

COMMELINACEAE

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A family of herbaceous, generally succulent plants with a predominantly tropical distribution, but extending into the temperate zones of North and South America. Growth-forms are variable, most commonly erect or prostrate herbs, however, twining and scrambling vines are known for *Dichorisandra*, *Elasis*, and *Siderasis*. Accidental climbers are also observed in *Callisia*, *Commelina* and *Tradescantia*, mostly in overcrowded and shaded situations. The climbing growth-form has evolved independently several times in the family, being recorded in distantly-related genera. Out of the ~300 species of Commelinaceae in the Neotropics, only ~8 are climbers, most of which belong to the genus *Dichorisandra*. Most neotropical climbers occur in the humid lowlands of South America, either in the Amazon or Atlantic Forest. Two species are found in Mexico and Central America.

Diagnosics: Stems succulent, nodes generally swollen, leaf-sheaths closed and tubular; inflorescences thyrsoid, sometimes subtended by a spathaceous basal bract, flowers ephemeral with deliquescent petals, petals generally showy, ranging from white to pink to purple to blue; capsules dehiscent (in the climbing genera); seeds arillate in *Dichorisandra* and *Siderasis*, or exarillate in *Elasis*, commonly with a conspicuous embryotega (i.e., calyptra).

General Characters

1. ROOTS. Fibrous or tuberous (Figure 19). Fibrous roots are usually densely branched, while tuberous roots are unbranched or poorly branched. Tuberous roots in the climbing genera can be of three types: (1) spindle-shaped or cylindrical, in which the root is more or less evenly thickened throughout; (2) enlarged and napiform at the base and distally fibrous (Figure 19A); or (3) fibrous at the base and distally enlarged into a fusiform or ellipsoid tuber (Figure

19B, C).

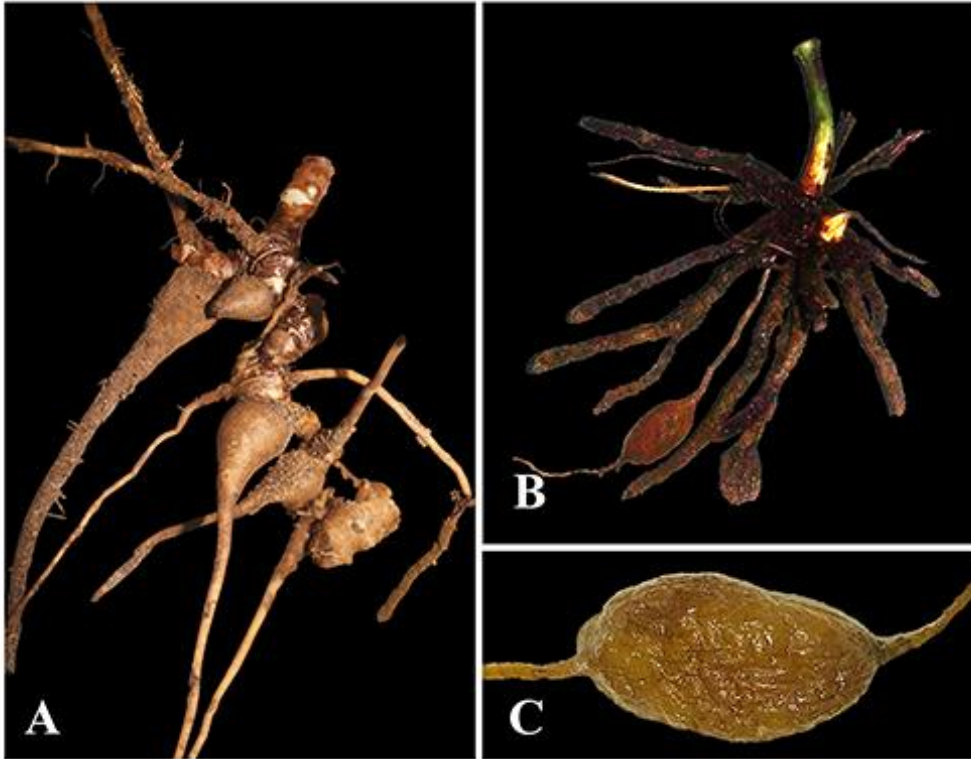


Figure 19. Tuberous roots in *Dichorisandra*. **A.** Tuberous roots in *D. thyrsiflora*, showing a napiform base. **B.** Tuberous roots in *D. ulei* showing ellipsoid apex. **C.** Ellipsoid tuberous root in *D. radicalis*. Photos: A by M.O.O. Pellegrini; B by M. Paulo; C by R.S.B. Vita.

2. **STEMS.** Herbaceous, cylindrical, 0.5 to 1 cm in diameter and up to 3(5) m in length. Internodes consistently elongated in most climbing species; nodes are generally conspicuously swollen.
3. **EXUDATES.** Hyaline and odorless in all genera, except for *Dichorisandra*, where several species are known to have foul-smelling exudates. These exudates are initially colorless but become yellow or brown upon oxidation.
4. **CLIMBING MECHANISMS.** Most climbing Commelinaceae are scramblers and sometimes twiners (e.g., *Dichorisandra* and *Siderasis*).

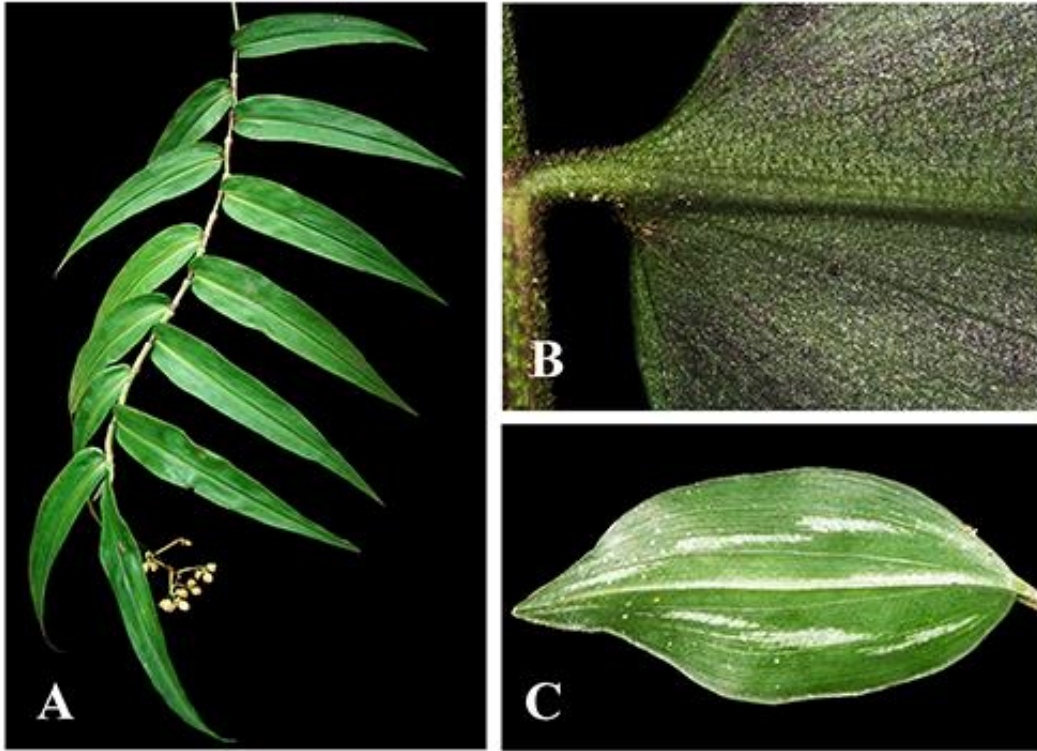


Figure 20. Leaves in *Dichorisandra*. **A.** Evenly distributed and asymmetrical in *D. incurva*. **B.** Pseudo-petiole in *D. hexandra*. **C.** Symmetrical leaf-blade with longitudinal silver stripes in *D. hexandra*. Photos: A by M.S. Wängler; B, C by M.O.O. Pellegrini.

5. LEAVES. Simple, alternate (distichous or spiral), evenly distributed along the stem (Figure 20A). Blades symmetrical (Figure 20C) or asymmetrical (Figure 20A, B), generally sessile, but sometimes with a petiole-like constriction at the base (i.e., pseudo-petiole; Figure 20B).
6. INFLORESCENCES. Axillary or terminal (Figure 21A) thyrses with flowers grouped in cincinni; sometimes forming a synflorescence. Basal bract or prophyll leaf-like, spathaceous, or extremely reduced and tubular; peduncle and main axis developed or not; cincinni alternate (Figure 21A, B) or fasciculate (Figure 21D). Bracts in *Dichorisandra*, *Elasis* and *Siderasis* are small (Figure 21A–D).

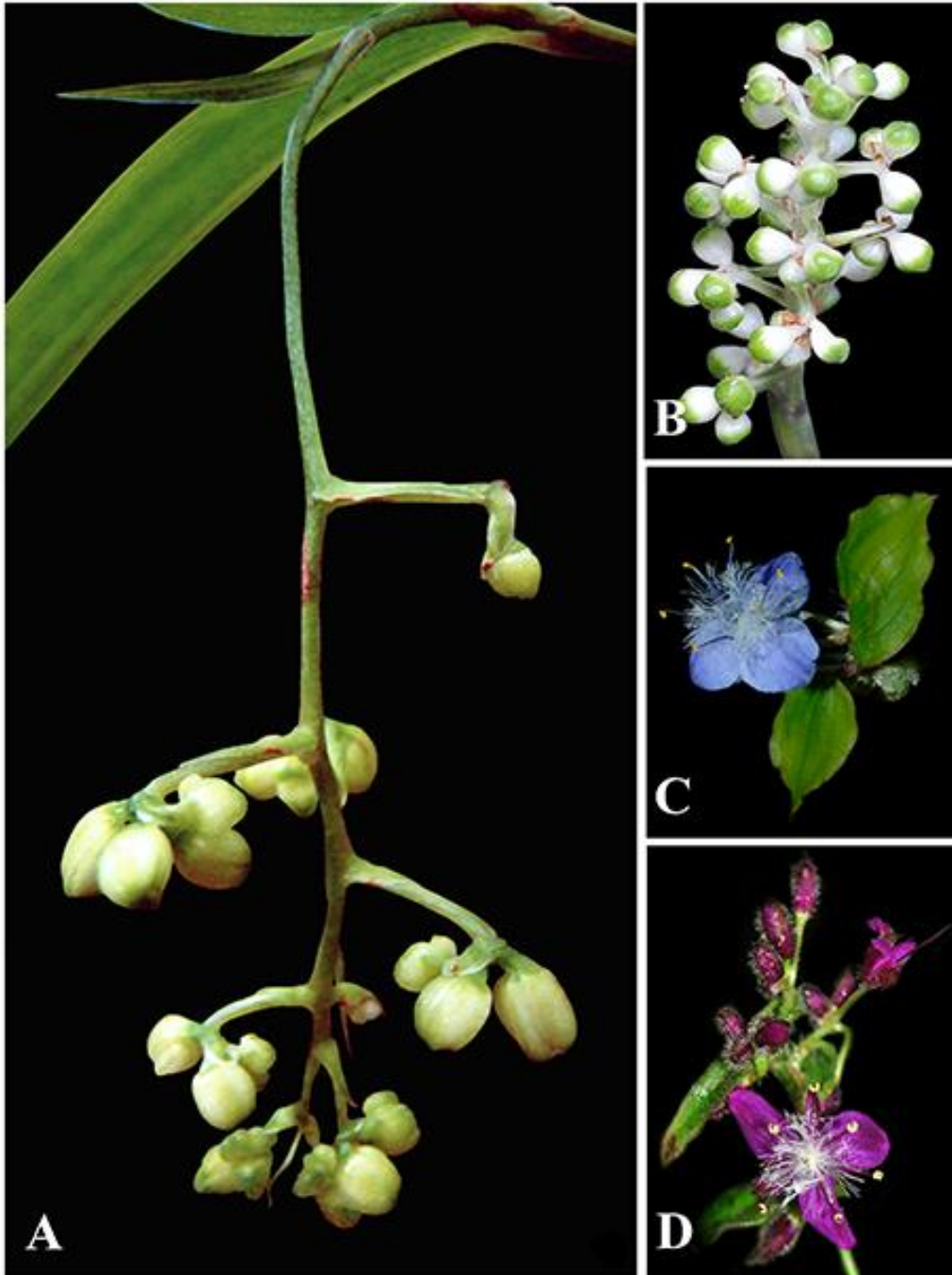


Figure 21. Inflorescences in climbing Commelinaceae. **A.** Pendulous thyrsoid inflorescence in *Dichorisandra incurva*. **B.** Thyrsoid in *Siderasis zorzanellii*, with basal bract and alternate cincinni. **C.** Reduced to a fasciculate cincinni, partially enclosed by two leaves in *Elasis guatemalensis*. **D.** *Elasis hirsuta*, with terminal and lateral inflorescences reduced to fasciculate cincinni. Photos: A by M.S. Wängler; B by J.P.F. Zorzanelli; C by C. Willemsen; D by J. Brito.

7. FLOWERS. Bisexual or occasionally functionally staminate, zygomorphic in *Dichorisandra*

(Figure 22A–D), and *Siderasis* (Figure 22G, H); or actinomorphic in *Elasis* (Figure 22E, F).

Sepals generally free. Petals free in all climbing species of Commelinaceae, very delicate and sometimes deliquescent at post-anthesis, ranging from white to shades of pink and purple or blue. Nectaries absent. Stamens highly variable: 6 fertile and equal in *Elasis* (Figure 22E, F); 5–6 fertile and unequal in *Dichorisandra* (Figure 22A–D) and *Siderasis* (Figure 22G, H); filaments glabrous (Figure 22A–D, G, H) or barbate with moniliform hairs (Figure 22E, F); anthers generally rimose, poricidal in *Dichorisandra*. Ovary superior, 3-carpellate; style elongated; stigma truncate, capitellate, trilobate or conspicuously capitate.

8. FRUITS. Loculicidal capsules, crustose, bright-colored, imitating berries to attract dispersers (most likely birds). The overall fruit morphology is taxonomically relevant for *Dichorisandra*, *Elasis*, and *Siderasis*. In *Dichorisandra*, the shape, ornamentation, and coloration can help differentiate closely-related species, such as in the *D. hexandra* (Figure 23A, B, D) and *D. thyrsoflora* species groups.
9. SEEDS. Small, variously shaped and ornamented, commonly with an embryotega, a conspicuous hilum and accessory tissues such as arils, lateral appendages, or farinose deposits covering the testa. Arils can be inconspicuous or thick, opaque or translucent, and either colorless or brightly-colored (Figure 23D). Lateral appendages are generally fleshy and tan, while the farinose granules are most commonly white or light-colored. The ornamentation of the testa is variable and can help differentiate species or groups of species. The embryotega is dorsal in *Elasis*, ranging from semi lateral to semi dorsal in *Dichorisandra* and *Siderasis* (Figure 23E). The hilum is C-shaped (Figure 23E), linear, elliptic, or punctate.

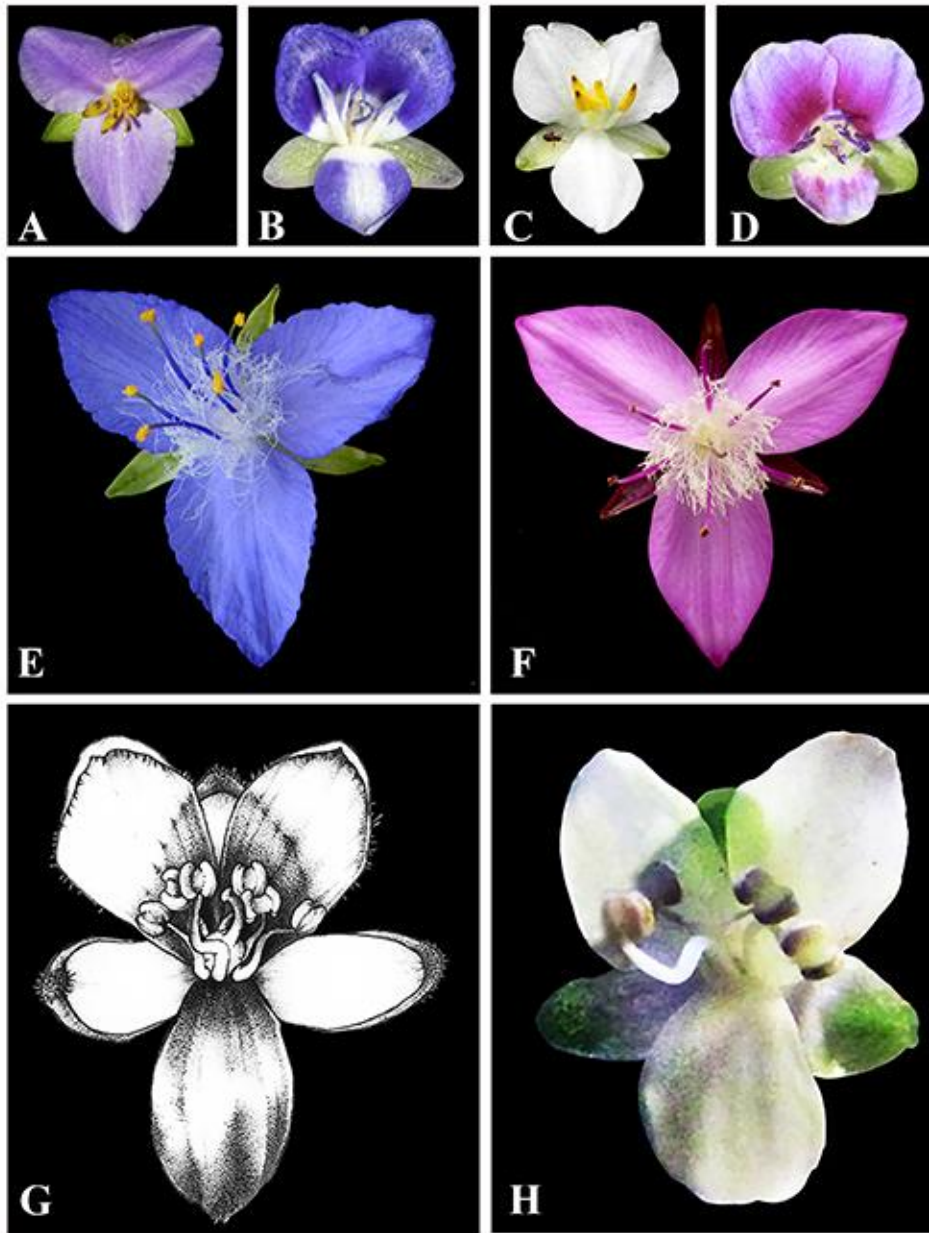


Figure 22. Flowers. **A.** *Dichorisandra glabrescens*. **B.** *Dichorisandra hexandra*. **C.** *Dichorisandra incurva*. **D.** *Dichorisandra ulei*. **E.** *Elasis guatemalensis*. **F.** *Elasis hirsuta*. **G.** *Siderasis spectabilis*. **H.** *Siderasis zorzanellii*. Photos: A by C.N. Fraga; D, G by M.O.O. Pellegrini; C by G. Shimizu; D by H. Medeiros; E by P. Acevedo; F by A. Kay; H by J.P.F. Zorzanelli.

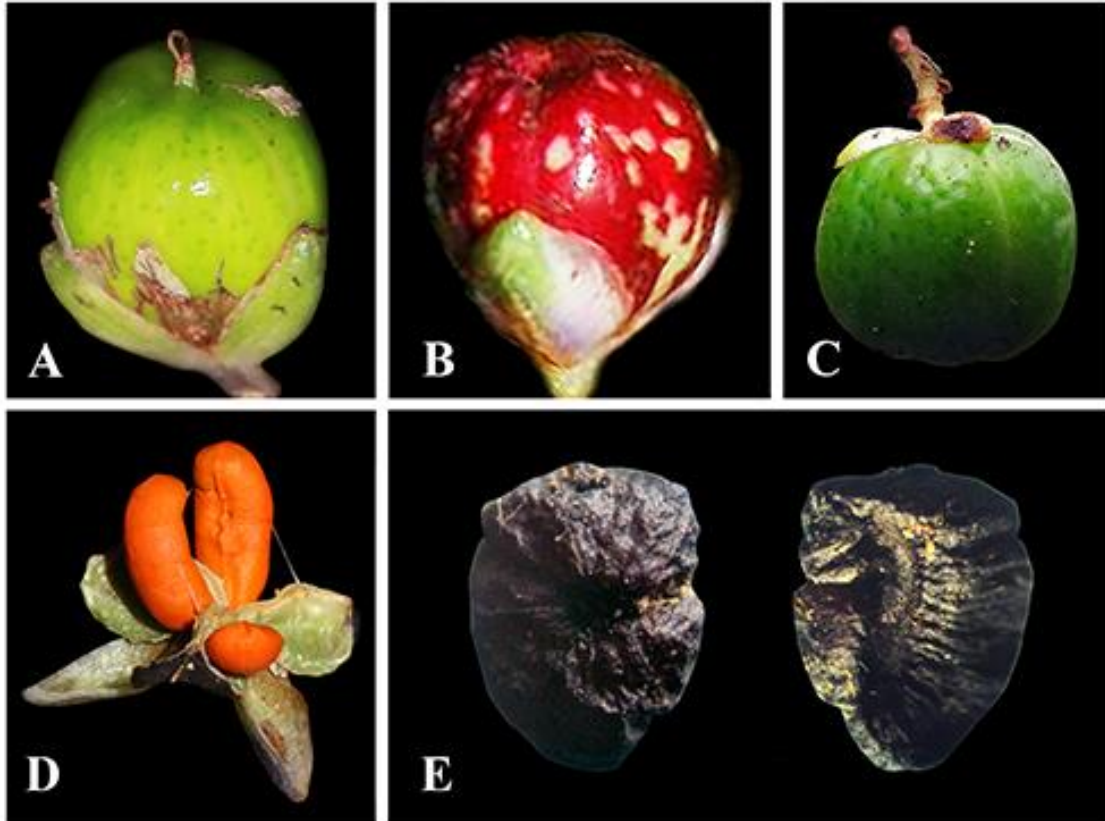


Figure 23. Fruits and seeds. A. Fruit in *Dichorisandra ulei*. B. Fruit in *Dichorisandra villosula*. C. Fruit in *Siderasis zorzanellii*. D. Dehisced fruit in *Dichorisandra hexandra*, showing seeds covered by an orange aril. E. Seeds in *Siderasis zorzanellii* with the aril removed, showing the semidorsal embryotege and the C-shaped hilum. Photos: A by H. Medeiros; B, D by M.O.O. Pellegrini; C, E by J.P.F. Zorzanelli.

USES

The tuberous roots of *Dichorisandra hexandra* (Aubl.) C.B. Clarke are used in Panama's traditional medicine to treat body ache, urinary infections, colds, diarrhea, and snake bites (Caballero-George & Gupta 2011). The aerial parts of *Dichorisandra* are very mucilaginous and therefore, are generally used for poulticing wounds and skin infections such as boils and ulcers, and also to promote suppuration (Odonne et al. 2013). The sap of the crushed aerial plant organs is applied directly over the skin to treat warts or in the eyes to treat inflammation. The leaves of several species of Commelinaceae are also used to reduce swellings (Dash et al 2017). The

tuberous roots of *Dichorisandra* are starchy and are occasionally consumed by people.

Numerous species of Commelinaceae are used as ornamentals worldwide, especially members of *Aneilema*, *Callisia*, *Commelina*, *Gibasis*, *Dichorisandra*, *Siderasis*, *Tinantia*, and *Tradescantia*, generally grown for their showy leaves and flowers. (Tucker 1989; Simpson 2010).

Key to the genera of climbing Commelinaceae

1. Inflorescence basal bract reduced and tubular; cincinni fasciculate or subopposite; filaments (at least the inner whorl) barbate; capsules thin-walled; seeds exarillate, embryotega dorsal*Elasis*
1. Inflorescence basal bract foliaceous; cincinni alternate; filaments glabrous; capsules thick-walled; seeds arillate, embryotega semi lateral or semi dorsal.....2
2. Stamens 5–6, anthers basifixed, anther sacs parallel, elongate, 3–4 times longer than the filaments, connectives inconspicuous, dehiscence poricidal or introrsely rimose (functionally poricidal)*Dichorisandra*
2. Stamens 6, anthers dorsifixed, anther sacs divergent, semicircular, 3–4 times shorter than the filaments, connectives expanded, dehiscence extrorsely rimose*Siderasis*

Identification of genera based on vegetative characters

The genera of Commelinaceae are circumscribed by their inflorescence, flower, and seed morphology. Vegetatively, the genera are very similar and difficult to differentiate. However, the following generalities can be useful in distinguishing the genera with a certain degree of confidence:

1. *Tuberous roots* (Figure 19). These are present in all climbing species of *Dichorisandra* and

Siderasis. They are always fibrous with a tuber-shaped apex (except for the non-climbing *S. almeidae* M. Pell. & Faden).

2. *Foul-smelling exudate*. So far, this feature has only been observed in *Dichorisandra*.
3. *Dimorphic branches*. The occurrence of this character is restricted to both climbing species of *Siderasis*.
4. *Epidermal cells of the leaves with domed outer walls*. In the leaves of all genera placed in tribe Tradescantieae, the outer epidermal wall has convex thickenings that seem associated with improving the plant's light absorption. These thickenings give the leaves a distinctive glittery aspect.
5. *Longitudinal silver stripes in the leaves* (Figure 20C). Such stripes represent bands of aerenchymatous tissue that serve to increase the absorption of light in shaded environments. However, these stripes seem to be genetically and ecologically controlled and are not constant within a population or throughout the plant's life. It is commonly observed in young individuals of *Dichorisandra* and *Siderasis* but has never been recorded for *Elasis*.

DICHORISANDRA J.C. Mikan, Del. Fl. Faun. Bras. t. 3. 1820 (nom. cons.).

Erect herbs, sometimes scrambling or twining herbaceous vines; Roots fibrous with an



Dichorisandra hexandra, photo by M. Pellegrini.

enlarged and tuber-shaped apex. Rhizome present, short or elongate. Stems commonly herbaceous, cylindrical, reaching ~1 cm in diam. and > 5 m long in *D. incurva* Schult. f. Leaves distichously- or spirally-alternate, pseudo-petiole present or not, blades symmetric or asymmetric. Main florescence terminal or axillary, rarely basal, pedunculate or not; basal bract leaf-like or small; main axis conspicuous or not; cincinni many, alternate, free; cincinnus bract small; bracteoles scarious. Flowers bisexual or staminate, actinomorphic or zygomorphic, chasmogamous;

pedicel erect at post-anthesis; sepals 3, equal or unequal, free, green, white, pink or purple; petals 3, equal or unequal, free, sessile, pinkish purple to purple to bluish purple, basal third white, sometimes completely white, light blue or lilac; stamens 5–6, equal or unequal, filaments straight or twisted, glabrous, anthers poricidal or introrsely rimose (but functionally poricidal), staminodes 0(–1), superior, filament straight, glabrous, antherode absent; ovary 3-carpellate, locules equal, 4–6 ovules per locule, style elongate, straight or curved, stigma truncate, capitellate or trilobate. Capsules loculicidal, dehiscent, thick-walled, bright-colored. Seeds elliptic to reniform, testa covered by an aril, aril thin or thick, hyaline or opaque, colorless, white or orange; embryotega semi dorsal, conspicuous; hilum C-shaped.

Distinctive features: Petals pinkish purple to purple to bluish purple with their basal third white, filaments stout, anthers 3–4 times longer than the filaments, basifixed, poricidal or introrsely rimose (but functionally poricidal); capsules thick-walled; seeds arillate.

Distribution: A neotropical genus of ~60 species (many still undescribed), of which *Dichorisandra musaica* K. Koch & Linden, *D. glabrescens* (Seub.) Aona & M. C. E. Amaral, *D. ulei* J. F. Macbr., and *D. villosula* Mart. are occasionally reported as leaning, climbing or twining vines but most collections describe them as erect herbs. *Dichorisandra incurva* Mart. and the widely distributed *D. hexandra* (Aubl.) Standl. are consistently recorded as scrambling or twining vines sometimes reaching 5 or more m in length. Mexico to Argentina but centered in the Atlantic Forest domain of Brazil.

ELASIS D.R. Hunt, Kew Bull. 33: 332. 1978.

Herbaceous erect, scrambling or twining vines, rarely prostrate herbs. Roots fibrous.



Elasis hirsuta, photo by Degailhampshire from Cradley, Malvern UK.

Rhizome absent. Leaves distichously-alternate, pseudo-petioled or sessile, blades asymmetric. Main inflorescence axillary or terminal, sessile or nearly so; basal bract reduced and tubular; main axis inconspicuous; cincinni 1–4, fasciculate, free; cincinnus subtended by a small bract; bracteoles ovate to triangular, hyaline. Flowers bisexual, actinomorphic, chasmogamous; pedicel deflexed at post-anthesis; sepals 3, equal, free, purple or

hyaline; petals 3, equal, free, sessile, white, sometimes blue or pink to purple; stamens 6, equal,

filaments straight, barbate with moniliform hairs, anthers rimose; ovary 3-carpellate, locules equal, two ovules per locule, style elongate, straight, stigma truncate or capitate. Capsules loculicidal, dehiscent, thin-walled, dull-colored. Seeds elliptic to reniform, testa farinose; embryotega dorsal, conspicuous; hilum linear.

Distinctive features: Inflorescences with 1–4, fasciculate cincinni; stamens 6, with anthers inserted at an oblique angle pointing outwards from the flower axis.

Distribution: A neotropical genus of five species of which *Elasis hirsuta* (Kunth) D.R. Hunt from Ecuador occasionally grows as a scrambling vine up to 5 m in length. Mexico to northern South America.

SIDERASIS Rafinesque, Fl. Tellur. 3: 67. 1837.

Erect or prostrate herbs, sometimes herbaceous twining vines. Roots fibrous with an



Siderasis zorzanellii, photo by J.P.F. Zorzanelli.

enlarged and tuber-shaped apex. Rhizome elongate. Stems

cylindrical, 5–7 mm in diam and up to 5 m long in *S.*

zorzanellii M. Pell. & Faden. Leaves distichously- or

spirally-alternate, pseudo-petioled or sessile, blades

symmetric or asymmetric. Main florescence terminal or

axillary, pedunculate; basal bract small; main axis

conspicuous or not; cincinni 1–many, alternate, free;

cincinnus bract small; bracteoles scarious, rarely absent.

Flowers bisexual or staminate, actinomorphic or

zygomorphic, chasmogamous; pedicel erect at post-

anthesis; sepals 3, equal or unequal, free, green, white, pink

or purple; petals 3, equal or unequal, free, sessile, purple to bluish purple, rarely white or vinaceous; stamens 6, equal or unequal, filaments straight or sigmoid, glabrous, anthers rimose; ovary 3-carpellate, locules equal, 4–6 ovules per locule, style elongate, straight or curved, stigma truncate or capitellate. Capsules loculicidal, dehiscent, thick-walled, bright-colored. Seeds elliptic to reniform, testa covered by an aril, aril thin or thick, hyaline or semi-hyaline, colorless or white; embryotega semi lateral or semi dorsal, conspicuous; hilum C-shaped.

Distinctive features: *Siderasis* is unique within the family because of its dimorphic stems. The primary stem is leafless, has indeterminate growth and climbs by twining around the phorophyte while secondary stems are leafy, spread away from the phorophyte and have determinate growth with a distal inflorescence. Filaments stout, anthers dorsifixed, anther sacs C-shaped, 3–4 times shorter than the filaments, connectives expanded, dehiscence rimose; capsules thick-walled; seeds arillate.

Distribution: A neotropical genus of six species, with only two species (i.e., *S. zorzanellii* from Espírito Santo & *S. spectabilis* M. Pell. & Faden from Rio de Janeiro) growing as twining vines. Endemic to the coastal Atlantic Rainforest of Brazil.