A Synopsis of the Genus *Hexalectris* in the United States and a New Variety of *Hexalectris revoluta*¹

P. M. Catling

Biodiversity, National Program on Environmental Health
Agriculture and Agri-food Canada, Research Branch
Wm. Saunders Bldg., Central Experimental Farm
Ottawa, Ontario K1A 0C6, CANADA
catlingp@agr.gc.ca

Abstract:
Information on typification, synonymy, habitat, distribution, phenology, classification and identification is provided for 7 taxa of *Hexalectris* occurring in the United States. The taxa included are *Hexalectris grandiflora*, *H. nitida*, *H. revoluta* var. *colemanii*, *H. revoluta* var. *revoluta*, *H. spicata* var. *spicata*, *H. spicata* var. *arizonica*, and *H. warnockii*. Illustrations of type material and distribution maps are included. A new variety, *H. revoluta* var. *colemanii*, is described from Arizona and a new form, *H. warnockii* f. *flavida* is described from Texas.

The genus *Hexalectris* (Orchidaceae) includes 7 species that occur in North America and Central America (Correll 1950; Luer 1975). Recent studies have resulted in the discovery of two new taxa, one previously described (Catling and Engel 1993) and the other described here. In addition much information on distribution and variation has been acquired. As well as introducing a new taxon, the work presented here represents an update to the taxonomic treatment in Flora of North America (Goldman et al. 2002) and includes additional information on distribution, typification, and illustrations of type material that could not be included in the condensed FNA format.

Species in this genus *Hexalectris* serve as valuable bioindicators of habitats deserving of consideration for protection. Each of the 7 taxa in the region under study are either locally or universally rare and of concern with respect to the protection of biodiversity. This study provides a basis for conservation by documenting distribution and providing new information on classification and identification.

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¹C. J. Shevick and R. A. Coleman provided useful comments on the manuscript. Locations and extensive historical data on populations in Texas were provided by J. Poole, botanist with Texas Wildlife Diversity Program. Other information on occurrences in Texas was provided by W. R. Carr, botanist with the Texas Conservation Data Centre. Information on populations in Arizona was provided by G. Ritter of the Heritage Data Management System of the Arizona Game and Fish Department.
METHODS-Material of *Hexalectris* in the following herbaria was examined: AMES, ARIZ, BAYLU, DAO, F, MICH, NY, PH, P, SEL, SMU, SR, TEX, and US (acronyms from Holmgren et al. 1990). Type specimens were located and examined to provide a basis for the correct application of names. Records from other herbaria were noted. In addition photographs and drawings were made available by a number of correspondents. All this material provided a basis for circumscription of taxa and a better understanding of distribution and status. All drawings were made with the aid of a camera lucida. Some locations plotted on the distribution maps may be up to 20 miles away from an actual collection site as a result of insufficient data to plot locations precisely.

**KEY TO THE SPECIES AND VARIETIES OF HEXALECTRIS IN THE UNITED STATES**

1a. Lip (7)9-11 mm long; column (6)7-8 mm long; lateral veins not keeled; stigma vestigial

*Hexalectris nitida*

1b. Lip 10-20 mm long; column 9-15(18) mm long; lateral veins prominently keeled at some point; stigma present or vestigial 2

2a. Midvein of the lip not keeled; flowers pale or deep pink to crimson, perianth spreading

*Hexalectris grandiflora*

2b. Midvein of the lip keeled; flowers purple, maroon, brown, or pinkish-brown; perianth spreading or revolute 3

3a. Keels pronounced, irregularly scalloped and broken toward the apex of the midlobe; petals purple or maroon, linear- or lanceolate-falcate, not revolute

*Hexalectris warnockii*

3b. Keels pronounced near the base of midlobe, never prominent, scalloped and broken toward its apex; petals pinkish-brown, yellowish-brown or brown, with or without purple stripes, elliptic-falcate, strongly revolute to not revolute 4

4a. Lateral lobes of the lip extending to or beyond the middle of the midlobe; central lobe of lip acute or truncate 5

5a. Central lobe of the lip acute at the tip; petals 19-22 mm long, strongly revolute; column 14-15 mm long

*Hexalectris revoluta var. colemanii*

5b. Central lobe of the lip more or less truncate at the tip; petals 15-17 mm long, revolute; column 9-13 mm long

*Hexalectris revoluta var. revoluta*

4b. Lateral lobes of the lip barely extending beyond the base of midlobe; central lobe of lip rounded or truncate 6

6a. The 5 central veins of the lip with their highest keels raised (0.4) 0.7-1 mm above the lip surface; column with a rostellar flap separating the pollen masses from the stigmatic surface; flowers opening and petals and sepals revolute

*Hexalectris spicata var. spicata*

6b. The 5 central veins of the lip with their highest keels raised 0.4-0.7 mm above the lip surface; column without a rostellar flap separating the pollen masses from the stigmatic surface; flowers often remaining closed or petals and sepals spreading but not revolute

*Hexalectris spicata var. arizonica*

6
SYNOPSIS

GREENMAN’S CORAL-ROOT, GIANT CORAL-ROOT (Fig. 1)


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**HABITAT, DISTRIBUTION, PHENOLOGY:** Found in shady places beneath pines and oaks. Luer (1976) illustrated plants in the gravel wash in the floor of a canyon that were periodically under water. In the Davis Mountains it occurs in oak-juniper-pinyon pine woodlands in shade of oaks and *Arbutus xalapensis* (Liggio and Liggio 1999). Several specimen labels refer to igneous soil. In the United States it is apparently confined to the Trans-Pecos region of Texas (Fig. 1), and is most frequent in the Davis Mountains and Glass Mountains. Only one collection was seen from the Chisos Mountains. It is widespread in México having been collected in the states of Coahuila, Chihuahua, Guerrero, Michoacán, Nuevo León, Oaxaca, Puebla, San Luis Potosí, Sonora, and Tamaulipas. Peak flowering occurs from mid-July to August but flowering plants have been found in late June and mid-September.

**CLASSIFICATION AND IDENTIFICATION:** Richard and Galeotti did not cite a specimen or indicate a location in the protologue. The specimen chosen
as a lectotype of *Corallorhiza grandiflora* includes two scapes, one with a portion of a rhizome, as well as flowers in packets. The sheet bears a "Herb. Mus. Paris" label upon which is written "*Corallorhiza grandiflora* AR" with "M. Andrieux 1834" printed at the bottom. At the lower left corner there is also a label with "Cymbidium 86, inter Chila et Huauapan, Oaxaca." Another small label bears the word "type" and annotations by M. Soto in 1990 and P.M. Catling in 1992 suggest that it is the type of *C. grandiflora*. Duplicates of this collection are at G and W and associated drawings are at AMO, P and W (G. Salazar, in litt.). Although it has often been assumed that the specimens used by Richard and Galeotti are at P, the main set may be at W as a result of an unreturned loan from P to H.G. Reichenbach (Christenson 1999). The specimen at W (15159) has only flowers and the lack of a description of the scape by A. Richard suggests it was this specimen that he used to describe *C. grandiflora*. However this can only be surmised, and the much more complete specimen at P appears to be a better choice of lectotype.

The specimen at G with two scapes was meticulously examined by G. Salazar who prepared a detailed description of it (AMO) and a drawing of a softened flower (G. Salazar, pers. comm.). The drawing corresponds closely to a drawing of a flower from the specimen at P (Fig.2, upper row). Salazar noted that the specimen at G represented the same species as the specimen at W. Thus, all are referable to *H. grandiflora*. With its long clawed lip, broadly rounded distally, the softened flower of the lectotype clearly represents the plant widely treated as *H. grandiflora* (Fig. 2).

The specimen chosen as lectotype of *H. mexicana* was designated as type by L. O. Williams (in litt.) and it has more plants and flowers than other syntypes (Fig. 2, lower row).

**REPRESENTATIVE SPECIMENS EXAMINED:** TEXAS. Brewster Co.: rare in lower willow creek basin of Chisos Mts., 16 July 1937, B.H. Warnock s.n. (ARIZ); rare beneath pines in upper Pine Canyon, Chisos Mountains, alt. 5200 ft., 1 August 1950, B.H. Warnock 9190 (SR); infrequent, Iron Mountain, Glass Mountains, alt. 4000 ft, 30 June 1959, G. McKenzie 406 (SR); Jeff Davis Co.: canyon, Mt. Livermore, Davis Mts., 21 August 1914, M.S. Young 192 (AMES); Fern Canyon, Alpine, July 1925, W.W. Wimberley s.n. (CU); Alpine, 26 July 1926 (SR); wooded slopes near Madera Springs, Davis Mts., alt. 4500 ft, August 1934, T.L. Steiger 34 (NY); Madera Canyon, Mt. Livermore, 6 August 1935, L.C. Hinckley 440 (AMES); sparse in Madera Canyon above observatory, Davis Mountains, alt. 5200 ft., 19 August 1935,
H.T. Fletcher 492 (SR); frequent, Goat Canyon at foot of Mt. Livermore Davis Mts., alt. 1950 m, 21 August 1935, L.C. Hinckley 440 (NY); infrequent after summer rains, Mt. Livermore, Davis Mts., alt. 2100 m, August 1935, L.C Hinckley s.n. (AMES); Livermore, July 1936, L.C. Hinckley s.n. (TEX) Madera Canyon, near Mt. Livermore, 27 August 1939, L.C. Hinckley s.n (TEX); H O Canyon near Livermore, 29 July 1937, L.C. Hinckley s.n. (ARIZ); under Emory oaks about 1 mi NE Boys Camp, 26 July 1944, L.C. Hinckley 3180 (NY); sparse on SW slopes of Mt. Livermore, lower springs in Madera Canyon, 3 September 1947, B.H. Warnock 7506 and F.M. Churchill s.n. (SR); rare on Flat Top near Tricky Gap, Buffalo Trail Scout Ranch Davis Mts., alt. 6500 ft., 8 August 1948, B.H. Warnock 8055 and B.L. Turner (SR); rare in Fern Canyon, 11 mi N of Alpine, Davis Mts., alt. 4600 ft., 30 June 1949, B.L. Turner s.n. (SR, SMU, TEX); rare at Mitre Peak Girl Scout Camp, Fern Canyon east grotto area, fall 1964, E.K. Bouchhorn s.n. (SR); rare in upper Madera Canyon beneath oaks, Davis Mts., elev. 5800 ft, 10 August 1968, B.H. W arnock 23303 (SR); Davis Mts. Resort, near resort headquarters along arroyo that drains Colleen Canyon, Davis Mts., elev. 5700 ft, 11 July 1981, R.D. Wor thington 7240 (ARIZ); upper Limpia Canyon above Davis Mts. Resort along and near the drainage, Davis Mts., 7 September 1985, A.M. Powell and S Powell 5169 (SR); oak juniper woodland, near small ravine, Davis Mts. Resort elev. 5500-6500 ft., 6 August 1988, A.L. Hempel 6 (SR)

SHINING CORAL-ROOT, GLASS MOUNTAIN CORAL-ROOT-Fig. 4


TYPE: MEXICO. Coahuila: Sierra Mojada, Cañon de Hidalgo, above San Salvador Mine, near Esmeralda, shaded canyon below crest at top of canyon, erect, among rocks, not common, 4 Aug. 1931, R.M. Stewart 1068 (Holotype: AMES!)

HABITAT, DISTRIBUTION, PHENOL-OGY: Engel (1987) reported that in the Dallas area the plants grow most often in a bed of decaying juniper needles over level limestone rock in Juniper-Oak forest and the same habitat is reported for Taylor County, Texas. The New Mexico site is in a canyon under _Quercus muhlenbergii_ near springs. _Hexalectri_
and *H. revoluta* var. *revoluta* are sometimes found together in moist canyons in oaks-juniper-pinyon pine woodland and in shady places under *Agave lechuiguita* and *Quercus mohriana* (Warnock 1977, Liggio and Liggio 1999).

Some years in the Dallas area there are hundreds of flowering plants whereas in other years there are none. Through surveying the Dallas populations on a regular basis and comparing the results with weather data, Engel (1987) concluded that “generous rainfall in the late spring is necessary for flowering of *H. nitida*.”

Until Engel’s (1987) discovery in the Dallas area *H. nitida* was known only from the Big Bend region of Texas (Luer 1975). Currently it is known from localities throughout much of Texas and in southeastern New Mexico (Fig. 5). Records on file with the Texas Wildlife Diversity program (J.Poole, pers. comm.) for which justifying material has not been seen are indicated with a solid triangle on the accompanying map. Mapped occurrences in Bell, Blanco, Bosque, Kerr and Somerville counties are based on published reports by Liggio and Liggio (1999). The New Mexico record from Otero Co. is based on information in the rare plant database at the University of New Mexico. In México it occurs in the states of Coahuila, and Nuevo Leon and possibly Oaxaca. Peak flowering from late June to early August. It blooms a little later than *H. revoluta* var. *revoluta* (Liggio and Liggio 1999).

![Map of Hexalectris nitida distribution](image)
CLASSIFICATION AND IDENTIFICATION: A flower from the holotype lacks a rostellum so that the pollinia and stigmatic surface develop in contact. Auto-pollination in *Hexalectris* has been previously reported in *H. nitida* from México (Catling 1990) and in *H. spicata var. arizonica* (Catling & Engel 1993). *Hexalectris nitida* is morphologically similar to the larger flowered *H. parviflora*, known from the Mexican states of Guerrero, Jalisco, and Sonora, and from the Sierra de Las Minas in Guatemala. It may have developed from the latter species through a selection for auto-pollination, this leading to smaller flowers with less prominent terminal lip lobes and relatively poorly developed keels on the lip as illustrated in the holotype (Fig. 4). The relationship between *H. nitida* and *H. parviflora* is unclear, partly because of insufficient material to allow an analysis of variation. The two species may be separated as follows:

1a. Lip mostly 8-10 mm long; terminal lobe of the lip not very prominent, extending 0.22-0.25 the length of the lip beyond the tips of the lateral lobes; petals spatulate-falcate, widest in the distal 1/3  *H. nitida*

1b. Lip mostly 12-14 mm long; terminal lobe of the lip very prominent, extending 0.40-0.45 the length of the lip beyond the tips of the lateral lobes; petals lanceolate-falcate, widest near the middle  *H. parviflora*

A plant from Baja California (La Laguna, Sierra Laguna, 24 March 1939, ARIZ) has a rostellum and the pollinia and stigmatic surface are separated and the petals are lanceolate as in *H. parviflora*, but the lip is 10 mm long and the midlobe is of intermediate prominence. This plant seems closest to *H. parviflora*, but may prove to be a new taxon.

CORRELL'S CORAL-ROOT, CURLY CORAL-ROOT- Fig. 7

*Hexalectris revoluta* Correll var. *revoluta*, Bot. Mus. Leafl. Harvard Univ. 10: 19, fig. 2. 1941. TYPE: MEXICO. Nuevo León: Sierra Madre Oriental, lower

Fig. 7. Distribution of *Hexalectris revoluta* var. *revoluta* based on both herbarium specimens examined (dots), and either published or databased reports (solid triangles).

San Francisco Canyon, about 15 miles SW of Galeana, alt. 7500-8000 ft, sparse in open oak wood, 10 June 1934, *C.H. and M.T. Mueller 767* (Holotype: AMES!)

HABITAT, DISTRIBUTION, PHENOLOGY:
Specimens with label data have been found in Oak woods but in Brewster County, Texas it was found beneath Maples. Luer (1976) reported it from groves of *Quercus gravesii* along creek beds in the Chisos Mountains. It has also been reported from shady places under *Agave lechuguilla* and *Quercus mohriana* where it occurs with *H. nitida* (Warnock 1977, Liggio and Liggio 1999).

There are two additional reports from Texas. One in the files of Texas Parks and Wildlife and discussed by Higgins (1989) includes correspondence with a detailed description of plants and the site in lower McKittrick Canyon in the Guadalupe Mountains National Park. The discovery was made by W.F. Jennings on 3 July 1986, but subsequent attempts to relocate the plants failed (J. Poole,
pers. comm.). The other Texas location is in the Glass Mountains of northeastern Brewster County where a photograph was taken and published by Warnock (1977). The specimen illustrated appears to be correctly identified as *H. revoluta*, but absolute identification is difficult because *H. revoluta* and *H. nitida* are very similar, differing principally in flower size and details of lip structure not evident in the illustration. In México it occurs in Nuevo León, San Luis Potosí and Tamaulipas. Peak flowering occurs from early to mid-June.

**CLASSIFICATION AND IDENTIFICATION:** The two veins on either side of the midvein of the lip are prominently keeled near the base of the lateral lobe (Figs. 8 & 9, previous page). A softened flower from *Louie* 4 had 4 pollen packets on the stigma but with the viscidium still attached to the rostellary edge. Pollen tubes attached the packets firmly to the stigmatic surface. Consequently there is good evidence here for self-pollination by a lifting of the anther cap and rotation of pollen masses onto the stigmatic surface. An opportunity for pollen removal and transfer by insects probably exists when the flower first opens, as in other cases of auto-pollination by rotation (see Catling, 1990). *Hexalectris nitida* may be the obligate auto-pollinating member of a group of three including the facultative auto-pollinating *H. revoluta* var. *revoluta* and the obligate outbreeding *H. revoluta* var. *colemanii*.

Variability in lip shape and venation is illustrated in Figures 6 and 7. The relatively long lateral lobes of the lip distinguish var. *revoluta* from both *H. spicata* var. *spicata*, *H. spicata* var. *arizonica* and *H. revoluta* var. *colemanii*. The truncate or broadly rounded middle lobe of the lip of var. *revoluta* also distinguishes it from var. *colemanii* which has a tapering and pointed terminal lobe.

**REPRESENTATIVE SPECIMENS EXAMINED:** **TEXAS.** Brewster Co.: Chisos Mts., 17 June 1931, C.H. Mueller 8957 (TEX); Boot Spring, Big Bend National Park, 8 July 1960, D.S. Correll and H.B. Correll 23478 (LL, TEX); Colima Trail, Chisos Mountains, Big Bend National Park, 21 June 1994, Denise A. Louie (5 sheets numbered 1-5, SRSC).
COLEMAN’S CORAL-ROOT
*Hexalectris revoluta* Correll var. *colemanii* Catling, var. nov.  Fig. 10

Fig. 10. Distribution of *Hexalectris revoluta* var. *colemanii* based on both herbarium specimens examined (dots) and either published or databased reports (solid triangles).

**TYPE:** UNITED STATES. Arizona: Pima County, northern Santa Rita Mountains, McCleary Canyon, elev. 5000', NE 1/4 Sect. 30, T18S, R16E, 3 May 1986, Steven P. Mclaughlin 3441 (Holotype: ARIZ).

A var. *revoluta* floribus magniioribus labio 16-20 mm longo, petalis lateralibus 17-21 mm longis et lobo centrali labii acuto differt. Differing from var. *revoluta* in its larger flowers with lip 16-20 mm long, lateral petals 17-21 mm long, and central lobe of the lip acute.

**ETYMOLOGY:** This variety (Fig. 11) is named in honour of Ronald A. Coleman, widely known for his exceptional work on the orchids of the southwestern United States and his outstanding photographs. Mr. Coleman provided much of the information necessary to characterize this new taxon.

**DESCRIPTION:** Stems pinkish-cream, 46-55 cm, with 4-6 sheathing bracts. Inflorescences 20-23 cm, floral bracts lanceolate, 3-12 mm. Flowers 13-19, with pedicellate ovaries 12-14 mm; sepals and petals whitish- or creamy-pink to very pale brown at the tips and partly with a suffusion of magenta or maroon, the veins maroon or brownish-maroon; dorsal sepal 20-2.5 x 4.5-5 mm; lateral sepals 17-21 x 6.5-7.5 mm; petals obovate-falcate or lanceolate-falcate, 19-22 x 4-5 mm; lip whitish-cream with maroon to magenta veins, the tips of the lateral and terminal lobes maroon or white between the veins, 16-20 x 10.5-12 mm, with 5 central veins with keels 0.2-0.5
mm high, midvein keeled or not keeled in the midlobe, lateral lobes extending 1/5–1/4 length of midlobe; column white above, 14-15 mm, rostellum present.

HABITAT, DISTRIBUTION, PHENOLOGY: The type was collected under *Quercus emoryi*. Currently known only from Cochise, Pima and Santa Cruz Counties in Arizona (Figs. 11, previous page, also 12, and 13). An additional location within 10 miles of McLaughlin's site was reported by Coleman (1999) and a probable location in Cochise County was alluded to. This latter station, in the Dragoon Mountains on the west side of the Cochise Stronghold Monument, has now been confirmed on the basis of a single flowering specimen (R. A. Coleman, pers. comm.).

Another location in Sawmill Canyon of Santa Cruz County has recently been reported (Coleman 1996) and is now supported by photographs at DAO. The cited specimens were in peak flower and therefore the flowering period is May and June.

CLASSIFICATION AND IDENTIFICATION: The distinctive characteristics of this plant were first recognized in 1992 in the single plant collected by McLaughlin in 1986. It was not until Coleman found additional sites in Pima Co., and sent photographs of flowers that enough information was available to propose a new variety. Coleman reported the plants described here as var. *colemanii* as a major disjunction of *H. revoluta* (Coleman 1999, 2001). *Hexalectris revoluta* var. *revo-luta* is a smaller flowered plant that occurs further to the southeast in Chisos and Guadalupe Mountains of Texas and in the Mexican states of Nuevo León, San Luis Potosí and Tamaulipas. Since the major differences from *H. revoluta* are largely size-related, but have a discrete distribution, the rank of *varietas*
(denoting discontinuous morphological differences of a particular type or in a small number of characters) seems most appropriate. There are also qualitative differences distinguishing var. *colemanii* from var. *revoluta*. For example the central lobe of the lip of var. *revoluta* is more or less truncate (Figs. 8 & 9) rather than acute. The midlobe of the lip of var. *colemanii* extends more than twice the length of the lateral lobe (Fig. 11, 12, previous page) instead of less than twice the length as in var. *revoluta*. The sepals and petals of var. *colemanii* are more strongly revolute. *Hexalectris revoluta* var. *colemanii* has smaller keels on the central veins of the lip, and more strongly revolute sepals and petals with less pronounced veins than *H. spicata* var. *spicata* (cf. Fig. 15). It differs from *H. spicata* var. *arizonica* in having thinner perianth parts and an acute instead of rounded apex of the central lobe of the lip and in having a rostellum which prevents the kind of self-pollination characteristic of *H. spicata* var. *arizonica*. Variation within *H. revoluta* var. *colemanii*, described by Coleman (2002, sub *H. revoluta*) requires more study.

**REPRESENTATIVE SPECIMENS EXAMINED:** **ARIZONA.** Pima Co.: Baboquivari Mountains, Baboquivari Canyon, elev. 4500', 16 June 1981, L. J. Toolin 1412 (ARIZ).

Santa Cruz Co.: in scrub oak forest on canyon slopes, Sawmill Canyon, foothills of the Santa Rita Mountains, 5100', 12RO522500 3509744, 31 May 1997, R.A. Coleman (DAO).

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![Map of Hexalectris spicata var. spicata distribution](image)

Fig. 14. Distribution of *Hexalectris spicata* var. *spicata* based on both herbarium specimens examined (dots) and either published or databased reports (solid triangles).
CRESTED CORAL-ROOT  Fig. 15


*Arethusa spicata* Walter, Fl. Carol. 222. 1788. TYPE: (Holotpe, n.v.).

*Bletia aphylla* Nuttall, Gen. 2: 194. 1818. TYPE: (Holotype, PH!).

*Hexalectris aphylla* (Nuttall) Rafinesque, Neogenyton 4. 1825.

HABITAT, DISTRIBUTION, PHENOLOGY: Most specimen labels indicating a habitat refer to Oak or Oak-Hickory woods. In the United States this species occurs from Virginia and southern Missouri south to Florida and west to Texas and Arizona. The locations mapped in southern Illinois are based on specimens (n.v.) in the Southern Illinois University herbarium from Pope and Monroe counties. Generally peak flowering occurs from early May to late June in the south (Florida) and in August in the north (Kentucky and the Great Smoky Mountains of North Carolina), but regional variation is substantial. For example a collection (Correll 6448) from Columbia Co., Florida was in peak flower on 13 August.

CLASSIFICATION AND IDENTIFICATION: Typification of this variety was discussed by Catling and Engel (1993). The lip may be creamy-white without any purple lines or purple suffusion. This white-lipped form, which also has relatively pale sepals and lateral petals, has been named f. *albolabia* P. M. Brown (North American Native Orchid Journal 1(1): 10. 1995) with the type being Luer's photograph (The native orchids of the United States and Canada: excluding Florida, p. 271, pl. 74, no.1. 1975). The broadly rounded lip with prominent, more or less straight-edged keels (Fig. 15) are distinctive characteristics of *H. spicata* var. *spicata*.

**Fig. 15. Hexalectris spicata var. spicata.** L, lip; P, petal; LS, lateral sepal; DS, dorsal sepal. Camera lucida drawings of softened flower from Mueller 2026 collected in Cañon Marisio above Municipio de Villa Santiago, Nuevo León, México (Ames).

REPRESENTATIVE SPECIMENS EXAMINED: ALABAMA. Falladuga, June 1882, G.F. Atkinson s.n. (CU); [prior to 1888], A. Winchell s.n. (US); Vances Station, 25 July [1870], Chapman s.n. (US). Lee Co.: Auburn, 20 July

ARIZONA CORALROOT


TYPE: UNITED STATES. Arizona: in rocky places on the Santa Rita Mountains, July 1881, C. G. Pringle (Holotype: NY!).

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Fig. 16. Distribution of _Hexalectris spicata_ var. **arizonica** based on herbarium specimens examined.

HABITAT, DISTRIBUTION, PHENOLOGY: The habitat of _H. spicata_ var. **arizonica** is Oak, Pine or Juniper woodland over limestone (Catling & Engel 1993). It occurs in Texas, southern New Mexico and southeastern Arizona. The locations in New Mexico plotted on the map (Fig.16) are based on specimens at New Mexico State University. The report from Dona Anna Co. in New Mexico is based on a listing without any material evidence in the University of...
New Mexico rare plant database. It is known in México only from the state of Coahuila. Peak flowering occurs in June and July. In Texas this is later than nearby populations of var. spicata which flower in primarily in May (Engel 1997).

CLASSIFICATION AND IDENTIFICATION: Most of the plants of this western variety have closed flowers or flowers that do not open as widely as those of H. spicata. Illustrations and a description of the auto-pollinating mechanism are provided by Catling and Engel (1993).


**TEXAS PURPLE-SPIKE**


HABITAT, DISTRIBUTION, PHENOLOGY: *Hexalectris warnockii* is most often found in leaf litter under Oaks and/or Junipers in the floor of canyons. Liggio and Liggio (1999) refer to the habitat as shaded slopes and rocky creek beds under oak, madrone, and pinyon pine. In Texas it occurs in calcareous soils of the Edwards Plateau, White Rock Escarpment and Trans-Pecos (Liggio and Liggio 1999). Several specimen labels refer to gravelly limestone soil. Peak flowering occurs from early July to mid-August.

Until recently this species was known only from central and Big Bend regions of Texas and southeastern Arizona (Luer 1975). Its range in the United States was extended to Dallas Co., Texas by Engel (1987). It was recently re-
ported from México on the basis of a specimen from the tip of the Baja California peninsula collected in 1990 (Salazar Chavez 1991). The Baja record is a major disjunction to the west. It was first collected in México in 1973 in Coahuila (62 miles WSW of Cuatro Cienegas at 5300 ft, 8 Aug.1973, J. Henrickson 12160, TEX), but was not identified at the time. Here it occurred occurred in leaf litter on the shaded side of a limestone canyon with *Quercus* spp., *Acacia berlandieri*, *Aloe* spp., *Dasylium* sp., *Leucophylum* sp., *Fraxinus* sp., *Echinopterus* sp., and *Psoralea* sp. At a recently discovered site in the Huachuca Mountains of Arizona (Bowers 1993) it occurred with *Platanus wrightii*, *Amorpha fruticosa*, *Quercus arizonica*, and *Q. hypoleucoides*. Specimens or photographs have not been seen to support the reports from Hays County, Texas (J. Poole, pers. comm.). An occurrence in the Mule Mountains of Arizona (Arizona Game and Fish Department 2001) is based on a correctly identified photograph confirmed by R.A. Coleman.

**CLASSIFICATION AND IDENTIFICATION:** The specimens collected by Warnock from “Upper Juniper Spring and Blue Creek” are not isotypes because the type cited by Ames and Correll does not refer to “Juniper Creek,” this label presumably representing a separate gathering on the same date. An excellent illustration by G. W. Dillon accompanies the original description (Ames & Correll 1943, pl. II) and shows the distinctive, prominent, scalloped and undulated keels (lamellae) that are most well developed in the centre of the terminal lobe of the lip (Fig. 15). The sepals, petals, and edges of the lip are usually maroon. This may be referred to:

**REPRESENTATIVE SPECIMENS EXAMINED:** **ARIZONA. Cochise Co.:**
Chiricahua National Monument, mouth of Rhyolite Canyon, 29 August 1939, F.L. Fish s.n. (ARIZ); headquarters area Chiricahua National Monument, elev. 5300 ft, 3 September 1963, H.L. Parent s.n. (ARIZ); Overline Canyon, Huachuca Mountains, T23S, R20E, sect. 33, J. E. Bowers 3347 (ARIZ). TEXAS. Brewster Co.: Love Peak Basin, Chisos, 20 July 1932, C.H. Mueller s.n. (TEX); dry, high slopes of Wade Canyon, Chisos Mts., alt. 6500 ft, 20 July 1935 (NY); Chisos Mountains State Park, August 1935, E.G. Marsh Jr. 69 (TEX); near Lost Mine Peak, Chisos Mts., 6500 ft, 18 June 1937, B.H. Warnock 20774 (TEX); Upper Juniper Spring and Blue Creek, Chisos Mts., Big Bend National Park, 25 June 1937, B.H. Warnock 658 (SR, US) (Fig. 18); Upper Oak Canyon, Big Bend State Park, 28 July 1937, Marsh 51-429 (TEX); along trail to Baldy Peak, Chisos Mts., 30 July 1937, B.H. Warnock 20776 (TEX); Window Trail, Chisos Mts., 7 July 1944. V.L. Cory s.n. (AMES); juniper-oak forest near “window” of Basin, Chisos Mts., 4 August 1946, D.S. Correll 13630 (SMU); under oaks along canyon floor at window, Basin, Chisos Mts., 4 August 1946, C.L. Lundell and A.A. Lundell 14609 (TEX); sparse beneath oaks on trail to Lost Mine, Chisos Mts., 1 August 1950, B.H. Warnock 9207 (SR); on rocky wooded slope, north side of Boot Canyon, Big Bend National Park, 8 July 1960, D.S. Correll and H.B. Correll 23480 (TEX); Cattail Falls, Big Bend National Park, 1 July 1964, P.D. Whitson s.n. (BAYLU); sparse beneath oaks at Cattail Falls, Big Bend National Park, alt. 4000 ft, 15 August 1966, B.H. Warnock 20943 (SR); rare beneath oaks at Cattail Falls, elev. 5000 ft, 23 August 1966, B.H. Warnock 20734 (SR); rare in basin at Iron Mt., elev. 4100 ft, 20 July 1968, B.H. Warnock 23263 (SR). Dallas Co.: Greenhills Environmental Center, Dallas. 16 July 1986. B. O’Kennon and L. E. O’Kennon 881 (SMU); Gillespie Co.: oak-cedar grove, 1 mi N of Crabapple Creek on the road from Fredericksburg to Enchanted Rock, 18 June 1946, D.S. Correll and H.B. Correll 12765 (SMU). Jeff Davis Co.: Fern Canyon, Alpine, 7 July 1925, Mr. & Mrs. W.W. Wimberley s.n. (CU); W side of Goat Canyon, Davis Mts., alt. 7500 ft, 20 August 1935, L.C. Hinckley 350 (NY); sparse in Fern Canyon, 10 miles north of Alpine, 22 August 1939, B.H. Warnock 21226 (TEX); 5 mi SE of Ft. Davis, at S end of Arkansas Mesa, near north rim of Musquitz Canyon at the CDRI visitors’ center, behind the pavilion, elev. 1540 m, 25 July 1985, A.D. Zimmerman 2270 and D. Miller (SR). Presidio Co.: oaks/Juniper woodland, high up slope near cliff face NE of Chinati Pk., elev. 5000-6500 ft., 26 July 1989, A.L. Hempel 314 (SR). Taylor Co.: Abilene State Park, small limestone ridges and bluffs with Juniperus and Quercus, S of county road, 32°13'40"N, 99°53'W, elev. 2200 ft, 6 August 1975, T. Wendt 1092 and E. Lott (TEX). Terrell Co.: live oak woods along Independence Creek, 1 mi above its junction with the Pecos River, rare, 22 June 1949, G.L. Webster 378 (TEX). A form with these parts whitish-yellow was found by Dale Miller in Dallas, Texas.


References


