) Semple, var. nov. BASIONYM: *Chrysopsis camphorata* Eastwood, Zöe 5:81. 1900. *Chrysopsis villosa* (Pursh) Nutt. var. *camphorata* (Eastwood) Jepson, *Man. Fl. Pl. Calif.* 1036. 1925. *Heterotheca camphorata* (Eastwood) Semple, *Canad. J. Bot.* 58:148. 1980. TYPE: U.S.A. California: Santa Cruz Co.; Glenwood, Jul 1900, *Davis s.n.* (HOLOTYPE: CAS; Isotypes: DS,GH(2),NY(2),RM(3),UC,US).

Heterotheca sessiliflora (Nutt.) Shinnars ssp. *fastigiata* (E. Greene) Semple, comb. et stat. nov. BASIONYM: *Chrysopsis fastigiata* E. Greene, *Pittonia* 3:296. 1898. *Chrysopsis villosa* (Pursh) Nutt. var. *fastigiata* (E. Greene) H.M. Hall, *Univ. Calif. Publ. Bot.* 3:43. 1907. *Heterotheca fastigiata* (E. Greene) Harms, *Brittonia* 26:61. 1974. TYPE:

U.S.A. California: San Bernardino Mts, 1000-1500' [not 10000-15000 as in protologue], 15 Oct 1895, *Parish 3815* (HOLOTYPE: NDG; Isotypes: CAS,GH,UC,US).

***Heterotheca sessiliflora* (Nutt.) Shinnery ssp. *fastigiata* (E. Greene) Semple var. *sanjacintensis* Semple, var. nov.** TYPE: U.S.A. California: Riverside Co., CA-243 just S of Idyllwild Park at Manzanita Drive, 30 Sep 1987, $2n = 9_{II}$, *Semple & Chmielewski 8982* (HOLOTYPE: WAT; Isotypes (all shoots from same plant): CAS,MT,NY,RSA,UC).

Heterotheca sessiliflora (Nutt.) Shinnery ssp. *fastigiata* (E. Greene) Semple var. *fastigiata accedens* sed foliis utrinque sparsusque vel intermediusque interdum densis strigosibus et hispidibus, utrinque intermediusque vel densis glandulibus, viridibus non albis nec canescentibus.

Perennial from stout woody taproots, the stems several to many, ascending-erect, 35-105 cm tall, moderately appressed strigose-hispid (hairs often broken off), becoming densely glandular and moderately pubescent above. Lower stem leaves oblanceolate, 12-38 mm long, 3-8 mm wide, subsessile, cuneate, acute, moderately (rarely densely) hispid-strigose on both surfaces; margins entire, strigose, longer hispid hairs near base, undulate. Upper stem leaves lanceolate, sessile, reduced upward, 11-20 mm long, 3.5-6.5 mm wide, sparsely to densely glandular (6-42 glands/mm²), sparsely to densely short strigose (27-150 hairs/mm²), margins usually distinctly undulate. Capitulescence cymose-paniculiform, branches ascending, heads 5-60. Peduncles densely glandular, bracts few, lower ones lanceolate, leaflike, reduced upward to 0.5-1.5 mm long, 0.3-1.0 mm wide, phyllarylike. Involucres cylindrical to turbinate when fresh, campanulate upon drying, 7.5-12. mm high; phyllaries in 5-6 imbricate series, outer 1/5-1/4 length of inner, mid series narrowly triangular, moderately glandular, very sparsely strigose, margins hyaline, fimbriate-ciliate apically. Ray florets 5-13, strap yellow, 3.5-5.0 mm long, 0.8-1.8 mm wide. Disc florets 25-45, yellow, corolla somewhat ampliate, 5.3-7.5 mm long, lobes 0.4-0.8 mm long, sparsely pilose, hairs 0.25-0.50 mm long. Achenes 2-3 mm long, moderately strigose; pappus off white, double, outer whorl of a few linear scales 0.25-0.50 mm long, inner whorl of 25-40 barbellate bristles 6-8 mm long. Chromosome number: $2n = 18$.

PARATYPES: U.S.A. California: Riverside Co.: CA-243 just S of Idyllwild Park at Manzanita Drive, 30 Sep 1987, $2n = 9_{II}$, *Semple & Chmielewski 8981* (Each shoot from a separate plant: CAN,CAS,DAO,JCS-personal herbarium,MO,OBI,RM,RSA,SD,UC,WAT).

Variety *sanjacintensis* is endemic to the San Jacinto Mountains and Mt. Palomar areas of southern California. It has a capitulescence form and very undulate stem leaves that are similar to var. *fastigiata*, but its leaves are far less densely strigose than those of var. *fastigiata* and the hairs are somewhat longer. Individuals with less undulate leaves are similar to var. *camphorata* of ssp. *echioides*, which occurs much farther north in California in the Coastal Range from San Mateo to San Luis Obispo counties.

Heterotheca villosa (Pursh) Shinnars var. *scabra* (Eastwood) Semple, *comb. nov.* BASIONYM: *Chrysopsis villosa* (Pursh) Nutt. var. *scabra* Eastwood, Proc. Calif. Acad. Sci., ser. 2. 6:294. 1896. TYPE: U.S.A. Utah: San Juan Co., near head of Willow Creek, Eastwood s.n. (HOLOTYPE: CAS).

Chrysopsis viscida (A. Gray) E. Greene ssp. *cinerascens* S.F. Blake, Proc. Biol. Soc. Wash. 35:173. 1922. *Heterotheca horrida* (Rydb.) Harms ssp. *cinerascens* (S.F. Blake) Semple, Brittonia 39:381. 1987. TYPE: U.S.A. Utah: Beaver Canyon, among rocks in the oak region, 2 Sept 1909, Tidestrom 2873 (HOLOTYPE: US).

Semple (1987) discussed this taxon under the synonym *Heterotheca horrida* ssp. *cinerascens*. Additional work on the genus and the *villosa* complex (Semple 1990) resulted in treatment of *H. horrida* as a synonym of *H. villosa* var. *hispida* (Hook.) Harms. At the varietal level Alice Eastwood's epithet has priority over a combination based on Blake's epithet.

Heterotheca villosa (Pursh) Shinnars var. *shevockii* Semple, *var. nov.* TYPE: U.S.A. California: Kern Co., Kern R. Canyon, Bodfish, CA-178 at Bodfish-Havilah Rd., off of off-ramp, ca. 850 m el., 16 Nov 1981, Shevock 9110 (HOLOTYPE: CAS; Isotype: WAT).

Heterotheca villosa (Pursh) Shinnars var. *hispida* (Hook.) Harms *accedens sed caulis altae, foliae deltoideae-lanceolatae, glandulissimae, acutae, marginibus plerumque involutibus, involucellis grandibus; chromosomatum numerus $2n = 36$.*

Perennial from stout woody taproots, the stems several to many, ascending-erect, 25-135 cm tall, sparsely strigose, moderately hispid (hairs often broken off in older stems), becoming densely glandular and sparsely hispid-strigose above. Lower stem leaves oblanceolate to lanceolate, 25-55 mm long, 8-26 mm wide, subpetiolate to sessile, cuneate, acute, mucronate, moderately hispid-villous on both surfaces; margins entire, strigose, longer hispid hairs near base.

Upper stem leaves linear lanceolate to lanceolate, sessile, base abruptly tapering, reduced upward, densely glandular, sparsely villous-strigose. Rameal leaves much reduced upward, becoming linear to linear oblanceolate. Capitulescence cymose-paniculiform, heads 3-70, branches elongated in robust shoots. Peduncles long, densely glandular, sparsely hispid-strigose, bracts few, lower ones leaflike, greatly reduced upward, becoming linear to oblanceolate, margins with long hispid hairs. Involucres cylindrical to turbinate when fresh, campanulate upon drying, 9-13 mm tall; phyllaries in 5-6 imbricate series, outer 1/5-1/4 length of inner, narrowly triangular, densely glandular, sparsely strigose especially along the pronounced midvein, margins hyaline, fimbriate-ciliate apically; midseries linear lanceolate to linear oblanceolate, moderately hispid apically, margins similar to outer series. Ray florets 9-14(-18), strap yellow, 5-10 mm long, 0.8-2.0 mm wide. Disc florets (31-)41-68(-77), yellow, glabrous, corolla barely ampliate, 5.4-7.5 mm long, lobes (0.4-)0.5-0.9(-1.1) mm long, glabrous or very sparsely strigose, hairs 0.04-0.27 mm long. Achenes 3.5-4.5 mm long, moderately strigose; pappus off white, double, outer whorl of a few linear scales 0.25-0.50 mm long, inner whorl of 35-45 barbellate bristles 5-7 mm long. Chromosome number: $2n = 36$.

PARATYPES: U.S.A. California: Kern Co., Kern R. Canyon, CA-178 8.2 km SE of CA-155, edge of rd. below rock cut, 26 Sept 1987, *Semple & Chmielewski 8953* (CAS, JCS-personal herbarium, NY, RSA, UC, WAT); CA-178 25.4 km SW of CA-155, Democrat Hot Springs, Democrat Raft Removal Area, 26 Sept 1987, *Semple & Chmielewski 8954* (CAS, RM, RSA, WAT); just E of Miracle Hot Springs, Sequoia Nat'l For. - NE end of Hobo Campground, 18 Aug 1990, *Semple, Suropto, & Ahmed 9363* (WAT); CA-178, ca. 1.5 mi E of Rich Bar, 1000 ft. el., 16 Nov 1981, *Shevock 9105* (CAS). [Additional duplicates to be distributed].

Shevock's Goldenaster is named for James Shevock, an expert on the flora of Kern County, California, who collected the taxon several times in the Kern River Canyon area and who provided valuable personal communication on its habit and habitat. The var. *shevockii* is distinguished from other races of the species by its usually tall stems and lanceolate-deltoid leaves with inrolled margins. Smaller plants are similar to *Heterotheca villosa* var. *scabra* to which var. *shevockii* is undoubtedly closely related. In California, var. *scabra* is known only from a few locations in the Little San Bernardino Mountains (1200-1300 m el.), var. *hispida* occurs in the Sierra Nevadas, the Cascade Mountains and on lava flows in Lassen and Modoc counties (600-3100 m el.), while var. *shevockii* is endemic to the Kern River Canyon (400-900 m el.) in the Greenhorn Mountains. As with all races of *H. villosa* (Semple 1990), in typical form var. *shevockii* is readily recognized, but depauperate and atypical individuals are not easily separated from similar taxa, i.e., var. *hispida* and var. *scabra*.

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