GENUS VICTIA
WITH NOTES ABOUT
TRIBE VICIEAE (FABACEAE)
IN MEXICO AND
CENTRAL AMERICA
ABSTRACT


Ten native and naturalized species and two native subspecies of *Vicia* in Mexico and Central America are keyed, described, discussed, and illustrated. Two new subspecies are named. All genera in the tribe Vicieae are keyed and discussed.

KEYWORDS: *Lathyrus, Lens, Pisum, Vicia, Vicieae, Mexico, Central America, Guatemala, Fabaceae, Leguminosae.*
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TRIBE VICIEAE (FABACEAE)
IN MEXICO AND
CENTRAL AMERICA

by
CHARLES R. GUNN
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GENUS VICIA WITH NOTES ABOUT TRIBE VICIEAE (FABACEAE) IN MEXICO AND CENTRAL AMERICA

By Charles R. Gunn

Vicia species (vetches) are economically important temperate zone crops used for forage, hay, green manure, seeds, and soil improvement. These species and such essential human seed-food crops as Lens culinaris Medikus and Pisum sativum Linnaeus are in the tribe Vicieae (Adanson) de Candolle. This bulletin on Mexican and Central American taxa in the genus Vicia expands and partially updates Agriculture Handbook 168, which treats the vetches of the United States (Hermann, 1960).

TRIBE VICIEAE

The relationship of the genus Vicia to the three other genera (Lathyrus, Lens, and Pisum) in the tribe Vicieae has been discussed (Hutchinson, 1964; Gunn, 1969; Gunn and Kluve, 1976; Kupicha, 1975; Radzhi, 1971). Cicer has been removed from the Vicieae and placed in its own tribe Cicereae (Kupicha, 1977). Hutchinson also has adequately described all five genera.

Vicieae is a natural tribe. Its taxa usually exhibit these characters: Low or climbing (not twining) herbs, stipules usually well developed, leaves often paripinnate (rarely imparipinnate or reduced to phyllodes in Lathyrus species) with rachis terminating in a tendril or bristle, stipels absent, flowers racemose or solitary in leaf axils, corolla papilionaceous, standard usually glabrous or rarely pubescent (V. anatolica Turrill, V. hybrida Linnaeus, V. pannonica Crantz), vexillary filament free to rather connate with others into an adaxially split sheath, filament apices linear, anthers uniform and versatile, style hairy to glabrous, ovules 2 or more, legumes 2-valved, seeds often spherical to subspherical to lenticular with funiculus expanded above hilum, germination usually hypogeal, most seedlings triarch, first leaves cataphylls (trifid scales), n = 7, 6, 5. Type genus Vicia.

The generic key is designed to quickly inform the user as to whether an unknown is a Vicia species or a member of another genus of the tribe. A key to the Vicia species is included with the genus discussion. The genera are presented alphabetically, and 10 Vicia species are given according to the phylogeny of Kupicha (1976).

Measurements with one number without a range should be considered as averages.

KEY TO VICIEAE GENERA

1. Abaxial surface of style pubescent or hairs encircling style or style glabrous
   (fig. 1)___________________________ Vicia

1. Adaxial surface of style pubescent.

   2. Stipules as large as or larger than leaflets; style grooved (easily seen at base
      of style)________________________ Pisum

   2. Stipules much smaller than leaflets; style not grooved.

   3. Flowers less than 10 mm long; androecial sheath apex oblique. .......... Lens

3. Flowers more than 10 mm long (for North American species); androecial
   sheath apex truncate (for Mexican species) ___________________________ Lathyrus

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1 Botanist, Plant Taxonomy Laboratory, Beltsville Agricultural Research Center, Beltsville, Md. 20705.
2 Kupicha (pers. commun.) recognizes a fourth genus, Vavitovia A. Fedorov.

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Cited, p. 35.

The most recent North American Lathyrus monograph has Mexican distribution maps for six native species (Hitchcock, 1952). Two cultivated and now naturalized species, named by Linnaeus, also have been collected in Mexico. The following species occur in Mexico and all except L. odoratus are illustrated in Hitchcock: L. eucosmus Butters & St. John (Sonora), L. graminifolius (S. Watson) White (Sonora and Chihuahua), L. lactiflorus Greene subsp. alefeldii (White) Jepson (northern Baja California), L. longipes White (Chihuahua and Nuevo León), L. odoratus Linnaeus (Michoacán, Puebla, and Chiapas), L. parviflorus S. Watson (from Sinaloa west to Tamaulipas and south to Oaxaca), L. splendens Kellogg (northern Baja California), and L. tingitanus Linnaeus (including L. mexicanus Schlechtendal) (Mexico).

Two species, L. longipes and L. parvifolius, are endemic only to Mexico. Their status is open to question because they are morphologically similar to each other and to L. arizonicus Britton, L. graminifolius, and L. pauciflorus Fernald. The type of L. longipes is not significantly different from many collections of L. parvifolius, according to Hitchcock. However, other collections are sufficiently different to merit specific recognition. Lathyrus longipes and L. parvifolius may be separated from L. pauciflorus by their range and such minor characters as leaflet and flower length, number of flowers per raceme, and length of calyx teeth.

Lathyrus is not native to Central America, and no native Mexican species have been collected south of the northern Oaxaca border. I have seen no herbarium sheets of naturalized or introduced Lathyrus species from Central America. There are endemic Lathyrus species in South America.


Although I have not seen an herbarium sheet of L. culinaris (lentil) from either Mexico or Central America, this species is cultivated in both regions. Westphal (1974, pp. 109–114, fig. 10) presents a lucid discussion and an excellent illustration of L. culinaris. Its flowers are self-pollinating and the plants produce many seeds. Like other self-pollinating seed crops, this species has many races based on seed, pod, and plant characters as well as geography. For example, Barulina (1930) recognized 58 varieties, now regarded as races.


Pisum sativum (pea) is cultivated in Mexico and Central America. Like Cicer arietinum Linnaeus (chickpea), which is now in the monogeneric tribe Cicereae, and Lens culinaris, it is a self-pollinating seed crop. Its seed characters have been used to erect lower taxa. Cultivar names are more widely used in this species than in the other two species. Excellent illustrations of P. sativum are in Westphal (1974, figs. 20–22).
VICIA LINNAEUS


Vicia species are primarily distributed in the north temperate zone and are also found in Hawaii, Canary Islands, and central Africa (map 1). The only large concentration in the south temperate zone is in South America. The intrusion into tropical areas is primarily based on the amelioration of temperature by elevation. Mountain chains are an important factor in the distribution of these species in Mexico, Guatemala, northern South America, Hawaii, southern China, northern India, and central Africa. In these areas, native Vicia species are found at higher elevations, 2,100-3,050 meters, than in temperate zones.

In North America there are 16 endemic and 17 naturalized species of Vicia. Six of the sixteen species are also native to Mexico, and the range of 2 of these 6, V. humilis Humboldt, Bonpland, Kunth and V. pulchella Humboldt, Bonpland, Kunth subsp. pulchella, extends into adjacent Guatemala. Vicia hirsuta (Linnaeus) S. F. Gray and V. sativa Linnaeus have become naturalized in Mexico, whereas V. sativa and V. villosa Roth have become naturalized in Guatemala. Although V. faba Linnaeus may not be naturalized in Mexico or Guatemala, it has been included because of the number of collections from field plantings in southern Mexico and Guatemala and the widespread use of its seeds as human food.

This is the first systematic treatment of Vicia species in Mexico and Central America and is a precursor to a study of these species in North and South America. Central America, with its lower elevations, generally does not provide a favorable habitat for native or naturalized Vicia species. Therefore, any gene flow between North and South America has been broken by the lower elevations in Central America south of Guatemala. One species complex is native to both North and South America, V. nigricans Hooker & Arnott subsp. nigricans and V. nigricans Hooker & Arnott subsp. gigantea (Hooker) Lasseter & Gunn. The vicarial species V. americana Muhlenberg ex Willdenow of North America and V. andicola Humboldt, Bonpland, Kunth of South America appear to be closely related.

A recently developed combination of tested morphological characters is used to establish species parameters. These characters include stylar hair patterns, external seed topography, flower topography and placement on and number per raceme, presence of nectary pits on stipules, presence of fibrous cross ribs (between seeds) on inner valve surfaces of legumes, and life forms. I used these characters in a general survey of U.S. Vicia species, and I was able to identify native and naturalized North American Vicia to species by their seeds alone (Gunn, 1968, 1971). Some of these characters were used by Lasseter (1972) in a revision of the southwestern U.S. Vicia species, the V. exigua-leavenworthii-ludoviciana complex. The only published treatment of U.S. Vicia species (Hermann, 1960) was completed before these data were coordinated.

Stylar hair patterns of more than 100 species of Vicia studied thus far may be placed in one of five illustrated categories (fig. 1): Style glabrous to glabrate; style with apical hairs restricted to abaxial surface, or adaxial surface bearing a few scattered small hairs; style with encircling apical hairs that are brushlike on the abaxial surface; style with encircling apical hairs that are uniform in length and density on both surfaces; and style with encircling medial hairs that are uniform in length and density on both surfaces. A sixth category with hairs restricted to the adaxial surface (not illustrated) is found in V. koeieana Rechinger f., a Near East species, and some specimens of V. ereilia (Linnaeus) Willdenow (Gunn and Kluve, 1976; Kupicha, 1973, 1976).

Five hilum shapes, based on a study of more than 100 Vicia species, are circumlinear, linear, oblong, wedge, and oval (fig. 1). A circumlinear hilum is more than 10 times longer than wide, has parallel margins, and occupies about 75 percent of the seed circumference. A linear hilum is 5 to 7 (rarely 9 to 10) times longer than wide, has parallel margins, and occupies less than 50 percent of the seed circumference. An oblong hilum is usually less than five times but usually greater than twice as long as wide, has slightly curved margins, and occupies less than 50 percent of the seed circumference. A
Figure 1.—Five stylar hair patterns for New World Vicia species and five hilum shapes of Vicia species.
wedge hilum has margins that converge to the lens; in all other respects it is similar to the oblong hilum. An oval hilum has a length that is never more than twice its width, is rounded in outline, and occupies less than 20 percent of the seed circumference.

The other morphological characters used in taxonomic determinations are depicted in figures 2-14.

The following abbreviations from Holmgren and Keuken (1974) are used in this bulletin:

- **ARIZ**: The University of Arizona Herbarium, Tucson
- **B**: Botanischer Garten und Botanisches Museum Berlin-Dahlem, Berlin, Federal Republic of Germany
- **BM**: British Museum (Natural History), London
- **CAS**: California Academy of Sciences Herbarium, San Francisco
- **ENC**: Escuela Nacional de Ciencias Biológicas Herbarium, Mexico
- **F**: John G. Searle Herbarium of Field Museum of Natural History, Chicago
- **IS**: Iowa State University Herbarium, Ames
- **JEPS**: Jepson Herbarium and Library of University of California, Berkeley
- **K**: The Herbarium and Library of Royal Botanic Gardens, Kew, Richmond, England
- **LINN**: The Linnean Society of London, London
- **MA**: Instituto “Antonio José Cavanilles,” Madrid
- **MEXU**: Universidad Nacional Autónoma de México, Mexico
- **MICH**: Herbarium of the University of Michigan, Ann Arbor
- **MO**: Herbarium of Missouri Botanical Garden, St. Louis
- **NA**: Herbarium of U.S. National Arboretum, Washington, D.C.
- **ND**: The J. A. Nieuwland Herbarium of University of Notre Dame, Notre Dame, Indiana
- **NDG**: The E. L. Greene Herbarium of University of Notre Dame, Notre Dame, Indiana
- **NY**: Herbarium of the New York Botanical Garden, Bronx
- **OKL**: Bebb Herbarium of University of Oklahoma, Norman
- **P**: Museum National d'Histoire Naturelle, Paris
- **PH**: Herbarium of Academy of Natural Sciences, Philadelphia
- **POM**: Herbarium of Pomona College, Claremont, California
- **RM**: Rocky Mountain Herbarium of University of Wyoming, Laramie
- **RSA**: Rancho Santa Ana Botanic Garden Herbarium, Claremont, California
- **SD**: San Diego Museum of Natural History Herbarium, San Diego, California
- **SMU**: Herbarium of Southern Methodist University, Dallas, Texas
- **TEX**: University of Texas Herbarium, Austin
- **UC**: Herbarium of the University of California, Berkeley
- **US**: U.S. National Herbarium of Smithsonian Institution, Washington, D.C.
- **VT**: Pringle Herbarium of University of Vermont, Burlington
- **WTU**: Herbarium of University of Washington, Seattle
KEY TO VICIA SPECIES

1. Stipules bearing nectary patches.
2. Tendrils absent (leaves ending in cusps); plants erect and blackening on drying--------------------------------- 12. **V. faba**
2. Tendrils present; plants not erect and remaining green on drying-------- 11. **V. sativa**
1. Stipules without nectary patches.
3. Corolla 5 mm or less; style nearly glabrous; hilum concealed by permanent funiculus--------------------------------- 2. **V. hirsuta**
3. Corolla more than 6 mm long; style pubescent; hilum visible.
4. Stylar hairs encircling and of same length.
5. Racemes 1–2 flowered; stylar hairs medial-------------------------------- 10. **V. leucophaea**
5. Racemes usually 3 or more flowered; stylar hairs apical.
6. Annual; flowers usually 1–5 (1–17 in subsp. *rudolphiana* phase laxiflora); calyx teeth unequal-------------------------------- 5. **V. ludoviciana**
6. Perennial; flowers 8–26; calyx teeth subequal.
7. Corolla up to 10 mm long--------------------------------------- 6. **V. pulchella** subsp. *pulchella*
7. Corolla 12–18 mm long----------------------------------------- 7. **V. pulchella** subsp. *mexicana*
4. Stylar hairs encircling or on one surface but always forming an abaxial brush.
8. Standard less than 10 mm long.
9. Style without hairs on adaxial surface; calyx teeth equal; hilum occupying less than 20 percent of seed circumference; restricted to Baja California-------------------------------- 4. **V. hassei**
9. Style without hairs on adaxial surface; calyx teeth equal; hilum occupying about 30 percent of seed circumference; no farther north and west than Sinaloa-------------------------------- 3. **V. humilis**
8. Standard more than 11 mm long.
10. Calyx gibbous at base; racemes densely 10–14 flowered-------- 1. **V. villosa**
10. Calyx not gibbous at base; racemes loosely (2)–3–10 flowered.
11. Calyx teeth unequal, upper 2 much shorter than lower 3---------------
11. Clayx teeth equal or nearly so------------------- 9. **V. americana** subsp. *mexicana*

DESCRIPTONS OF VICIA SPECIES

**Vicia villosa** Roth (subgenus *Vicilla*, section *Cracca*)

**Hairy Vetch**


*V. consentina* Sprengel, Pugil. 2: 74. 1815.
*V. littoralis* Salzmann, Flora 4: 110. 1821.
*V. bisonae* Sering in de Candolle, Prod. 2: 357. 1825.
*V. dasyacarpa* Tenore, Abruzz. 81. 1829. **Cracca dasyacarpa** (Teoreno) Aleyon, Bonplandia 9: 121. 1861.
*V. varia* Host, Fl. Aust. 2: 332. 1831. **Cracca varia** (Host) Grenier & Godron, Fl. Fr. 1: 469. 1848.
*V. littoralis* Tenore, Fl. Nap. 4: 103. 1838.

Annual or biennial, rarely perennial. Herbaceous vine, up to 1.3 m long, drying green, villose to glabrous. Trichomes white. Leaves pin-
FIGURE 2.—*Vicia villosa* drawn from greenhouse-grown plants: A, Habit (× 0.5); B, leaflets (× 2.5); C, flower (× 2.5); D, androecial sheath and style (× 5); E, stylar hair pattern (× 11); F, mature legumes (× 1); G, seeds (× 3).
nately compound, terminating in a ramified prehensile tendril. Leaflets 8-20, entire, thin, obovate to linear-lanceolate or linear, 8-35 by 1-10 mm, apex acute to obtuse and mucronulate, base abruptly tapered. Stipules inconspicuous, eglandular, usually entire. Racemes elongate, with (3)-5-40 closely spaced flowers, generally longer than subtending leaf. Calyx one-half standard length, teeth unequal with 2 upper shortest poorly developed and curved and 2 lateral and especially basal straight and long attenuate, gibbous at base, usually partially bluish purple toward apex. Corolla varying shades of bluish purple to pink or rarely white, with standard 12-20 mm long. Androecial sheath oblique at apex. Stigma globular. Style apex encircled by hairs with abaxial surface bearing elongated hairs forming brush. Ovary glabrous to puberulent. Legume 20-40 mm long, dark to light straw color, glabrous, reticulate and punctate, oblong, flattened, obliquely short acuminate at both ends (occasionally almost rounded), on 2-3 mm stipe, bearing 4-5 ovules, inner valve surface smooth, twisting tightly to loosely during dehiscence. Seed 3.4-5 mm in diameter, spherical to nearly sublenticular, smooth, dull dark reddish brown to greenish brown densely mottled and pointed with blackish brown. Hilum color of seedcoat to darker, oblong, 3 times longer than wide, parallel to length of seed, occupying 14 percent of seed circumference, hilar lips color of hilum. Lens darker than seedcoat, with raised center 1-1.3 mm from hilum.

Distribution.—*Vicia villosa* is a polymorphic species that is usually cross-pollinated. Some self-pollination may occur, but seed set is greatly increased when bees are available to pollinate flowers. The species varies in degree of stem and legume pubescence, width of leaflets, number of flowers per raceme, length and color of corolla, size of calyx teeth, and legumes. These and other characters have been used as bases for describing many species and lower taxa. The list of synonyms is not complete and includes only species epithets.

Although the subspecific taxonomy may be satisfactorily established for Europe (Ball, 1968), it perhaps does not reflect all elements found in the New World, especially in the United States. The description here is for *V. villosa* in a broad sense. The six Guatemalan specimens seen during this study represent *V. villosa* subsp. *villosa*, because their stems are villous. This subspecies is often found in the cooler parts of the species range. Other subspecies that are glabrous or appressed-pubescent may be expected in warmer areas as introduced crops or naturalized plants.

*Vicia villosa* is an important green manure crop that apparently has not been widely planted in Mexico or Central America. One reason may be the vetch bruchid (*Bruchus brachialis* Fähraeus). Its larvae hollow out the seeds and thus decrease their viability and value.

2. *Vicia hirsuta* (Linnaeus) S. F. Gray (subgenus *Vicilla*, section *Cracca*)

(Fig. 3, Map 2)


*Collector's name and collection number in italic; herbarium symbol in parentheses (see p. 5).*
Figure 3.—*Vicia hirsuta* drawn from greenhouse-grown plants: A, Habit (× 0.5); B, stipule (× 4); C, leaflets (× 2); D, flowers (× 2); E, androecial sheath and style (× 4); F, stylar hair pattern (× 8); G, mature legumes (× 2); H, seeds (× 5).
oblong or narrowly elliptical, 5-20 by 1-4 mm, lunate, base tapering and rounded. Stipules inconspicuous, eglandular, sharply serrate to toothed. Trichomes white. Leaves pinnately compound, terminating in a simple or ramified prehensile tendril. Leaflets 4-16, entire, thin, linear, narrowly oblong, or narrowly elliptical, 5-20 by 1-4 mm, apex usually truncate or emarginate and mucronulate, base tapering and rounded. Stipules inconspicuous, eglandular, sharply serrate to toothed. Racemes elongate, with 2-6-(8) closely spaced flowers, as long as to shorter than subtending leaf. Calyx about one-half standard length, teeth subequal straight attenuate, not gibbous at base, green throughout. Corolla whitish blue with standard 2-5 mm long. Androecial sheath not oblique at apex. Stigma globular. Style apex bearing only a few scattered hairs on abaxial side. Ovary pubescent. Legume 6-11 by 2.5-4 mm, brown to blackish, apically more so, hilum darker than seedcoat, linear to ocher. Lens darker than seedcoat, with raised, parallel to length of seed, occupying 14-21 percent of seed circumference, with lips of hilar groove ocher. Lens darker than seedcoat, with raised center 0.6-1 mm from hilum.

Distribution.—*Vicia hirsuta* is a native of Europe. It has now been naturalized in North America along roadsides and waste places. Plants in flower or fruit are inconspicuous and often overlooked.

Mexican specimens examined.—STATE UNKNOWN: "Lathyrus angustifolius," Sessé, Mociño, Castillo, & Maldonado 3640 (F); *Vicia linearis* Sessé, Mociño, Castillo, & Maldonado 3641 (fragment F). MEXICO: Pringle (F); Temascaltepec, elev. 2,700 m, Hinton 4895 (ARIZ, US).

*Vicia hirsuta* has two characters that separate it from most other *Vicia* species, a glabrate stylar apex and a persistent funiculus. For these and other reasons, this species has been placed in six genera, and it is the lectotype of two segregate genera, *Endiussa* Alefeld and *Ervilla* Opiz. Although it is generally regarded as a weed or ignored in the New World, it is cultivated in the Near East. Like other self-pollinating *Vicia* species, it is polymorphic, exhibiting pronounced variation in stature, density and number of leaves and leaflets, leaflet size, legume pubescence, and seed size. Plitmann (1963) described a form, probably cultivated, with stems about 13 dm long and leaflets 10-20 by 3-4 mm. Although it is not known whether a lack of stylar hairs enhances self-pollination or not, apparently hairs are not needed for this species because selfing approaches 100 percent.

3. *Vicia humilis* Humboldt, Bonpland, Kunth (subgenus Vicilla, section Cracca) Low Vetch (Fig. 4, Map 2)


*Lathyrus parviflorus* Sessé, Mociño, Castillo, & Maldonado, based on their collection 1903 (name not intended to be published here). (Negative 46449, F)

Perennial.—Herbaceous vine, up to 1 m long, dry green, glabrate. Trichomes white. Leaves pinnately compound, terminating in a simple prehensile tendril. Leaflets 2-6, entire, thin, linear, 10-40 by 0.9-3 mm, apex tapered and mucronulate, base tapered. Stipules inconspicuous, eglandular, entire. Racemes subsessile, with 1 or rarely 2 closely spaced flowers, shorter than subtending leaf. Calyx about one-half standard length, teeth essentially equal straight attenuate, not gibbous at
**Figure 4.** *Vicia humilis* drawn from greenhouse-grown plants: *A*, Habit (*×* 0.5); *B*, leaflets with stipules and flower (*×* 2); *C*, flower (*×* 4); *D*, androecial sheath and style (*×* 6); *E*, stylar hair pattern (*×* 14); *F*, mature legumes (*×* 1); *G*, seeds (*×* 4).
base, green throughout. Corolla varying shades of bluish purple, with standard 5–10 mm long. Androecial sheath oblique at apex. Stigma conical. Style apex with abaxial surface bearing a brush and adaxial surface nearly glabrous. Ovary glabrous to pubescent. Legume 30–40 by 4–7 mm, straw color, glabrous to pubescent, strongly reticulate, linear-falcate, terete to partially flattened, oblique and acute at both ends, on 1 mm stipe, bearing 7–8 ovules, with inner valve surface smooth, twisting tightly during dehiscence. Seed 2–2.3 mm in diameter, spherical to subspherical, mottled with black so as to nearly mask base color. Lens darker than seedcoat, with raised hilum color of seedcoat or silvery (due to funicular remnants), oblong, 4 times longer than wide, center 0.5–0.7 mm from hilum.


Guatemalan specimens examined.—HUEHUETENANGO: Aguacatan, elev. 1,950 m, Standley 81298 (F). QUEZALTENANGO: Cerro la Pedrera, elev. 2,400 m, Standley 65539, 65561 (F). TOTONICAPAN: Chui-quisis, elev. 2,500–2,800 m, Standley 81401 (F).

Vicia humilis is one of the most common and widespread native Mexican vetches, and is one of two vetches endemic to Central America. The other is V. pulchella subsp. pulchella. Although the species was originally described as possessing solitary flowers, a few widely scattered plants with two flowers per raceme have been found. These plants occur throughout the range of the species, including northern Guatemala. These twinned-flowered plants do not exhibit other characters that could be used as a basis for separating one- and two-flowered plants. Mature legumes may be glabrous or pubescent; there is no correlation between this character and distribution or other studied morphological characters. Although it is widespread in Mexico, little is known about this species. Greenhouse tests have shown that it is self-pollinating.

4. Vicia hassei S. Watson (subgenus Vicinia, section Cracca)  

Slender Vetch  

(Fig. 5, Map 3)

Annual.—Herbaceous vine, approaching 1 m long, drying green, pubescent. Trichomes white. Leaves pinnately compound, terminating in a simple or ramified prehensile tendril. Leaflets 4–12, entire, thin, linear-lanceolate to elliptic, 8–40 by 1.5–9 mm, apex usually truncate to retuse or emarginate, base rounded. Stipules inconspicuous, eglandular, usually sharply serrate. Racemes elon-
Figure 5.—*Vicia hassei* drawn from herbarium specimens: A, Habit (× 0.75); B, leaflets (× 2); C, flower (× 3); D, androecial sheath and style (× 4); E, styal hair pattern (× 12); F, mature legumes (× 1); G, seeds (× 6).
gate, with 1–2 closely spaced flowers, shorter than subtending leaf. Calyx less than one-half standard length. Teeth essentially equal straight short-attenuate, not gibbous at base, green throughout. Corolla white to faint bluish or lavender, with standard 6.5–8.5 mm long. Androecial sheath oblique at apex. Stigma globular. Style apex encircled by hairs with abaxial surface bearing elongated hairs forming brush. Ovary pubescent. Legume 22–38 by 5–7 mm, straw color, pubescent. Dimorphic species that is restricted in Mexico to the Pacific coast of northern Baja California and adjacent islands. This species shares many characters and its range with the much wider ranging polymorphic species complex V. ludoviciana, which now includes V. exigua. Although the circum-
scriptions of V. hassei and V. ludoviciana have been controversial, Lasseter (1975) presents evidence herein accepted that clearly separates them. Vicia hassei has an apical abaxial stylar brush and pubescent ovaries and legumes. Vicia ludoviciana has the apex of its style encircled by hairs of essentially equal length and glabrous ovaries and legumes.

5. Vicia ludoviciana Nuttall subspecies ludoviciana (subgenus Vicilla, section Craeca) Deerpea Vetch


V. ludoviciana var. laxiflora Shinners, Field and Lab. 16: 22. 1948. TYPE: UNITED STATES: Whitehouse 15275, Wise Co., Tex. (HOLOTYPE: SMU; ISO-

Through roadsides.

Mexican specimens examined.—BAJA CALI-

FORNIA: Coronado Islands, elev. 150 m, Cowles 7 (POM); Ejido, elev. 300 m, Raven, Lewis, & Thompson 12248 (UC); Ensenada, Norland (SD); South Todos Santos Island, Moran 2799 (UC); Valle Denos Creek, Brandegee (UC); Vallecito, Orcutt (MO). GUADALUPE ISLAND: Elev. 200 m, Moran 6643 (SD); Palmer 847 (MEXU, US); Wiggins & Ernst 200 (SD, UC).

Vicia hassei, often regarded as a variety of V. exigua, has been a poorly understood mono-

morphic species that is restricted in Mexico to the Pacific coast of northern Baja California and adjacent islands. This species shares many characters and its range with the much wider ranging polymorphic species complex V. ludoviciana, which now includes V. exigua. Although the circum-
scriptions of V. hassei and V. ludoviciana have been controversial, Lasseter (1975) presents evidence herein accepted that clearly separates them. Vicia hassei has an apical abaxial stylar brush and pubescent ovaries and legumes. Vicia ludoviciana has the apex of its style encircled by hairs of essentially equal length and glabrous ovaries and legumes.
Figure 6—Vicia ludoviciana drawn from herbarium specimens: A, Habit (× 0.5); B, leaflets (× 5); C, inflorescence and subtending leaf (× 1); D, flower (× 5); E, androecial sheath and style (× 9); F, stylar hair pattern (× 27); G, mature legumes (× 1); H, seeds (× 7).

Winter annual.—Herbaceous vine, up to 2 m long, drying green, glabrous to puberulent. Tri-chories white. Leaves pinnately compound, terminating in a ramified prehensile tendril. Leaflets 5–17, entire, thin, linear-oblong or elliptic to oval, 5–13 by 1.2–11 mm, apex acute to truncate or enarginate and sometimes mucronulate, base tapered. Stipules inconspicuous, eglandular, entire. Racemes with 1–19 closely spaced flowers, shorter than to exceeding subtending leaves. Calyx less then one-half standard length, teeth subequal with 2 upper averaging 0.2 mm shorter than lower and all lance subulate, not gibbous at base, green. Corolla deep blue to bluish purple or white. Androecial sheath oblique at apex. Stigma globular. Style apex encircled by hairs of approximately equal length. Ovary glabrous. Legume 16–30 by 4–6 mm, straw color to brown, glabrous, reticulate, rhombic-oblong, partially flattened to nearly terete, obliquely acuminate at both ends, on 1 mm stipe, bearing 4–7 ovules, with inner valve surface smooth, twisting tightly during dehiscence. Seed 2 mm in diameter, spherical to subspherical, smooth, light greenish ocher to reddish brown, mottled and pointed with dark brown. Hilum color of seedcoat, oblong, 5 times longer than wide, parallel to length of seed, occupying about 30 percent of seed circumference, with lips of hilar groove usually pale straw color. Lens brown to blackish, with raised center about 0.5 mm from hilum.

Distribution.—Vicia ludoviciana subsp. leavenworthii is part of what has been a poorly understood alliance of southwestern United States and northern Mexico Vicia species that included V. exigua, V. hassei, V. leavenworthii, and V. ludoviciana (Shinners, 1948; Turner, 1959; Hermann, 1960). Lassetter (1972) recorded the characters that have intrinsic taxonomic significance and concluded that two varieties and seven geographical races (phases) were recognizable and definable in the V. ludoviciana complex. Although a variety of nomenclature has been formalized in accordance with the “International Code of Botanical Nomenclature,” the phase nomenclature for geographical races is informal and is used for guidance. Vicia hassei, now reestablished as a species, is an element of the Baja California flora, and the other three taxa are now part of the polymorphic species complex, V. ludoviciana (Lassetter, 1975).

The two subspecies of V. ludoviciana are ludoviciana and leavenworthii (Torrey & Gray) Lassetter and Gunn stat. nov., based on V. ludoviciana Torrey and Gray (1838, p. 271). Subspecies leavenworthii has two phases, leavenworthii and louisiana. Although neither phase has been collected in Mexico, phase leavenworthii likely may be in Mexico along the Rio Grande, based on its U.S. distribution.

Subspecies ludoviciana has five phases, with three in Mexico. Vicia ludoviciana var. ludoviciana phase exigua is restricted to Baja California and adjacent islands. This taxon is sympatric with V. hassei. Phase laxiflora is found in northern Coahuila and Nuevo León. Phase producta is known from one specimen collected in Chihuahua. Phase texana likely may be found in northern Mexico along the Rio Grande, based on its U.S. distribution. Phase ludoviciana is not expected to be in Mexico, based on its U.S. distribution.

Table 1 summarizes some of the characters that may be used to identify the Mexican members of this species complex. Lassetter (1972) presents additional characters and a discussion.
### Table 1.—Characters used to identify members of Vicia ludoviciana complex

<table>
<thead>
<tr>
<th></th>
<th>Occurrence and characters</th>
<th>Known from Mexico</th>
<th>Flowering before peduncle and internode elongation</th>
<th>Immature fruits present during initial flowering</th>
<th>Leaflets (7)–11–17</th>
<th>Leaflets 5–10–13</th>
<th>Flowers 1–17</th>
<th>Flowers 1–5</th>
<th>Flowers usually 3,1 terminal pair below</th>
<th>Flowers 1–3, each from separate point</th>
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</thead>
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<tr>
<td><strong>leavenworthii</strong> phase leavenworthii</td>
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<td></td>
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<tr>
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<tr>
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</tr>
<tr>
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</tbody>
</table>

1 For additional characters and discussion, see Lassetter (1972).

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### 6. Vicia pulchella Humboldt, Bonpland, Kunth subspecies *pulchella* (subgenus *Vicilla*, section *Cracca*)

(Fig. 7, Map 4)


Perennial.—Herbaceous vine, up to 1.5 m long, drying green, pubescent to glabrate. Trichomes white. Leaves pinnately compound, terminating in a ramified prehensile tendril. Leaflets 8–16, entire, thin to coriaceous, elliptic to linear-oblong, oblong-lanceolate or linear, 7–30 by 0.8–11 mm, apex obtuse to acute and mucronulate, base tapered. Stipules inconspicuous, eglandular, entire. Racemes elongate, with (6)–8–25 closely spaced flowers, longer to shorter than subtending leaf. Calyx about one-half standard length, teeth subequal with upper 2 deltoid and lateral 2 and basal acute to acuminate, not gibbose at base, green throughout. Corolla creamy white to white with purple veins or pinkish to bluish purple, with standard 5–8–(12) mm long. Androecial sheath oblique at apex. Stigma globular. Style apex encircled by hairs of uniform length. Ovary glabrous. Legume 20–35 by 5–8 mm, straw color, obliquely acuminate at both ends, on 1 mm stipe, bearing 5–7 ovules, with inner valve surface smooth, twisting tightly during dehiscence. Seed 2.2–2.5 mm in diameter, subspherical, smooth dull reddish brown mottled with black. Hilum color of seedcoat, oblong to wedge-shaped, 6 times longer than wide, parallel to length of seed, occupying 26 percent of seed circumference. Lens black, with raised center 0.7 mm from hilum.

Distribution.—*Vicia pulchella* subsp. *pulchella* is found in Arizona and New Mexico south to northern Guatemala, exclusive of Baja California and the Yucatan Peninsula.

FIGURE 7.—*Vicia pulchella* subsp. *pulchella* drawn from herbarium specimens: A, Habit (× 0.75); B, leaflets (× 2.5); C, inflorescences and subtending leaf (× 0.75); D, flower (× 5); E, androecial sheath and style (× 10); F, stylar hair pattern (× 30); G, mature legumes (× 1.3); H, seeds (× 5).

Guatemalan specimens examined.—HUEHUETENANGO: Ravines and hillsides below Calaveras, elev. 3,000 m, Williams, Molina R., & Williams 21937 (F). QUEZALTENANGO: San Juan Ostuncalco, elev. 3,000 m, Williams, Molina R., & Williams 22740 (F, US) and 25531 (F, NA). SAN MARCOS: Edge of cypress forest, San Sebastian, elev. 3,050 m, Williams, Molina R., & Williams (F).

Vicia pulchella subsp. pulchella is the most common and widespread native Mexican vetch, and it is one of two vetches endemic to Central America. The other endemic is V. humilis. Vicia pulchella exhibits less variation than most endemic vetches, especially considering its wide range. The flowers exhibit color variation and the subspecies are based on discrete flower lengths. Subspecies mexicana with a flower length of 12 mm or more, usually 13–18 mm, is the next taxon. Of the approximately 250 specimens of subspecies pulchella and mexicana collected in Mexico and Guatemala, only three have an intermediate flower length. These collections were made in Chihuahua. The collection by LeSueur 703 has flower lengths from 8.9 to 11 mm. Another and more widely distributed collection, Townsend & Barber 123, has flower lengths from 9.5 to 12 mm. The Kruckeberg 4943 specimens have flowers approaching 13 mm. Except for these collections, subspecies pulchella flowers are less than 10 mm long and usually less than 8 mm.

Little is known about the pollination and crop potential of V. pulchella. Plants are usually found at about 2,000 meters and often associated with stony hillsides. Collectors' habitat remarks included barren mountain summits, covering volcanic rocks and shrubs, on steep slopes, shaded arroyo bank, under cliffs, crest of ridge, well-drained soil between rocks, and rocky rhyolitic soil. The vines may be abundant. They may grow in shade or full sunlight and in association with or separately from other plants.

7. Vicia pulchella Humboldt, Bonpland, Kunth subspecies mexicana (Hemsley) C. R. Gunn (subgenus Vicilá, section Cracca) (Fig 8, Map 4)

Hemsley (cited here) used several characters to separate V. mexicana from V. pulchella. He said that his species was glabrous, except for the youngest tips of the branches and that it was larger in all parts. Two parts were specifically mentioned: Flowers nearly three times larger and ovary borne on a much longer stalk. Of these characters, only flower size is valid in separating subspecies mexicana from subspecies pulchella. Flowers of the former are at least 13 mm long, usually 13–18 mm, whereas flowers of the latter are usually 10 mm or less in length.
Figure 8.—*Vicia pulchella* subsp. *mexicana* drawn from herbarium specimens: A, Habit (× 0.5); B, leaflets (× 1.5); C, flowers (× 1.5); D, androecial sheath and style (× 3.5); E, stylar hair pattern (× 10).
Pringle 6786 (cited here) is a widely distributed collection of subspecies mexicana, which has a stiff appearance when compared with the average material of subspecies pulchella. As a result, all plants of subspecies mexicana are often thought of as stiff, but this is generally not true. There are specimens of subspecies mexicana that lack this character, and there are stiff specimens of subspecies pulchella, such as Pringle 1231.

Selected Mexican specimens examined: Colima: Volcano Colima, elev. 2,591 m, Goldsmith

8. Vicia americana Muhlenberg ex Willdenow subspecies americana (subgenus Vicilla, section American Vetch)


V. sylvestris of Nuttall, Gen. Hist. 2: 97. 1818. Non L. (Incorrectly attributed to Nuttall by subsequent authors.)


V. californica Greene, Fl. Fr. 3. 1891. TYPE: UNITED STATES: Greene, June 1889, Calaveras Co., Calif. (HOLOTYPE and fragment: ND).


Perennial.—Herbaceous vine, up to 2 m long, drying green, glabrous to pubescent. Trichomes golden or white. Leaves pinnately compound, terminating in a simple or ramified prehensile tendril. Leaflets 4–14, entire to toothed, thin to coriaceous, oval to linear, 5–60 by 1–15 mm, apex rounded to truncate to sharply acute and mucronulate, base rounded to sharply acute. Stipules
Figure 9.—Vicia americana subsp. americana drawn from herbarium specimens: A, Habit ($\times$ 0.5); B, leaflets showing size and shape variation ($\times$ 0.75); C, flower ($\times$ 3); D, androecial sheath and style ($\times$ 7); E, stylar hair pattern ($\times$ 21); F, mature legumes ($\times$ 1); G, seeds ($\times$ 5).
inconspicuous, eglandular, usually sharply serrate. Racemes elongate, with (2)–3–10 widely spaced flowers, shorter than subtending leaf. Calyx less than one-half standard length, teeth unequal with 2 upper shortest poorly developed and curved and 2 lateral and basal straight deltoid not long attenuate, gibbous at base, usually partially bluish purple toward apex. Corolla varying shades of bluish purple to rarely white, with standard 12–25 mm long. Androecial sheath oblique at apex. Stigma globular. Style apex encircled by hairs with abaxial surface bearing elongated hairs forming brush. Ovary bearing soon deciduous golden hairs. Legume 25–35 by 5–6 mm, light to dark straw color, glabrous (pubescent in small populations in Arizona, California, Oregon, and Washington), strongly reticulate, oblong, terete to partially flattened, oblique and acute at both ends, on 4–5 mm stipe, bearing 8–14 ovules, with inner valve surface smooth, twisting loosely to tightly during dehiscence. Seed 3–3.5 mm in diameter, subspherical to oblong, smooth, dull purplish brown to dull light brown, with scattered to dense dark-brown mottles and points (some seeds so densely speckled as to appear almost monochrome). Hilum color of seedcoat or silvery (due to funicular remnants), oblong to slightly wedge-shaped, 5–6 times longer than wide, parallel to length of seed, occupying 20–33 percent of seed circumference, with lips of hilar groove color of hilum. Lens generally darker than seed, with raised center 1.3–2 mm from hilum.

Distribution.—*Vicia americana* subsp. *americana* is found throughout southern Canada and Alaska and the United States essentially north of the 74° F isotherm, from New England and adjacent Canada. The 74° F isotherm separates the microthermal and mesothermal climatic regions (Thornthwaite, 1931). South and west of the terminus of this line in New Mexico (Gunn, 1968, fig. 5), the distribution of subspecies *americana* is governed by elevation or an ocean-cooled climate. In Mexico, this subspecies has not been found below 2,200 meters. Sustained heat appears to be detrimental. The collections in Morelos, Distrito Federal, and Mexico represent both the southern limit of this subspecies as well as possibly relic populations. There are no discernible differences between these central Mexican populations and comparable populations in the United States.

Mexican specimens examined.—STATE UNKNOWN: Wright 945 (UC). CHIHUAHUA: Near Colonia Garcia, elev. 2,280 m, Townsend & Barber 4 (F, MEXU, MO, NY, POM, TEX, UC). DISTRITO FEDERAL: Canada de Contreras, elev. 3,100 m, Vasquez H. (ENCB). MEXICO: Municipio de Tlalmanalco, elev. 3,050 m, Moncayo 25 (US); Rafael, elev. 2,700 m, Rzedowski 153 (ENCB); Rzedowski 19427 (ENCB, ISC); Rzedowski & Holguin (ENCB). MORELOS: Zempoala, Paray 1280 (ENCB).

Although *V. americana* subsp. *americana* is not an obligate self-pollinator, it is polymorphic, exhibiting pronounced variations in leaflet shape, size, and thickness; pubescence; stipule shape and size; height; and flower number. It may be identified easily and consistently by the number of flowers per raceme, standard length, shape of stylar hairs, unequal calyx teeth, ovule number, and percentage of seed circumference occupied by the hilum. Its phenotypic variability and wide geographic range have contributed to its taxonomic and nomenclatural confusion. This phenotypic variability has been discussed and evaluated by Gunn (1968).

*Vicia americana* subsp. *minor* (Hooker) C. R. Gunn stat. nov., based on *V. americana* var. *minor* Hooker (Fl. Bor. Am. 1: 157. 1831, syntype K), has not been found in Mexico, though one of the herbarium sheets from Chihuahua (Townsend and Barber 4, UC) resembles this subspecies. This sheet, although superficially similar to subspecies *minor*, has been identified as subspecies *americana* using characters presented by Gunn (1968). Furthermore, there are at least seven sheets of this collection and the other six do not superficially resemble subspecies *minor*.

One Mexican specimen, Wright 945 (UC), possesses unusually narrow leaflets (a length/width ratio of 10 or more), which do not exceed 42 by 1 mm. The occurrence of narrow leaflet plants throughout the range of *V. americana* subsp. *americana* has been discussed (Gunn, 1968, pp. 197–198). This phenotype has been assigned specific and varietal ranks in the United States. However, I have concluded that these linear leaflet phenotypes merit no more than forma recognition for these reasons: (1) They share all the technical characters exhibited by broader leaflet plants, (2) some plants have leaves with both broad and nar-
row leaflets on the same stem, and (3) the distribution of the narrow leaflet plants has no geographical significance because they occur throughout the range of the broad leaflet plants. There is no taxonomic advantage to propose formal names for either the narrow leaflet form or other forms based on such minor characteristics as leaflet shape, pubescent legumes, or white flowers.

*Vicia setifolia* Humboldt, Bonpland, Kunth resembles the narrow leaflet form of *V. americana* subsp. *americana*. The range of *V. setifolia*, as recorded by Humboldt, Bonpland, and Kunth (1824, pp. 500–501), is “crescit prope Mexico, Quito et Santa Fe de Bogota, alt. 1,170–1,500 hæv.” *Vicia nigricans* is the only vetch native to both North and South America. Except for *V. humilis* and *V. pulchella* whose ranges were extended south of the Chiapas border into adjacent Guatemala, there are no endemic *Vicia* species in Central America.

Two extant sheets of *V. setifolia*, one in Paris (F), which is the lectotype (Burkart, 1966), and the other, a fragment, in Berlin (B), were placed in the Willdenow collection and subsequently saved. The main Berlin sheet was destroyed, but not before it had been photographed, and the negative, number 2346, was deposited at the Field Museum (F). These two specimens and the photograph are unique among Humboldt and Bonpland collections because they contain no data about where they were collected. Lacking published or unpublished data, one must review the Humboldt-Bonpland pre-1824 New World itinerary for clues about where these plants were collected.

Humboldt and Bonpland’s Mexican travels were primarily in and around the State of Mexico (Humboldt, Bonpland, and Kunth, 1824, pp. 500–501; Sprague, 1926), the southernmost limits of *V. americana* subsp. *americana*, a taxon known for its plasticity. As previously noted, *V. setifolia* and this subspecies share several superficial and technical characters that are not shared with other Mexican *Vicia* species. One may postulate that if any of the three sheets of *V. setifolia* were collected in or around the State of Mexico, the collection either would be part of the *V. americana* complex or would represent a new taxon.

There are two technical characters that may be used to separate *V. setifolia* from *V. americana* subsp. *americana*, viz, shape and relative length of the two upper calyx lobes and length of the style covered by stylar hairs (fig. 10). In my study of the *V. americana* complex, I have never found a plant that exhibited these two characters singly or collectively. Therefore, two possibilities remain. The first is the highly unlikely possibility that Humboldt and Bonpland collected a new Mexican species of *Vicia*, which has not been collected by anyone else. The second and more plausible possibility is that they may have seen a narrow leaflet plant of *V. americana* subsp. *americana* in Mexico, but they collected the three *V. setifolia* sheets in the Andes Mountains of southwestern North America.

During their South American travels from Bogotá, Colombia, to Quito, Ecuador, Humboldt and Bonpland could have seen only one endemic *Vicia* species, *V. andicola* Humboldt, Bonpland, Kunth, which they collected and named (Sandwith, 1926; Sprague, 1926; Stearn, 1968). No other endemic *Vicia* species has been found in this part of South America. *Vicia andicola* is a South American vicariate of *V. americana* subsp. *americana*. It exhibits all the variability of the latter taxon and is strikingly similar to it. Only a thorough study of the two taxa can determine their taxonomic status.

One of three technical differences is the relative lengths of the five calyx lobes. The lobes tend to be more or less equal for *V. andicola*, whereas they are definitely unequal in *V. americana*. There are some specimens of *V. andicola* that possess unequal calyx lobes and closely resemble *V. americana*, even to being purplish at the apex. Another technical difference is that the length of style covered by stylar hairs is longer for *V. andicola* than for *V. americana*. The third character is that the androecial sheath apex is rather truncate in *V. andicola* and oblique in *V. americana*.

Specimens of *V. andicola* with the same general and technical characters as *V. setifolia* at the U.S. National Herbarium (US) include Smith, Idrobo, & Jaramillo-Mejie 1029, Usme, Colombia; Idrobo, Jaramillo, Mesa-Bernal, & Mora 322, Cundinamarca, Colombia; Maguire & Maguire 61723, Bolivar, Ecuador; and Hitchcock 22049, Chimborazo, Ecuador.

These reasons would explain why Humboldt and Bonpland did not record finding the narrow
leaflet form of *V. andicola*. They did find it, but they called it *V. setifolia*. If *V. setifolia* was collected in South America and not Mexico, then it becomes a synonym of *V. andicola*.

When Kuntze (1898, p. 73) reduced *V. setifolia* to a variety of *V. graminea* Linnaeus, some taxonomists stated that *V. graminea* was an endemic of both South and North America. *Vicia graminea* is clearly a separate species and is not endemic to Mexico. There are no herbarium specimens to indicate that the species has been introduced to Mexico.

Burkart (1966) described *V. setifolia* var. bonariensis Burkart from Argentina as possessing a "caliz 4–7 mm long, campanulado, pubescentehirtulo, con 5 dientes acutísimos, los 2 superiores de long, igual al tubo, inferiores mayores." The illustration of the spread calyx shows the two upper lobes to be no more than 2 mm longer than the lower three. The status of these and other *V. setifolia*-like plants can only be established by a thorough review of South American *Vicia* species.

9. *Vicia americana* Muhlenberg ex Willdenow subspecies *mexicana* C. R. Gunn (subgenus *Vicilla*, section *Americanae*)

(Fig. 10, Map 5)

*Vicia americana* Muhlenberg ex Willdenow subsp. *mexicana* C. R. Gunn nov. subsp. TYPE: MEXICO:


*V. americana* subsp. *mexicana* (Fig. 10.—*Vicia americana* subsp. *americana* and subsp. *mexicana* compared with two phenotypes of *V. andicola*, a South American species: *V. americana* subsp. *americana* inflorescence and leaves (X 1), flower (X 2), androecial sheath and style (X 2), stylar hair pattern (X 6); *V. americana* subsp. *mexicana* inflorescence and leaves (X 1), flower (X 2), androecial sheath and style (X 2), stylar hair pattern (X 6); *V. andicola* (broad leaflet) inflorescence and leaves (X 1), flower (X 2), androecial sheath and style (X 2), stylar hair pattern (X 4.5).
A subsp. americana calyces dentibus longe attenuatis essentialiter aequalibus differt. Differs from subspecies americana by possessing long-attenuate calyx teeth of essentially equal length.

*Vicia americana* subsp. *mexicana* is known only from Nuevo León in the Sierra Madre Mountains from Monterrey to the Coahuila border area. In addition to the collection cited here, this subspecies has been collected by Mueller and Mueller 511 (F) in Mesa Canyon; Pringle, 16 June 1888 (MEXU); and Palmer 247, Caracol Mountains at the Coahuila border (US). This subspecies is geographically separated from subspecies *americana*, which is found in the Chihuahua mountains. This is an expected extension of the Arizona and New Mexico population. In Texas, subspecies *americana* occurs no farther south than the Panhandle. A small population of *V. americana* subsp. *americana* found in the States of Mexico and Morelos as well as the Distrito Federal may be a relic of what once was a larger population in Mexico.

10. *Vicia leucophaea* Greene (subgenus *Vicilla*, section *Mediocinctae*)

*Mogollon Vetch* (Fig. 11, Map 5)


Perennial.—Herbaceous vine, up to 8 dm long, drying green, sparsely villous. Trichomes golden to tawny. Leaves pinnately compound, terminating in a simple (seldom ramified) prehensile tendril. Leaflets 6–8, entire, thin to coriaceous, linear to lanceolate to elliptic-oblong (basal leaflets occasionally obovate and truncate), 7–25 by 1–6 mm, apex rounded to acute and mucronulate, base tapered. Stipules inconspicuous, eglandular, entire. Racemes short, with 1–2 closely spaced flowers, shorter than subtending leaf. Calyx less than one-half to one-half standard length, teeth essentially equal straight attenuate, not gibbous at base, green throughout. Corolla whitish to cream color with standard veins and keel tip purple, with standard 7–9 mm long. Androecial sheath oblique. Stigma disc-shaped. Style apex glabrous, style encircled by hairs about midway between stigma and ovary. Ovary appressed-villous, with white hairs. Legume 25–40 by 4–6 mm, straw color to brown, appressed-villous, obscurely reticulate, lanceolate, flattened, obliquely acuminate to almost beaked at both ends, on 0.5 mm stipe, bearing 8–10 ovules, with inner valve surface smooth, twisting tightly during dehiscence. Seed 2–2.6 mm in diameter, subspherical to squarish, smooth, monochrome dull brown or greenish ochre and mottled with dark brown. Hilum brown, oblong, 6 times longer than wide, parallel to length of seed, occupying about 23 percent of seed circumference, with lips of hilar groove color of hilum. Lens black, with raised center about 1 mm from hilum.

Distribution.—*Vicia leucophaea* is a little studied species. Its range is restricted to southeastern Arizona and southwestern New Mexico and south into Mexico through Sonora and Chihuahua into Durango.


*Vicia leucophaea* is the only North American *Vicia* species that I have not grown in a field plot or a greenhouse. Data about its duration are conflicting. From studies of herbarium specimens, the species would seem to be a perennial. This conclusion is based on the appearance of the bases and not on the presence of rhizomes.

Because of the placement of its stylar hairs, *V. leucophaea* is unique among New and Old World *Vicia* species. Its relationship to other New World *Vicia* species needs further study. This unique character was incorrectly recorded by Greene (1881), who said "style very villose at apex." He differentiated *V. leucophaea* from other *Vicia*
Figure 11.—*Vicia leucophaea* drawn from herbarium specimens: A, Habit (× 0.5); B, leaflets (× 3); C, flower (× 3); D, androecial sheath and style (× 4.5); E, stylar hair pattern (× 14); F, mature legume (× 1); G, seeds (× 3).
species by its cream-colored standard changing to purple and its appressed hairs. Watson (1886) correctly described the placement of stylar hairs and recognized its significance by using the character as the source of his species epithet.

Apical stylar hairs hold pollen in juxtaposition to the stigma and thus facilitate fertilization. *Vicia leucophaea* flowers would be expected to be self-pollinated in the bud stage because of the placement of the stylar hairs. They are too low to hold pollen around the stigma when the flower is fully expanded.

Some of the widely distributed *Palmer 378* sheets bear a notation that is unexpected and not verified: "Garbansea grows among grasses and other plants, it is said to be injurious to animals to eat it, has the same reputation at Alvarez, San Luis Potosí." It is unlikely that this note is recorded on the correct specimen for these reasons: (1) The species is not known from San Luis Potosí, (2) *Vicia* species are seldom injurious (poisonous), and (3) it is doubtful that this plant occurs in sufficient numbers to constitute a noticeable range hazard.

11. *Vicia sativa* Linnaeus (subgenus *Vicia*, section *Vicia*)

*(Fig. 12, Map 5)*


*V. notata* Gillibert, Fl. Lituan. 2: 105. 1781.

*V. bacta* Moench, Meth. 148. 1794.

*V. alba* Moench, Meth. 148. 1794.

*V. leucosperma* Moench, Meth. 148. 1794.


*V. cordata* Wulfen ex Hoppe in Sturm, Deutschl. Fl. Heft 32. 1812.


*V. glabra* Schleicher, Cat. Pl. Helv. ed. 4: 37. 1821.

*V. intermedia* Viviani, Fl. Leb. 42, t. 19, f. 1. 1824.


*V. nemoralis* Tenore, Fl. Nap. 5: 118. 1835.

*V. macrocarpa* Bertoloni, Fl. Ital. 7: 511. 1847.

*V. cuneata* Grenier & Godron, Fl. Fr. 1: 459. 1848.


*V. communis* Rouy, Fl. Fr. 5: 208. 1899.

*V. maculata* Rouy in Rouy & Foucard, Fl. Fr. 5: 211. 1900.

**Common Vetch**

**Annual.—Herbaceous vine, up to 1 m long, drying green, glabrescent. Trichomes white. Leaves pinnately compound, terminating in a ramified prehensile tendril. Leaflets 4-18, usually entire (toothed or incised in subspecies *incisa*), thin, linear or lanceolate to oblong or obovate, or elliptic to obcordate, 10-40 by 2-15 mm, apex acute or obtuse to truncate or emarginate and mucronulate, base tapered to slightly rounded. Stipules inconspicuous to somewhat conspicuous, bearing purplish nectary, usually sharply serrate. Racemes subsessile, with 1-2-(3) closely spaced flowers, shorter than subtending leaf. Calyx one-half or less standard length, teeth subequal linear-subulate to lanceolate with lower 3 bearing conspicuous yellowish-brown nectary, not gibbous at base, green throughout. Corolla violet-purple to rarely white, with standard usually 18-30 mm long (8-18 mm long in subspecies *nigra*). Androecial sheath oblique at apex. Stigma globular. Style apex encircled by hairs with abaxial surface bearing elongated hairs forming a brush. Ovary pubescent. Legume (25)-35-80 by 6-12 mm or 4.5-6 mm in subspecies *cordata*, yellowish to brown, rarely white or black (black or nearly so in subspecies *nigra*), rather pubescent, strongly reticulate, linear, compressed to nearly terete, torulose or smooth in subspecies *macrocarpa*, oblique and acute at both ends, stipe absent, bearing 5-13 ovules, with inner valve surface bearing fibrous cross ribs, twisting loosely to tightly during dehiscence. Seed 3.5-6 mm in diameter, subspherical to spherical, sublenticular, lenticular, ovoidal, or cuboidal, smooth, dull pale straw to dark greenish ochre to green, lightly to intensely mottled and pointed with light to dark brown, some so densely mottled as to appear monochrome dark brown to blackish. Hilum generally color of seedcoat, wedge-shaped, 3-4 times longer than wide, parallel
**GENUS VICIA WITH NOTES ABOUT TRIBE VICIEAE**

**Figure 12.** *Vicia sativa* L. subsp. *sativa* drawn from greenhouse-grown plants: A, Habit (× 0.5); B, stipule with nectary patch (× 3); C, leaflets showing shape and apex variation (× 2); D, flower (× 2); E, androecial sheath and style (× 2.5); F, styal hair pattern (× 6); G, immature legume (× 0.5); H, mature legume (× 1); I, seed shape and color variation (from white to nearly black) (× 3).
to length of seed, occupying 14–15 percent of seed circumference, with lips of hilar groove color of hilum. Lens usually blackish or brown to light straw on seeds with light-colored seedcoats, with raised center usually 1 mm from hilum (occasionally about 0.7 mm).

Distribution.—*Vicia sativa* is a widely planted seed and fodder crop in North America. The species has become naturalized in diverse areas of southern Mexico and Guatemala.


Selected Guatemalan specimens examined.—CHIMALTENANGO: Weed in garden, elev. 1,830 m, *Standley 80480* (F). QUEZALTE-NANGO: Oak forest, elev. 2,400 m, *Standley 66469* (F). SAN MARCOS: Moist woods or sandy field above Río Tacaná, elev. 2,700 m, *Standley 66068, 66085, 66131* (F).

The list of synonyms for this species includes only species epithets, and the list is incomplete. The multitude of synonyms at the species level and below is staggering. Six subspecies are keyed and described in "Flora Europaea" (Ball, 1968). This is the best available treatment even though a flowering mature fruiting specimen must be available to use the key. Unfortunately most Mexican and Guatemalan specimens of *V. sativa* were collected in flower and thus the value of the key is limited.

The Ball key is as follows:

1. At least some leaflets toothed or incised

   1. All leaflets entire, or at most crenate-dentate at apex.

2. Plant with underground stems bearing apetalous flowers and white, 1- to 2-seeded legumes

   2. Plant without underground stems.

3. Corolla (8)-10–18 mm; calyx teeth shorter than tube; legume black or very dark brown

   3. Corolla 18–30 mm; calyx teeth as long as or longer than tube; legume yellow brown to dark brown, rarely almost black.

4. Legume 4.5–6 mm wide

   4. Legume 6–11 mm wide.

5. Legume contracted between the seeds, brown or yellow brown; seeds 3.5–6.5 mm

   5. Legume not contracted between the seeds, dark brown or almost black; seeds 5.5–8 mm

Based on the surveyed herbaria, *V. sativa* subsp. *sativa* is the only subspecies found in Mexico and Central America. It is unlikely that subspecies *amphicarpa* (Dorthes) Ascherson & Graebner and subspecies *incisa* (M. Bieberstein) Arcangeli are in Mexico or Central America. Lack of mature legumes and seeds often prevents the correct identification of subspecies *cordata* (Wulfen ex Hoppe) Ascherson & Graebner and subspecies *macrocarpa* (Moris) Arcangeli. Of these two, *cordata* is more frequently found in the United States than *macrocarpa*. Although some of the Guatemalan specimens are labeled *V. angustifolia* Linnaeus, now subspecies *nigra* (Linnaeus) Ehrhart, apparently none is labeled correctly according to flower length or legume color and shape.

Of the five other subspecies, *nigra* is the most likely to be found in Mexico and Central America and is depicted in figure 13. Care should be taken in measuring dried standards to determine whether they are below or above 18 mm in length. They are often allowed to wither before pressing and thus their length is shortened. The legume color and tereteness are the best characters to separate subspecies *sativa* from subspecies *nigra*. Narrow leaflet plants are not necessarily the latter.

Because *V. sativa* is a self-pollinating polymorphic species and often used as a seed crop, numerous forms are named based on different colors, shapes, and sizes of seeds, as well as flower color variation. *Vicia sativa* exhibits more leaflet variation than most *Vicia* species. It is still being studied and bred for special uses. The cultivar Warrior is designed for use in the Southern
FIGURE 13.—Vicia sativa subsp. nigra drawn from greenhouse-grown plants: A, Habit (× 0.5); B, stipule with nectary patch (× 3); C, leaflets (× 2); D, flowers (× 2); E, androecial sheath and style (× 4); F, stylar hair pattern (× 8); G, mature legumes (× 1); H, 2 mottled and 2 black seeds (× 4).
United States and may be of value in Mexico and Central America.

The different subspecies of *V. sativa* hybridize, and crosses made between *V. sativa* and *V. angustifolia* are often cited as one of the few examples of *Vicia* species hybridization. There is a remarkable claim by Moritz and vom Berg (1931) that *V. leganyi* Rapaico & Lengyel arose as a hybrid of *Lens culinaris* and *V. sativa*. This claim is not accepted by most taxonomists.

In southern Mexico and Guatemala, *V. sativa* is known as *alherja* and grown as a seed, forage, or green manure crop. Seeds are planted on dry, well-drained soil and do best in full sunlight. They are often planted in old grainfields or with oats (El Agricultor Mexicano, 1908).

12. *Vicia faba* Linnaeus (subgenus *Vicia*, section *Faba*)

(Fig. 14, Map 5)


*Faba major* Desfontaines, Tabl. ed. 1: 196. 1804.


*Faba minor* Roxburgh, Fl. Ind. 3: 323. 1832.

Annual or biennial.—Erect herb, up to 2 m tall, drying black, glabrous. Leaves pinnately compound, terminating in a cusp. Leaflets 2–6, entire (rarely toothed), fleshy, oval, 3–10 by 1–5 cm, apex rounded and mucronulate, base rounded. Stipules foliaceous, bearing purplish nectary, sharply serrate. Racemes sub sessile, with up to 12 closely spaced flowers, much shorter than subtending leaf. Calyx less than one-half standard length, teeth unequal with 2 upper shortest and poorly developed and 2 lateral and basal deltoid to somewhat attenuate, slight gibbous at base, occasionally partially bluish purple toward apex. Corolla white with faint brown streaks, bearing a large black or deep maroon patch on each wing (wings rarely yellowish brown, reddish, or variegated), with standard 2–3.5 cm long and 15 mm wide. Androecial sheath oblique at apex. Stigma conical on the abaxial side of the style. Style apex with brush of hairs on abaxial surface and scattered short hairs on adaxial surface. Ovary puberulous. Legume 30–200 by 10–30 mm, dark brown to black, glabrous, reticulate, oblong, terete to partially flattened (plump and bulging over seeds), obliquely acuminate at both ends, on a 4–5 mm long stipe, bearing 2–5 ovules, with inner valve surface bearing fibrous cross ribs between seeds, twisting loosely or occasionally rather tightly during dehiscence. Seed variable in size and shape, 7–30 by 6–17 mm, oblong to oval, flattened or terete, smooth, bright reddish brown to light to dark purple and obscurely mottled and pointed with colors similar to the base colors. Hilum blackish to brown, completely or partially covered by scurfy remnants of funiculus, elliptic on smaller seeds, oblong on larger seeds, 3–6 times longer than wide, at right angles to length of seed, occupying about 18 percent of seed circumference, with lips of hilar grooves often white. Lens conspicuous, brown, with raised center 1.3–2 mm from hilum.

Distribution.—*Vicia faba* may not have become naturalized in North or Central America, and its occurrence is probably governed by its cultivation.


Guatemalan specimens examined.—ALTA VERAPAZ: Rarely planted, elev. 1,300 m, *Standley 92166* (F). QUEZALTENANGO:
Figure 14.—*Vicia faba* L. drawn from greenhouse-grown plants: A, Habit (× 0.5); B, stipule with nectary patch (× 2); C, flowers (× 2); D, androecial sheath and style (× 4); E, stylar hair pattern (× 8); F, dying plant with mature legumes (× 0.5); G, seed in legume (× 0.6).
Linnaeus (1735) recognized the Tournefort genus *Faba* in his first reference to this species. However, the binomial *Vicia faba* was used by Linnaeus (1753, p. 737), and this is the legitimate, validly published name for this species in the genus *Vicia*. It is a matter of opinion as to whether *V. faba* is sufficiently different from other *Vicia* species to warrant recognition of the genus *Faba*. The characters that may be used to circumscribe this genus are reliable, but according to most taxonomists they are not of a quality to clearly establish a separate genus. These characters have also been used to place *V. faba* in its own subgenus (*Gray*, 1821, pp. 617–618) or section (Ascherson and Graebner, 1909, pp. 987–989). The major ones are (1) hilum at right angles to length of seed, (2) plant without tendrils (erect) and blackening when drying, and (3) seed without significant concentrations of any of the nonprotein amino acids or related compounds found in most other tested seeds of *Vicia* species (Bell, 1966; Bell and Tirimanna, 1965).

The problem in using these characters to establish the genus *Faba* is that other *Vicia* species also exhibit these characters, except for the basal hilum, which is unique for *V. faba*. *Vicia narbonensis* Linnaeus, often cited as a near relative of *V. faba*, has generally been excluded from the segregate genus *Faba*.

A simple explanation, though not necessarily correct, of why *V. faba* has these unusual characters involves these considerations. Like a few other members of the tribe Vicieae, flowers of *V. faba* are self-pollinated in the bud. Therefore, any viable trait or trend that becomes established may be perpetuated. The introduction of these traits and trends has been increased by the selective influence of man, who has had more effect on this *Vicia* species than most other species. Parallel examples, though lacking the extreme phenotypes, include *V. ervilia*, *V. narbonensis* Linnaeus, and *V. sativa* (including *V. angustifolia*).

Linnaeus (1753, p. 737) mentioned a variant of *V. faba*, “β. *Faba minor f. equina*. Bauh. pin. 338,” which may be recognized by its much smaller terete seeds and legumes. Although the large flat seeds of variety *faba* can be readily separated from seeds of variety *minor*, flowering plants cannot be separated. Fruiting plants may be separated, though not with the ease that seeds can. Between these two extremes are many phenotypes that have been selected by man and perpetuated by self-pollination. Many of them were named by Alefeld (1866, pp. 27–32) and Muratova (1931). A key to these taxa using seed and flower characters may be found in Guinea (1953, pp. 75–79), who cited Gams (1924) as the source of his data. A complicated codification of subspecific taxa (Hanelt, 1972) may be biologically sound but will be difficult for laymen to use. The holotype of *V. faba* var. *faba* is LINN 906.34, and the neotype of *V. faba* var. *minor* (Petermann) Beck is Westphal 445, collected in Ethiopia (Westphal, 1974, pp. 205–213). Although I have found no record of variety *minor* in Mexico or Central America, it likely has been planted as a seed crop.

*Vicia faba* var. *faba* is a widespread Mediterranean seed crop plant, known as *haba* in Mexico and Central America, but it has not become naturalized in these countries. Because *haba* seldom sets seeds in warm regions, plants are usually cultivated in the Tropics at an elevation of 2,000 meters or more. Most *haba* seeds are produced in southern Mexico and northern Guatemala. According to Berlin, Breedlove, and Raven (1974), the Mayan-speaking people of the Chiapas highlands intercrop *Vicia faba* var. *faba* and *Zea mays* Linnaeus. The seeds are used as green shell and dry beans to feed man and livestock. In Central America, *haba* is commonly cultivated in the Guatemalan highlands, where it is an important source of food.

Standley and Steyermark (1946) estimated that over 4 million pounds of seed are produced annually in the Departments of Alta Verapaz, Chimaltenango, Quetzaltenango, San Marcos, Suchitepéquez, and Totonicapán. Most seeds are roasted and used like seeds of *Arachis hypogaea* Linnaeus (peanut) even though they are much harder to chew than the latter. Although seeds are eaten by most individuals without any danger, raw or cooked seeds may cause severe hemolytic anemia in some individuals 2 to 3 days after consumption. This condition, known as “favism,” is an inherited trait characterized by a deficiency of glucose-6-phosphate dehydrogenase. About 10–15 percent of the Black race and about 1 percent of Caucasians of Greek and Italian origin have this deficiency (Hardin and Arena, 1974, pp. 88–89).
EXCLUDED SPECIES

*Vicia pedunculata* Peyritsch, Linn. 30: 80. 1859-60.
TYPE: MEXICO: HOLOTYPE: Heller 374, Mexico (location unknown). Peyritsch has described a *Vicia* or vetchlike plant. His description is too general to be useful.

*Vicia reverchonii* S. Watson. A sheet deposited at ARIZ is correctly labeled *V. reverchonii*, but it bears this legend: *J. Reverchon, 1881, Mexico*. There is no collateral evidence that this species is found in Mexico. *V. reverchonii* has been collected only from Dallas, Tex., and Wewoka, Okla., (both localities between 96° and 97° longitude). Even if *V. reverchonii* is considered an element of the more widespread species, *V. minutiflora* Dietrich, the taxon should remain excluded from Mexico. The southernmost collection of *V. minutiflora* is around Galveston Bay, Tex.

TYPE: UNKNOWN. Based on their description, the authors described a species of *Galactia*.

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GENUS Vicia
WITH NOTES ABOUT TRIBE VICIEAE

- *Vicia hassei*
- ▼ V. ludoviciana subsp. ludoviciana phase exigua
- ● V. ludoviciana subsp. ludoviciana phase laxiflora
- ▲ V. ludoviciana subsp. ludoviciana phase producta

MAP 3