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Authors: Bowe, L. Michelle, and Yatskievych, George

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Cynoglossum creticum in the North American Flora

L. Michelle Bowe[1] and George Yatskievych[2]

[1]Ozarks Regional Herbarium, Department of Biology, Missouri State University, 901 S. National Ave, Springfield, Missouri 65897 email: mbowe@missouristate.edu

[2]Plant Resources Center, The University of Texas at Austin, Main Bldg, Rm 127, 110 Inner Campus Dr, Stop F0404, Austin, Texas 78712

Author for Correspondence: george.yatskievych@austin.utexas.edu

Abstract: The naturalized North American distribution of the Old World native, *Cynoglossum creticum* Mill. (Boraginaceae), is detailed. The species has now been documented from a number of sites in six counties in Arkansas, Missouri, and Texas, as well as from the Mexican states of Coahuila, Nuevo León, and Zacatecas.

Keywords: *Cynoglossum*, Boraginaceae, North American flora.

As traditionally circumscribed, *Cynoglossum* L. (Boraginaceae *sensu stricto*) is subcosmopolitan in its overall distribution, with a major center of diversity in the Mediterranean region and adjacent western Asia. In the absence of a comprehensive, modern taxonomic monograph, estimates of the number of accepted species have varied from ca. 50 (Selvi & Sutorý, 2012) to 80–90 (Johnston, 1924), ca. 100 (Weigend et al., 2013), or as many as 200 (Chacón et al., 2016), with varying numbers of segregate genera accounting for much of this discrepancy. Recent phylogenetic work involving both molecular and morphological markers (Cohen, 2011, 2014, 2015; Weigend et al., 2013) has supported the conclusion that the Old World and New World species aggregates form separate major clades within the tribe Cynoglosseae DC. This has led to the more widespread acceptance of several segregate genera.

In the New World, generally four or five species have been accepted in the taxonomic and floristic literature. In recent years, these have been reclassified into three generic segregates: *Cynoglossum grande* Douglas ex Lehm. = *Adelinia grandis* (Douglas ex Lehm.) J.I. Cohen; *C. boreale* Fernald = *Andersonglossum boreale* (Fernald) J.I. Cohen; *C. occidentale* A. Gray = *Andersonglossum occidentale* (A. Gray) J.I. Cohen; *C. virginianum* L. = *Andersonglossum virginianum* (L.) J.I. Cohen, and *C. pringlei* Greenm. = *Oncaglossum pringlei* (Greenm.) Sutorý] (Sutorý 2010; Cohen 2015; Chacón et al. 2016). The monotypic *Adelinia* J.I. Cohen occurs from British Columbia south to California. *Andersonglossum* J.I. Cohen, with three taxa, is widespread in temperate and boreal North America. *Oncaglossum* Sutorý is endemic to central Mexico. A sixth taxon from the Chihuahuan Desert region of northeastern Mexico, *C. henricksonii* L.C. Higgins, was initially described under the later homonym, *C. erectum* L.C. Higgins (Higgins, 1976,a, b) and appears not to have been included in any of the recent phylogenetic studies.

In addition to the native taxa, a small suite of Old World species has found its way into the North American flora. The USDA's PLANTS database (http://plants.usda.gov) includes information on five such taxa, most of which are sporadic in their occurrences. A treatment of all of the non-native taxa in temperate North America, including a comprehensive key, is scheduled to appear in an upcoming volume in the Flora of North America series (J. Cohen, Kettering University, in prep.). Among these, the best-known and most widely distributed is *Cynoglossum officinale* L. (common hound's tongue), which occurs nearly throughout temperate North America (except for a few of the southernmost states). It is considered a noxious weed in some western states, for, as is characteristic of the genus, it produces

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pyrrolizidine alkaloids that are toxic to livestock (Burrows & Tyrl, 2001).

During the late 1990s, as work proceeded on the treatment of Boraginaceae for the Flora of Missouri Project (Yatskievych 2006), a small group of specimens surfaced that mostly had been identified as *Cynoglossum officinale*, but that appeared anomalous in several features, including leaf shape, pubescence, inflorescence shape, and corolla color. Michael Skinner, who has since retired from his Regional Biologist position with the Missouri Department of Conservation, first brought the existence of these anomalous plants to the authors' attention and guided us to plants in the field. Once a search image had been established, subsequent work disclosed a number of additional southern Missouri populations in herbaria and in the field. Consultation of various floristic treatments involving European and Asian Boraginaceae, as well as comparisons with specimens of *Cynoglossum* collected in that part of the world, eventually led to the determination that the plants in question represented *C. creticum* Mill. (blue hound's tongue), a taxon not previously reported from North America in the literature (although already noted online prior to the present account; cf.: http://texasinvasives.org/plant_database/detail.php?symbol=CYCR11). More recently, a population of this species was discovered on a ranch in central Texas, and another population was documented in northern Arkansas.

In addition, a search of specimens in the TEX-LL herbarium disclosed that, in 2010, specimens originally named as *Cynoglossum henricksonii* (including the type) had all been redetermined as *C. creticum* by Karel Sutorý, the well-known borage specialist from the Moravian Museum in the Czech Republic. We have confirmed Dr. Sutorý's findings, which he mentioned briefly in his description of the genus *Oncaglossum* (Sutorý, 2010). Mexican plants, which occur at higher elevations than those in the United States, differ mainly in their somewhat shorter stature and slightly smaller flowers and fruits, but are identical in floral and nutlet morphology, as well as vestiture. Thus, the name *C. henricksonii* L.C. Higgins should be treated as a heterotypic synonym of *C. creticum* Mill. and as an introduced taxon in Mexico, rather than a regional endemic.

Cynoglossum creticum has a large native distribution in the Mediterranean region (northern Africa, southern Europe, western Asia) north to central France (Selvi & Sutorý, 2012). It is also well-established as an introduction in southern South America in Argentina and Chile (where it was first collected in 1907; Ugarte et al., 2011), including the Juan Fernandez Islands (Danton et al., 2006). In Australia, it was first recorded in 1898 and is considered a potential noxious weed, despite its continued localized distribution in southern New South Wales (Anonymous, 2003).

Cynoglossum creticum has been a member of the North American flora for more than four decades. The earliest collections from the United States and Mexico date back to 1972, but all of the specimens in various herbaria gathered prior to 2010 were routinely misdetermined as other species. In many cases, multiple redeterminations indicate that botanists were aware of the anomalous morphology of the plants. It is not known how the taxon arrived in North America, whether it was introduced from Eurasian or South American stocks, or whether the North American material represents the progeny of a single or multiple introductions. Specimens from the United States and Mexico have fairly uniform morphology which is no help in addressing these questions, although the Mexican plants appear to be generally somewhat smaller than well developed plants from farther north. The species has been spread by various means; through cultivation as an ornamental or medicinal garden plant; as a contaminant in soil or potted plants of other species; as a contaminant in wool or animal hides; and as a hitchhiker on various kinds of livestock. Seeds may also be present in some packets containing commercial

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wildflower mixes, although we have no empirical evidence to support this suggestion. Once introduced, dispersal in a region is likely accomplished by a combination of physical factors (wind, water) and epizoochory (the nutlets becoming attached by their barbs to the fur of mammals).

The species is reported here from the North American continent as a non-native taxon naturalized in three states in Mexico and three states in the United States. Despite its documented presence for the last 45 years over such a large area, *Cynoglossum creticum* has not displayed strongly invasive tendencies. Populations are generally localized and the plants are most abundant in areas where disturbance limits competition from other taxa. Based on casual observations, it seems that cattle tend to avoid *C. creticum*, perhaps because of unpalatability, but even at heavily grazed sites in which the species has been known to occur for decades, the plants do not grow densely. Thus, although ranchers should be concerned about this toxic plant (particularly in the rare situation in which it might become a contaminant in hay), it currently does not appear to pose a substantial threat to livestock, at least no more so than some other unpalatable and toxic native taxa that tend to increase in grazed habitats, such as various species of *Helenium* and *Vernonia* (Asteraceae).

Taxonomic Treatment

Cynoglossum creticum Mill., Gard. Dict. (ed. 8), no. 3. 1768.

Type: Originally described from material grown at Chelsea Physic Garden from seed collected in Gibraltar. Neotype: **SPAIN.** Andalucia: Prov. Cádiz, 10 km W. of Puerto de Santa Maria, 17 April 1951, *A.H.G. Alston 10283* (Neotype: BM), designated by Selvi and Jarvis (2011).

C. erectum L.C. Higgins, Phytologia 33: 411–413, 1976, nom. illeg., non *C. erectum* Schweigg. ex Schrank (1822).

C. henricksonii L.C. Higgins, Phytologia 34: 234. 1976. Type. **MEXICO:** Zacatecas: 10 km WNW of Tecolotes on road to Coapa, 17 June 1972, *F. Chiang, T. Wendt & M.C. Johnston 7890* (Holotype: TEX; Isotype: WTS).

Plants robust biennials with stout, somewhat woody taproots (Fig. 1B). Stems solitary or more commonly 2 or 3(–5), 35–80 cm long, erect or strongly ascending, sometimes leaning with age, usually unbranched below the inflorescence, inconspicuously striate (this becoming more conspicuous in dried specimens), densely villous to slightly tomentose with unbranched, mostly unicellular, acicular trichomes, these variously 0.3–2.0 mm long, grayish white, soft to the touch, loosely appressed to spreading, those on the proximal stem mostly short and somewhat retrorsely spreading, grading to a mixture of shorter and longer, antrorsely appressed to spreading, often slightly tomentose medially, straight to somewhat curved from above the base, the bases of at least the larger hairs slightly bulbous or expanded (but not pustular) and often dark-pigmented. Leaves basal and spirally alternate, simple, entire (but the margins of distal leaves sometimes somewhat curled under, both surfaces densely villous to slightly tomentose with unbranched, unicellular, acicular hairs, these variously 0.2–1.6 mm long, grayish white, soft to the touch, antrorse, loosely appressed to somewhat curved, the bases of at least the larger hairs slightly bulbous or expanded (but not pustular) and often dark-pigmented. Venation brochidodromous, the midvein whitened and somewhat canaliculate adaxially, raised abaxially (Fig. 2A), the secondary and tertiary veins faint or obscure, forming complex areoles. Rosette leaves sometimes senescent prior to flowering (Fig. 1B), they and the similar proximal cauline leaves 10–32 cm long, the lamina narrowly elliptic to elliptic-oblanceolate, bluntly to sharply acute at the apex, tapered to the petiole (Fig. 2B), this usually about as long as the lamina.

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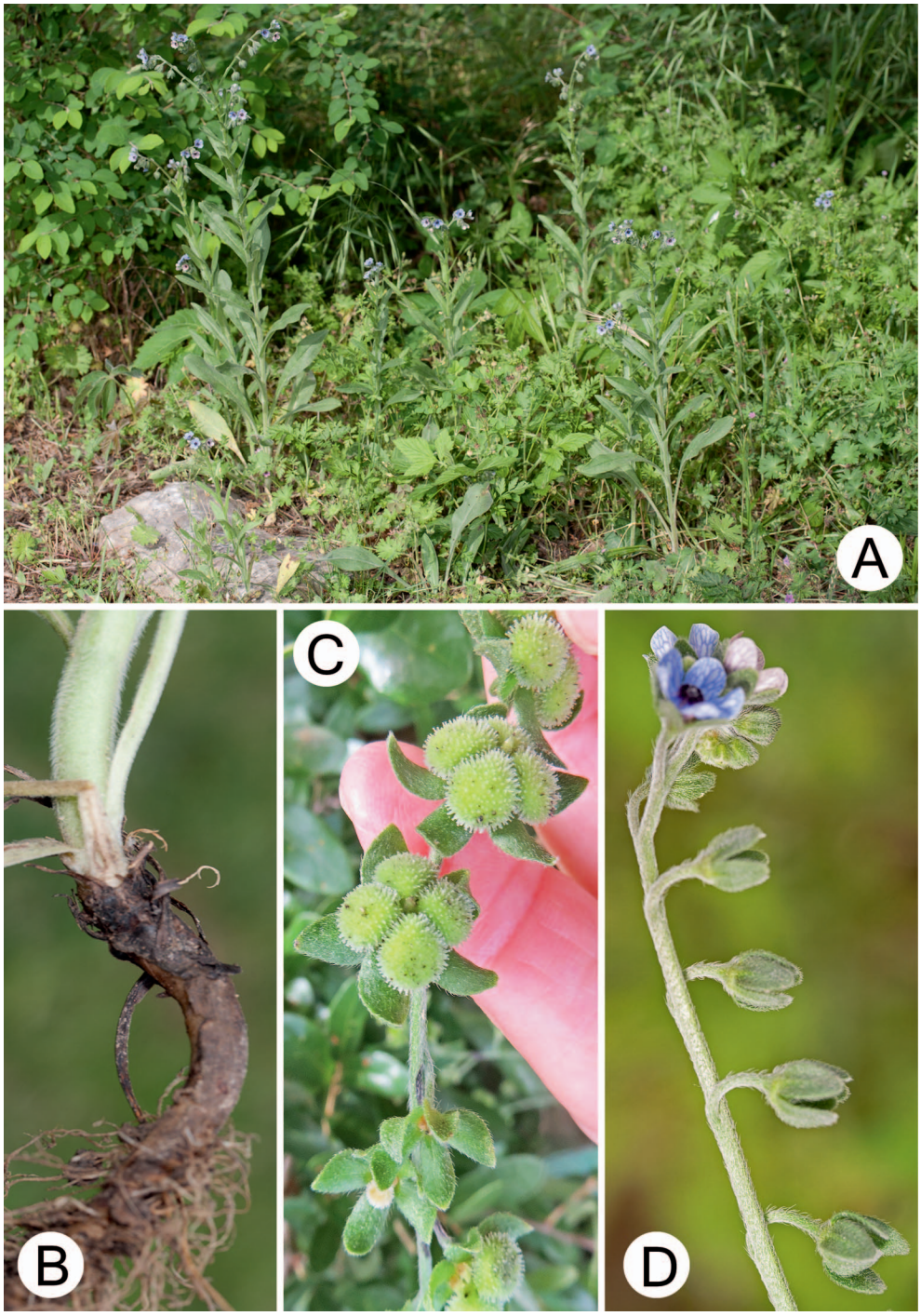


FIG 1. Views of *Cynoglossum creticum* from living plants in the field. **A.** Plants growing at the edge of a calcareous glade. **B.** Base of a mature plant showing bases of abscised old basal leaves and portion of taproot. **C.** Portion of an infructescence. **D.** Mature inflorescence branch; note the progressive elongation of the calyx lobes following anthesis. Photos: A, B, D: George Yatskievych (taken in Missouri); C: Minnette Marr (taken in Texas).

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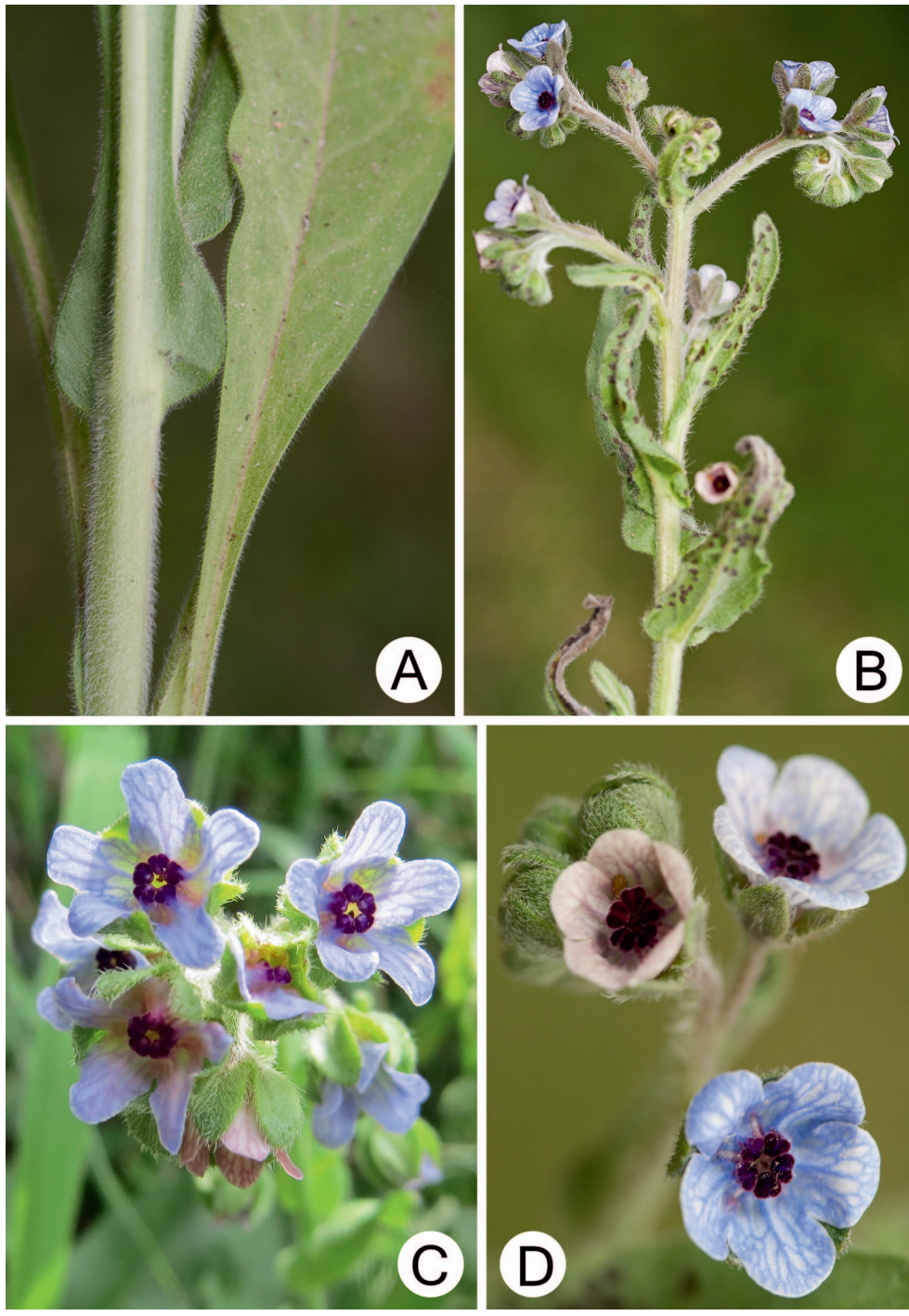


FIG. 2. Details of *Cynoglossum creticum*. **A.** Portion of stem showing pubescence and clasping abaxial base of medial cauline leaf, along with adaxial base of a petiolate lower cauline leaf. **B.** Young inflorescence. **C.** Flowers with oblong corolla lobes. **D.** Flowers with broadly rounded corolla lobes. Photos: A, B, D: George Yatskievych (taken in Missouri); C: Minnette Marr (taken in Texas).

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MEDIAL AND DISTAL CAULINE LEAVES progressively reduced, 2–10(–18) cm, the lamina narrowly oblong-lanceolate to narrowly oblong-oblanceolate, sessile, bluntly to sharply acute at the apex, auriculate-clasping at the base (Fig. 2B). INFLORESCENCES terminal (these usually paired with a small bracteal leaf between the axes; Fig. 2B) and solitary from the distal leaf axils, cymes, helicoid but becoming elongated, unbranched, the axes similar to the stems but with the trichomes loosely antrorse-appressed, the flowers in 2 series along the adaxial side of the axis, dense and ascending at anthesis but becoming widely spaced and pendant as the fruits develop. PEDICELS ebracteate, 2–10 mm at anthesis, elongating to 8–17 mm and becoming strongly curved as the fruits develop, densely villous-sericeous. FLOWERS perfect, homostylous. CALYCES 3–5 mm at anthesis, the tube slightly less than 2 times as long as the lobes, the 5 lobes oblong-ovate, rounded at apex, the exterior villosulous, the interior villosulous on the lobes, more or less ciliate (the marginal trichomes slightly longer than those on the surfaces; becoming enlarged to 6–9 mm at fruiting and deeply lobed (Figs. 1C, D), the lobes oblong-lanceolate to narrowly ovate. COROLLAS broadly campanulate; the tube 1.5–3.0 mm; the limb 5.5–7.5 mm in diameter, the 5 lobes broadly rounded (Fig. 2D) to broadly oblong (Fig. 2C), imbricate in bud and often slightly imbricate basally at anthesis, usually pale pink with darker pink veins as the buds open, becoming pale to medium purplish blue to blue with darker veins at full anthesis; the throat partially closed by 5 faucal appendages (Figs. 2C, D), these saccate, reniform, dark purple to dark bluish purple, and densely papillose-pilosulous. STAMENS 5, not exserted, attached slightly below the midpoint of the corolla tube, the anthers 0.7–0.9 mm, appearing sessile, positioned just below the faucal appendages, yellow. OVARY strongly depressed-globose, shallowly 4-lobed, papillose, the style 0.3–0.5 mm, not exserted, the stigma usually positioned slightly below the anthers, minute, scarcely differentiated. NUTLETS 4 (rarely fewer by abortion), light green, becoming yellowish green to tan at maturity and light gray with age, attached ventrally near their tips to a narrowly conical gynobase that extrudes beyond the nutlets, the scar ovate, forming a more or less hemispherical cluster, individually 4–7 mm, inflated, asymmetrically ovoid (the tip positioned near the gynobase), dorsally rounded, the surface densely glochidiate (Fig. 1D), the glochids ca. 0.5 mm, the shaft tapered from the base, relatively stout, its surface ornamented with microscopic, mostly retrorse barbs.

PHENOLOGY: In the United States, flowering from mid-March through late April. In Mexico, the blooming period extended irregularly though late October. Fruits mature 4–5 weeks after anthesis. Because dispersal is by epizoochory, fruits can persist on senescent plants through the winter months or until the plants become degraded by weather.

DISTRIBUTION: Macaronesia, Northern Africa (Algeria, Morocco, Tunisia), southern Europe (including Mediterranean islands) north to France and Hungary, east to the Ukraine, Turkey, Armenia, Israel, Lebanon, Iran, and Iraq. Introduced in the United States (Arkansas, Missouri, Texas), Mexico (Coahuila, Nuevo León, Zacatecas), Argentina, Chile (including the Juan Fernandez Islands), and Australia (southern New South Wales).

ELEVATIONS AND HABITATS IN NORTH AMERICA: In Mexico, plants occur at 1650–2150 m elevation in habitats ranging from Chihuahuan desert-scrub to pine-oak woodlands, on both calcareous and acidic substrates. Plants frequently occur on lower slopes or in disturbed, slightly wetter microhabitats. In contrast, the U.S. populations occur at 200–450 m elevation. Those in Arkansas and Missouri grow in thin-soil pastures, glades, and open, rocky, disturbed places (such as road-cuts and quarries) on calcareous substrates (Fig. 1A). The Texas plants grow in oak-juniper woodlands ranging from more mesic sites on clay soils to drier sites with limestone near the surface. Rarely, plants can become aggressive weeds

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in ornamental plantings, often from earlier intentional cultivation.

COMMON NAME: Blue hound's tongue.

SPECIMENS EXAMINED: **UNITED STATES. ARKANSAS.** Izard Co.: Limestone quarry on E side of County Rd. 301 and N of Arkansas Hwy. 56, about 0.75 mi. E of junction with County Rd. 61 in Myron. T18N R07W S26 SE4 of NE4, heavily disturbed slopes and gravel piles above and surrounding limestone quarry, locally abundant, growing with *Melilotus* spp., *Schedonorus arundinaceus*, *Smilax* sp., *Ulmus alata, Diospyros virginiana, Lespedeza cuneata*, etc., 36° 11′ 16″ N, 091° 41′ 34″ W, 15 Apr 2010, *Baker 10-0036* (ANHP). **MISSOURI.** Christian Co.: In pasture along Woods Fork, just E of Hwy. 65, 9 May 1981, *Redfearn 32650a* (SMS). Greene Co.: Ca. 3 mi. W of Willard, heavily grazed pasture, T30N R28W S28 C3 of S2, 10 May 1989, *Currier 89-008* (MO); ca. 2 mi E of Willard, along County Hwy O at bridge over Little Sac River, on W side of river and edge of N right-of-way, local along edge of woodland on top of roadcut, T30N R33W S20 SW4, 20 Apr 2006, *Smith, Yatskievych & McKenzie 4212* (MO); N side of County Hwy. O, W side of Sneeds Bridge over Sac River, along fence line at edge of remnant woodland, T30N R22W S20, 4 Sep 2006, *Skinner 6286* (MO); Rt. O roadcut, 0.1 mi W of Little Sac River, roadside, 37° 18.4826′ N, 093° 23.1192″ W, 14 May 2010, *Edmond & Bowe 472* (SMS); Farm Rd. 84, W of Farm Rd. 85, along N side of road, roadside, 37° 17.5814′ N, 093° 28.0349′ W, 1 June 2010, *Edmond & Bowe 473* (SMS); 'Payne Glade', on S side of Horse Creek Lane near SW end, ca. 0.8 mile SW of junction with County Hwy. O, ca. 1.2 air miles ESE of Willard, disturbed limestone glade used as horse pasture, with scattered *Juniperus, Quercus, Aesculus*, scattered, mostly under trees and along fence line, 37° 17′ 56″ N, 093° 23′ 55″ W, 1110 ft, 15 May 2015, *Yatskievych et al. 15-052* (MO); NE side of Springfield; Missouri Dept. of Conservation Southwest Regional Office, 2630 N Mayfair Ave., abundant weed in raised bed at NE corner of building, 37° 14′ 36″ N, 093° 13′ 42″ W, 1370 ft, 15 May 2015, *Yatskievych et al. 15-047* (MO). Ozark Co.: Caney Mountain Wildlife Refuge; near top of Caney Mountain, in small ditch on open dolomite glade, T23N R13W S21, 14 May 1972, *Nightingale s.n.* (SOTO). Taney Co.: Hwy. 160, 300 yards uphill from Swan Creek, growing along road, T23N R20W S33 SE¼ of SW¼, 5 May 1974, *Nelson s.n.* (SMS); Along Blair Ridge Rd., Mark Twain National Forest; in Ozark cedar glades and oak-hickory forest, T23N R18W, 2 June 1978, *Hicks 1016* (SMS); Ozark Underground Laboratory, 'Resurrection Glade' on Bray property, ca. 3.62 mi. NNE of Protem or ca. 1.92 mi. SSE of Reuter, 10–12 plants scattered near summit of glade top, 36° 34′ 50″ N, 092° 51′ 48″ W, 10 May 2012, *McKenzie & Aley 2489* (MO). **TEXAS.** Burnet Co.: At S end of Johnson property (Oak Valley Ranch) just N of R.M. 963, ca. 2.0 road mi. W of jct. R.M. 2657 at Oakalla, common in shade of mostly deciduous woodland dominated by *Ulmus crassifolia*, on valley flat along nameless wet-weather drainage-way between gentle slopes underlain by Upper Glen Rose Limestone, on soils mapped as deep, well-drained, moderately alkaline clay loam (Lewisville Series, Typic Calciustolls), 30° 58′ 25.3″ N, 097° 56′ 47.8″ W, 825–830 ft., 20 May 2015, *Carr 34847* (MO, TEX). **MEXICO. COAHUILA.** Mpo. Arteaga, Carbonera, edge of little swamp, colonies, 2125 m, 29 Oct 1994, *Hinton et al. 24922* (TEX); Mpo. Parras, Sierra de Parras, Rancho El Tunal, approx. 25 km al ESE de Parras de la Fuente, vegetación de *Dasylirion cedrosanum, Quercus intricata, Yucca carnerosana, Berberis trifoliolata, Cowania plicata, Agave falcata* y *Pinus pinceana*, litosol, 28° 20′ N, 101° 55′ W, 2050 m, 7 May 1983, *Rodríguez & Carranza 922a* (TEX); 10 km NW of La Ventura, 1 km W of Rancho Campamento Hidalgo, veg. matoral desierto inerme, near bottom of bolson in bajada, very fine-textured adobe, with *Larrea tridentata, Flourensia cernua*, 24° 41′ N, 100° 58′ W, 1750 m, *Chiang, Wendt & Johnston 7951* (LL, WTS); *7952* (LL, WTS). **NUEVO LEÓN.** Mpo. Aramberri, Cerro Grande, oak and pine woods, 2150 m, 4 Apr 2004, *Hinton et al. 18943* (TEX); Mpo. Aramberri, Ascención to Sandia, llano, 1900 m, 9 May 1992, *Hinton et al. 21938* (TEX). Mpo. Galeana, Cerro del Voladero, dense colony, 2100 m, 3 July 1984, *Hinton 18717* (TEX). **ZACATECAS.** 10 km WNW of Tecolotes, on rd. to Coapa, flat area near bottom of a bajada, calcareous gravelly adobe, with *Larrea, Flourensia, Yucca, Celtis pallida*, 24° 39′ N, 102° 02′W, 1800 m, 17 June 1972, *Chiang, Wendt & Johnston 7890* (TEX, WTS; type of *C. henricksonii*); 7 mi NW of Tecolotes, 20.9 rd. mi. W of Cedras to Coapa, 24° 41′ N, 102° 03′W, 5900 ft, 12 Sep 1971, *Henrickson 6356a* (TEX); 8 mi. E of San Tihurcio off Mexico Hwy. 54, depression where water stands, with *Tagetes* and *Prosopis*, 1 only, 5460 ft, 3 Aug 1975, *Engard & Gentry 709* (LL).

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Early discussions with Mike Skinner, Mike Currier, and Tim Smith (retired state agency botanists in Missouri) kindled our interest in this species. They also assisted with fieldwork, as did Paul McKenzie (U.S. Fish & Wildlife Service), Rhonda Rimer (Missouri Department of Conservation), and Christy Edwards and her colleagues in conservation biology at the Missouri Botan-

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ical Garden. Brian Edmond (Missouri State University) and Minnette Marr (Lady Bird Johnson Wildflower Center) allowed us to study their excellent photographs (two of Minnette Marr's are used in Figs. 1 and 2 with her permission). Brent Baker (Arkansas Natural Heritage Commission) and Bill Carr (Acme Botanical Services, Austin, Texas) kindly shared their specimens and knowledge of the species in Arkansas and Texas, respectively. Dennis and Denise Johnston, owners of Oak Valley Ranch in Oakalla, Texas, generously allowed access to their property, and Tom Wendt (Curator Emeritus at TEX-LL) provided assistance and discussion about the Texas population. We appreciate the following herbaria for making their specimens of *Cynoglossum creticum* available for study: ANHP, LL, MO, SMS, SOTO, TEX.

Literature Cited

Anonymous. 2003. Weed Management Guide – Blue Hound's Tongue – *Cynoglossum creticum*. CRC for Australian Weed Management and the Commonwealth Department of the Environment and Heritage, Canberra, Australia. [accessed online on 1 December 2015 at: https://www.environment.gov.au/biodiversity/invasive/weeds/publications/guidelines/alert/pubs/c-creticum.pdf]

Burrows, G. E. and R. J. Tyrl. 2001. *Toxic Plants of North America*. Iowa State University Press, Ames.

Chacón, J., F. Luebert, H. H. Hilger, S. Ovchinnikova, F. Selvi, L. Cecchi, C. M. Guilliams, K. Hasenstab-Lehman, K. Sutorý, M. G. Simpson, and M. Weigend. 2016. The borage family (Boraginaceae s.str.): A revised infrafamilial classification based on new phylogenetic evidence, with emphasis on the placement of some enigmatic genera. Taxon 65: 523–546.

Cohen, J. I. 2011. A phylogenetic analysis of morphological and molecular characters of *Lithospermum* L. (Boraginaceae) and related taxa: Evolutionary relationships and character evolution. Cladistics 27: 559–580.

———. 2014. A phylogenetic analysis of morphological and molecular characters of Boraginaceae: Evolutionary relationships, taxonomy, and patterns of character evolution. Cladistics 30: 139–169.

———. 2015. *Adelinia* and *Andersonglossum* (Boraginaceae), Two new genera from New World species of *Cynoglossum*. Syst. Bot. 40: 611–619.

Danton, P. Perrier, C, Perrier, and G. Martinez de Reyes. 2006. Nouveau catalogue de la flore vasculaire de l'archipel Juan Fernández (Chili). Nuevo catálogo de la flora vascular del Archipiélago Juan Fernández (Chile), Acta Bot. Gallica, 153: 399–587.

Higgins, L. C. 1976a. Two new species from the Chihuahuan Desert. Phytologia 33: 411–413.

———. 1976b. A new name for *Cynoglossum erectum*. Phytologia 34: 234.

Johnston, I. M. 1924. Studies in the Boraginaceae,—III. 1. The Old World genera of the Boraginaceae. Contr. Gray Herb. 73: 42–73.

Selvi, F. and C. E. Jarvis. 2011. Typification of the name *Cynoglossum creticum* Mill. (Boraginaceae). Taxon 60: 1477.

——— and K. Sutorý. 2012. A synopsis of the genus *Cynoglossum* (Boraginaceae–Cynoglosseae) in Italy. Pl. Biosyst. 146: 461–479.

Sutorý, K. 2010. *Oncaglossum*, a new genus of Boraginaceae, tribe Cynoglosseae, from Mexico. Novon 20: 463–469.

Ugarte, E., F. Lira, N. Fuentes, and S. Klotz. 2011. Vascular alien flora, Chile. Check List 7: 365–382.

Weigend, M., F. Luebert, F. Selvi, G. Brokamp, and H. H. Hilger. 2013. Multiple origins for hound's tongues (*Cynoglossum* L.) and navel seeds (*Omphalodes* Mill.) – The phylogeny of the borage family (Boraginaceae s.str.). Molec. Phylogen. Evol. 68: 604–618.

Yatskievych, G. 2006. *Steyermark's Flora of Missouri*, Second Edition, Volume 2. Missouri Botanical Garden Press, St. Louis.

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