

MATERIALS TOWARDS A MONOCOT FLORA OF ASSAM-IV
(PONTEDERIACEAE, XYRIDACEAE & COMMELINACEAE)

A. S. RAO AND D. M. VERMA*

Botanical Survey of India, Dehra Dun

ABSTRACT

In continuation to the previous publications on the Monocot Flora of Assam, this paper deals with the families *Pontederiaceae*, *Xyridaceae* and *Commelinaceae*.

Pontederiaceae Kunth in H. B. K. Nov. Gen. Sp. 1: ed. fol. 211; ed. qu. 265. 1816 ('*Pontedereae*').

Perennial, aquatic or marsh herbs; stems and petioles with numerous air-chambers. *Leaves* submerged, floating or emersed, rosulate, alternate or solitary, curvi-nerved, sheathing at the base. *Inflorescence* spicate, racemose, sub-umbellate or paniculate, subtended by 1-2 spathaceous or tubular leaf-sheaths; floral bracts minute or absent. *Flowers* bisexual, actinomorphic or zygo-

morphic, ephemeral; perianth-lobes 6, sub-biseriate, marcescent; stamens 6 or 3 (rarely 1), inserted on the base of the perianth, sometimes unequal; anthers 2-celled; ovary superior, 3-celled with axile placentas or 1-celled with 3 parietal placentas; ovules numerous; style 1, slender, entire or minutely lobed. *Fruit* a membranaceous, 3-valved, loculicidally dehiscent capsule (or indehiscent); seeds longitudinally ribbed; endosperm copious, mealy.

1a. Petioles not swollen. Flowers pedicelled, actinomorphic

... *Monochoria*-1.

1b. Most of the petioles swollen to form bulbous floats. Flowers sessile, zygomorphic

... *Eichhornia*-2.

1. **Monochoria** Presl, Rel. Haenk. 1: 127. 1827.

Rootstocks spongy, short and oblique, or creeping. *Leaf* solitary, terminal, with its erect petiole appearing as though the continuation of the stem. *Inflorescence* shortly peduncled, racemose or sub-umbellate, partly hidden within the leaf-sheath when young, then bursting forth, and ultimately deflexed. *Flowers* actinomorphic; perianth

lobes cohering only at the base, inner rather larger; stamens 6, filaments glabrous, five of them subequal and with small yellow anthers, filament of the sixth rather longer, mostly provided with a lateral obliquely erect tooth, with larger, blue anther; anthers basi-fixed; ovary 3-celled, placentas axile. *Capsules* ellipsoid, 8-10 mm long; seeds oblong, ca 1 mm long, brown, ca 10-ribbed.

1a. Leaves ovate, usually sagittate or hastate, sometimes cordate at the base; basal lobes narrowed to an acute tip. Flowers successively opening in groups; inner perianth-lobes 15-18 mm long

... *M. hastata*-1.

1b. Leaves oblong-lanceolate or ovate, usually rounded or truncate, sometimes cordate at the base; basal lobes, if present, broadly rounded. Flowers almost simultaneously opening; inner perianth-lobes 10-15 mm long

... *M. vaginalis*-2.

1. **M. hastata** (L.) Solms in A. DC. Mon. Phan. 4: 523. 1883. *Pontederia hastata*

L. Sp. Pl. 288. 1753. *M. hastaeifolia* Presl, Rel. Haenk. 1: 128. 1827.

*Present address: Botanical Survey of India, Allahabad.



Pontederiaceae. Figs. 1-3 : 1. *Monochoria hastata* (L.) Solms. 2. *M. vaginalis* (Burm. f.) Presl. 3. *Eichhornia crassipes* (Mart.) Solms.

Perennial, usually robust herbs, 2-10 dm high. *Rootstocks* of older plants branched, creeping. *Leaves* 7.25 × 4-20 cm; basal lobes divergent. *Inflorescence* 4-7 cm long, 12-60-flowered; upper leaf-sheaths oblong-lanceolate, subcaudate, 3.5 × 1.5-3 cm; pedicels 1.5-4.5 cm long. *Perianth-lobes* pale blue with a greenish median vein, outer oblong, 10-15 × 3.5 mm, inner obovate, 15-18 × 10-13 mm; filaments subequal, white, *ca* 5 mm long, five of the anthers usually 3-4 mm long, but very often upto 5 mm long, the sixth 6-7 mm long; style *ca* 6 mm long.

Fls.: Feb.-Sept.; *frts.*: Oct.-Nov. Common in shallow water and mud, especially in and around paddy-fields; 100-1200 m. The above ground parts are sometimes eaten as greens.

ARUNACHAL PRADESH: Kameng; Tirap. ASSAM: Cachar; Darrang; Goalpara; Kamrup; Lakhimpur; Mikir hills; Sibsagar. MANIPUR. MEGHALAYA: Garo hills; K. & J. hills.

2. *M. vaginalis* (Burm. f.) Presl, Rel. Haenk. 1: 128. 1827. *Pontederia vaginalis* Burm. f. Fl. Ind. 80. 1768. *M. vaginalis* var. *plantaginea* (Roxb.) Solms in A. DC. Mon. Phan. 4: 524. 1883. *P. plantaginea* Roxb. Fl. Ind. 2: 123. 1832.

Perennial, rather slender herbs, 0.5-5 dm high. *Rootstocks* usually short, suberect or oblique. *Leaves* 1.5-12 × 1-7(-10) cm. *Inflorescence* 2-5 cm long, 2-25-flowered; upper leaf-sheath oblong-lanceolate, 2-5 cm long; pedicels 0.2-3 cm long. *Perianth lobes* dark blue or blue-violet with a green median vein, outer oblong, 8-11 × 2-3 mm, inner obovate, 10-15 × 7-10 mm; filaments subequal, 4-5 mm long, five of the anthers 2-3 mm long, the sixth 3-4 mm long; styles 4-5 mm long.

Fls. & frts.: May-Sept. Common in shallow water and mud, along streams, drains and paddy-fields; 200-1600 m. The above ground parts are sometimes eaten as greens.

ARUNACHAL PRADESH: Kameng; Subansiri. ASSAM: Darrang; Goalpara; Sibsagar. MANIPUR. MEGHALAYA: K. & J. hills. NAGALAND. TRIPURA.

2. *Eichhornia* Kunth, Enum. Pl. 4: 129. 1843, *nom. cons.*

E. crassipes (Mart.) Solms in A. DC. Mon. Phan. 4: 527. 1883. *Pontederia crassipes* Mart. Nov. Gen. Sp. Pl. 9. t. 4. 1823. *E. speciosa* Kunth, l.c.

Perennial stoloniferous herbs, 1.5-5 dm high, with large bunches of purplish roots, floating, or rooting in mud. *Leaves* rosulate, emersed, broadly ovate or rhomboid, subcordate or rounded at the base, broadly obtuse at the apex, 3-25 cm long and equally broad; petioles spongy, swollen, upto 30 cm long. *Inflorescence* spiciform, peduncled, lower sheath long with a small lamina, upper short, tubular; rachis 3-13 cm long, 3-35-flowered. *Flowers* almost simultaneously opening; perianth tube 15-20 mm long, greenish; lobes ovate-oblong or obovate, lilac, posterior with a bright yellow, blue-bordered median blotch, *ca* 3 cm long, more forward placed lobes gradually smaller; stamens 6, curved, inserted near the throat of the corolla; filaments glandular hairy, 3 posterior ones longer than the 3 anterior ones; anthers *ca* 2 mm long. *Capsules* linear-oblong; seeds ovoid.

Fls.: Throughout the year. A serious pest, choking the ponds with its prolific growth, also in slow moving streams, throughout the plains.

It is a native of Brazil, and probably first introduced into south-east Asia as an ornamental plant, and now widely spread. In Malaya, and now in Assam, the plant is used as a manure and for fattening pigs; young leaves, petioles and inflorescence are also sometimes eaten as greens.

ASSAM: Darrang; Kamrup; Lakhimpur; Nowgong.

Xyridaceae C. A. Agardh, Aphor. 158. 1823 ('*Xyrideae*').

Perennial, tufted, marsh herbs. *Rootstocks* short. *Leaves* clustered at the base, biseriate, linear, sheathing; sheaths often producing mucilage. *Inflorescence* a solitary, terminal, ellipsoid or ovoid-globose head; peduncles terete or compressed; bracts rigid, persistent, spirally imbricating, lower empty, upper enclosing a solitary flower, entire, ciliate, fimbriate or lacerate with one complete median nerve and few complete or incomplete lateral, descending nerves. *Flowers* small, bisexual, slightly zygomorphic, white or yellow, ephemeral; sepals 3, unequal, lateral two navicular, median (anterior) broader and membranaceous, and clawed with a cucullate apex forming a hood over

the corolla, and ultimately with the growth of the corolla, pushed away and caducous; petals 3, obovate, dentate, clawed, cohering only near the junction of the blade and the claw by means of hairy staminodes; stamens 3, opposite the petals; anthers 2-celled, dehiscing by longitudinal slits; staminodes 3 (or absent), filiform, bifid, clothed with long articulate hairs; ovary superior, sessile or stipitate, 1- or imperfectly to perfectly 3-celled, placentas basal, parietal or central, ovules numerous; style slender, 3-fid; stigmas usually capitate. *Capsules* 3-valved; seeds oblong-ellipsoid, longitudinally ribbed.

Xyris L. Sp. Pl. 42. 1753 et Gen. Pl. ed. 5. 59. 1754. Genus characters as in the family.

- 1a. Bracts brown, most of them with a prominent, ovate-triangular, greyish-green, papillate blotch at the tip ... *X. pauciflora*-4.
- 1b. Bracts all brown or blackish, lacking the blotch described above.
 - 2a. Slender herbs, 6-20 cm high. Leaves, at least some, about two-thirds to as long as the peduncle. Bracts oblong-lanceolate, 4.5 × 1-1.7 mm ... *X. wallichii*-2.
 - 2b. Rather stout herbs, 10-80 cm high. Leaves about one-fourth to one-half as long as the peduncle, or even shorter. Bracts obovate-oblong or orbicular, 4.9 × 3-7 mm.
 - 3a. Peduncles, in the upper half, with 6-8 rather strong longitudinal ribs; bracts not or scarcely keeled, brown. Keel of the lateral sepals apically serrate-dentate ... *X. indica*-1.
 - 3b. Peduncles of living plants with only a single, rather strong, longitudinal rib, of the dried specimens with several feeble nerves; bracts prominently keeled, chest-nut brown to blackish. Keel of the lateral sepals entire ... *X. capensis* var. *schoenoides*-3.

1. **X. indica** L. Sp. Pl. 62. 1753; van Royan in Fl. Males. ser. I. vol. 4:373. 1953. *X. robusta* Mart. in Wall. Pl. Asiat. Rar. 3: 30. 1832.

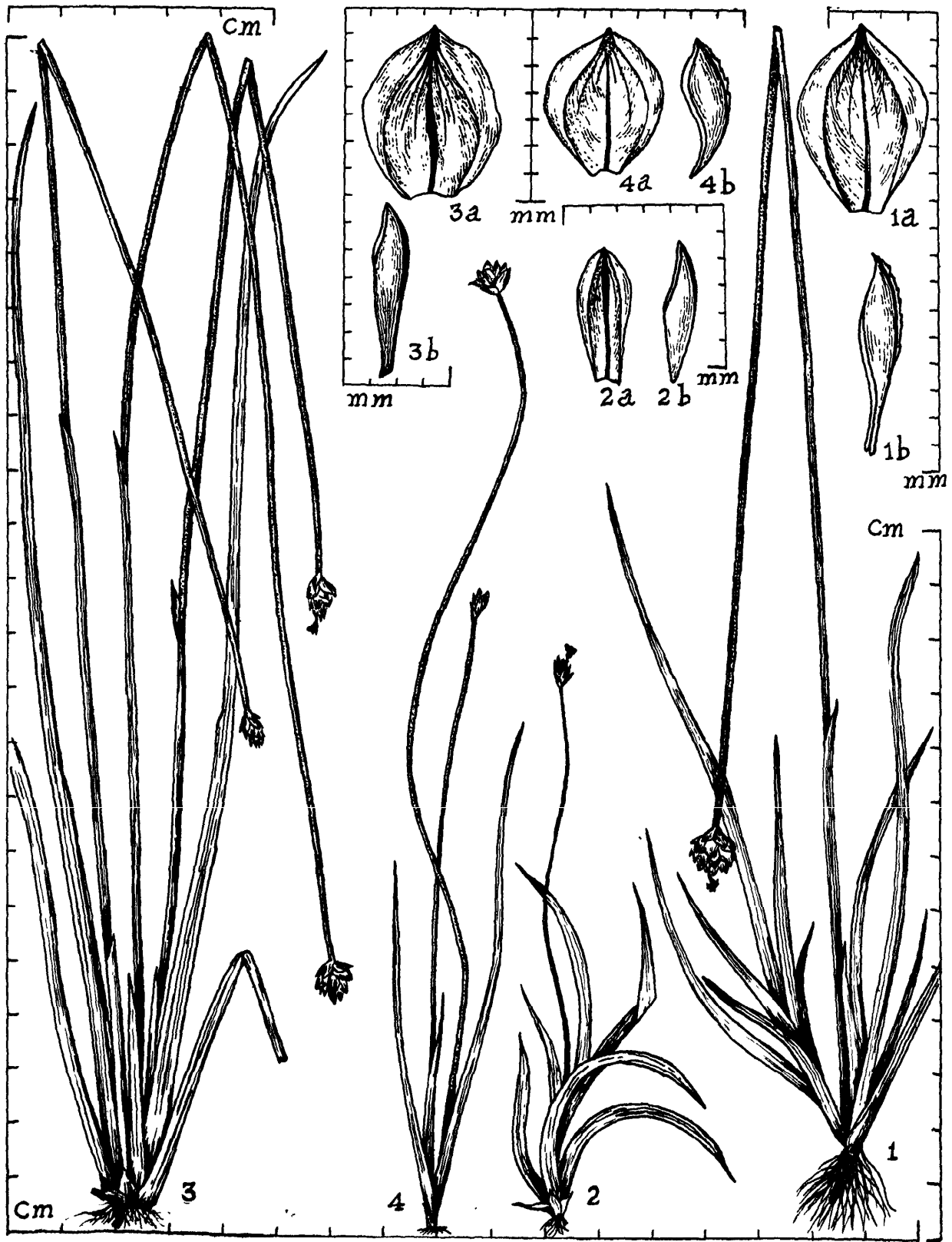
Tufted, 1-8 dm high. *Leaves* ultimately falcate, 5-60 cm long, 3-10 mm broad, dried leaves with the main nerves connected by numerous transverse nervules; sheaths 8-30 cm long. *Heads* 5-10 mm long; peduncles compressed or terete, twisted, 1.5-2 mm thick; bracts obovate, 5.8 × 5-7 mm, entire or emarginate, with 4-6 lateral descending nerves, brown with golden membranaceous margins. *Lateral sepals* 5.7 × 1 mm, median sepal ca 4 × 2.5 mm; claw of the petals 4-6 mm long, lamina 3.5-5 × 3-4 mm; stamens ca 4 mm long; staminodes ca 3 mm long;

styles 2-3 mm long. *Capsules* 3-4 mm long; seeds yellowish-brown with darker extremities.

ASSAM. MEGHALAYA: K. & J. hills.

2. **X. wallichii** Kunth, Enum. Pl. 4: 16. 1843.

Leaves often falcate, 5-18 cm long, 3-6 mm broad, pale green; sheaths 1-4 cm long. *Heads* 5.8 × 2-4 mm; peduncles slender, compressed, flexuous, sometimes twisted, narrowly winged, ca 0.5 mm broad; bracts obtuse, acuminate or emarginate, keeled, with 2-4 lateral, descending nerves, brown with narrow, pale membranaceous margins. *Lateral sepals* ca 5 × 2 mm, red-brown with green midrib and pale margins; claw of the petals ca 6 mm long, lamina ca 5 mm long,



Xyridaceae. Figs. 1-4 : 1. *Xyris indica* L. 1a. Bract. 1b. Lateral sepal. 2. *X. wallichii* Kunth. 2a. Bract. 2b. Lateral sepal. 3. *X. capensis* Taunb. var. *schoenoides* (Mart.) Nilss. 3a. Bract. 3b. Lateral sepal. 4. *X. pauciflora* Willd. 4a. Bract. 4b. Lateral sepal.

subentire, yellow or sometimes whitish; anthers 1-2 mm long; styles *ca* 5 mm long. *Capsules ca* 4 mm long; seeds *ca* 0.7 mm long, hairy.

Fls. & frts.: Aug.-Nov. Fairly common in rock-crevices, near marshy habitats; 800-1200 m.

MEGHALAYA: K. & J. hills.

3. **X. capensis** Thunb. var. **schoenoides** (Mart.) Nilsson in Kongl. Vet. Akad. Foerh. 3: 154. 1891. *X. schoenoides* Mart. in Wall. Pl. Asiat. Rar. 3: 30. 1832.

Tufted, 2-8 dm high. *Leaves* rigid, falcate, obtuse, 10-50 cm long, 2-4 (-6) mm broad; sheaths 5-15 cm long. *Heads* 6-9 (-13) mm long; peduncles twisted, 1.5-3 mm broad; bracts orbicular-oblong, 4-9 × 3-6 mm, with 6-9 partly complete and partly incomplete lateral descending nerves. *Lateral sepals ca* 6 × 1.5 mm, reddish-brown, median *ca* 4 × 2 mm; claw of the petals *ca* 7 mm long, lamina obovate, subentire, 4-6 mm long, yellow; stamens *ca* 2 mm long; staminodes 1.5-2.5 mm long; styles 4-6 mm long.

Fls. & frts.: June-Sept. Common in marshy places; 900-1600 m.

MEGHALAYA: K. & J. hills. NAGALAND.

4. **X. pauciflora** Willd. Phytogr. 1:2. t.1.f.1. 1794.

Herbs, 0.4-4 dm high. *Leaves* rather rigid, 3-25 cm long, 1.5-2 mm broad, sparsely papillate, rough-margined; sheaths 1.5-7 cm long, keel scabrid. *Heads* 3-10 mm long; peduncles subterete or compressed, twisted, ribbed or narrowly winged, 1-1.5 mm broad; bracts elliptic, obovate or orbicular, 3-6 × 4-5 mm, spinulose at the tip with 4 lateral incompletely descending nerves, brown with

golden yellow membranaceous margins. *Lateral sepals* 3.5 × 1.5 mm, with a broad serrate-dentate keel, anterior *ca* 3 mm long; claw of the petals 4-6 mm long, lamina 2-3 mm long; stamens 1-1.5 mm long; staminodes *ca* 1 mm long; styles *ca* 2.5 mm long.

ASSAM.

Commelinaceae R. Br. Prodr. 268. 1810 ('*Commelineae*').

Perennial or sometimes annual, erect or scandent herbs, rarely climbers, often somewhat succulent, sometimes rooting at the lower nodes. *Leaves* simple, sheathing at the base, usually cauline and alternate, sometimes also in radical bunches; sheaths closed, nervose, rarely open. *Flowers* usually in terminal, axillary or leaf-opposed cymes, fascicles, cincinni or panicles, rarely solitary, pedicellate, bisexual (or bisexual and male), actinomorphic or zygomorphic, bracteate, ephemeral; sepals 3, free or connate at the base; petals 3, imbricate, sometimes clawed, free or united into a slender tube; stamens 6, biseriate, or 3 or 2 with 3 or 4 staminodes; filaments often bearded; anthers dorsi- or basi-fixed, globose-oblong, 2-celled, dehiscing usually by longitudinal slits, sometimes by apical pores; ovary superior, sessile or subsessile, 2-3-celled; placenta axile, ovules 1-9 in each cell; style usually simple, sometimes 3-fid; stigmas capitate. *Fruit* usually a loculicidally dehiscent capsule, sometimes fleshy and indehiscent; seeds solitary or several in one or two series, variously sculptured, the testa characteristically marked on the outside with a circular or elliptic callosity (embryostega or embryotega) under which the embryo is situated; endosperm abundant, mealy.

- 1a. Climbers or stragglers. Leaves broadly ovate or suborbicular; petioles almost as long as, to longer than the blade

... *Streptolirion*-8.

- 1b. Erect or scandent herbs. Leaves linear, lanceolate, oblong or obovate-oblong; petioles absent or much shorter than the blade.

- 2a. Flowers 6-12-together in sessile, globose clusters perforating and fully emerging from the axils of the persisting leaf-sheaths, all or mostly in the axils of the fallen leaves ... *Amischotolype*-5.
- 2b. Flowers not perforating the leaf-sheaths, in terminal panicles, leaf-opposed cincinni or in pedunculate axillary cincinni, or if in axillary sessile clusters then either embraced by spatheaceous bracts or hidden within the leaf-sheaths of existing leaves with only emergent tops.
- 3a. Bracts spatheaceous.
- 4a. Bracts solitary or few, clustered, folded like a boat or a funnel. Petals free; stamens 2-3; staminodes present ... *Commelina*-2.
- 4b. Bracts several, biseriate, imbricate, secund, not folded. Petals connate below into a tube; stamens 6; staminodes absent ... *Cyanotis*-6.
- 3b. Bracts minute or absent.
- 5a. Flowers solitary or 2-6-together in axillary fascicles.
- 6a. Flowers sessile, excepting the emergent tops, wholly hidden within the swollen leaf-sheaths; stamens 6; staminodes absent ... *Amischophacelus*-7.
- 6b. Flowers pedicellate, fully emerged from the leaf-sheaths; stamens 2-3; staminodes present ... *Murdannia*-4.
- 5b. Flowers usually many, sometimes few, in terminal panicles or sometimes also panicled in the uppermost leaf-axils.
- 7a. Fruits indehiscent, glossy blue or bluish-black, rarely brown (in *P. pentasperma*) ... *Pollia*-1.
- 7b. Fruit a loculicidally dehiscent capsule, glossy or dull, whitish or brownish.
- 8a. Panicle-branches, pedicels and sepals clothed with long glandular hairs ... *Floscopa*-9.
- 8b. Panicle-branches, pedicels and sepals glabrous or sparsely puberulus.
- 9a. 3 anterior stamens (2 antesealous and 1 antepetalous) fertile while 3 or 2 posterior ones transformed into staminodes, or staminodes absent ... *Aneilema*-3.
- 9b. 3 antesealous stamens fertile, alternating with usually 3, sometimes 2 or 1, antepetalous staminodes, or staminodes absent, or sometimes one of the antesealous stamen also transformed into a staminode or absent ... *Murdannia*-4.

1. **Pollia** Thunb. Nov. Gen. 1: 11. 1781.

Usually large, ascending herbs, creeping and rooting at the lower nodes. *Leaves* lanceolate or oblanceolate, caudate-acuminate. *Flowers* bisexual, panicled, terminal or in uppermost leaf-axils; sepals 3, free; petals 3, free, subequal, smaller than the sepals; stamens 6, subequal, or 3 with 3 staminodes

bearing smaller anthers; filaments naked; fertile anthers oblong-lanceolate with parallel cells, sterile anthers triangular-hastate with cells diverging at the base; ovary 3-celled, ovules 2-many in each cell. *Fruits* indehiscent, dry crustaceous, glossy blue or bluish black in age, or brown; seeds biseriate, compressed, usually scrobiculate.

- 1a. Fruits long beaked ... *P. pentasperma*-5.
- 1b. Fruits not beaked.
- 2a. Panicles sessile, the rachis much shorter than its branches ... *P. subumbellata*-4.
- 2b. Panicles pedunculate, the rachis longer than its branches.
- 3a. Panicle-branches glabrous; peduncles 1-4 cm long; panicles dense-flowered, with the flowers or its scars scarcely 1 mm apart ... *P. thyrsiflora*-2.
- 3b. Panicle-branches densely clothed with hooked hairs; peduncles 2.5-20 cm long; panicles lax-flowered, with the flowers or its scars ca 5 mm apart.
- 4a. Leaves sessile, with a long cuneate, stipitiform base. Bracts caducous. Sepals hairy on the back; stamens 6; staminodes absent ... *P. hasskarlii*-1.
- 4b. Leaves with a distinct, though only 2-5 mm long, petiole. Bracts persistent. Sepals glabrous; stamens 3; staminodes 3 with smaller anthers ... *P. secundiflora*-3.

1. **P. hasskarlii** Rolla Rao in Notes Roy. Bot. Gard. Edinb. 25: 188. 1964. *P. acli-sia* Hassk. in Miq. Pl. Jungh. 1: 148. 1852, *nom. illeg.*

Stems 0.5-3 m high. *Leaves* oblanceolate, 12-35 × 4-9 cm, glabrous or scaberulous beneath; sheaths 1-6 cm long, 0.5-2 cm broad. *Peduncles*, rhachis and its branches sparsely

hairy to villous; bracts oblong, acute, amplexicaul. *Sepals* membranaceous, oblong, ca 4 mm long; petals white or purplish. *Fruits* globose, ca 7 mm dia., cells many-seeded; seeds ca 2 mm long, brown.

Fls.: April-June; *frts.*: Sept.-June. Usually in forest-shade; 850-1600 m.

ARUNACHAL PRADESH; Kameng; Lohit;

Siang; Subansiri; Tirap. MEGHALAYA: K. & J. hills. NAGALAND.

2. **P. thyrsiflora** (Bl.) Steud. Nom. ed. II. 2: 368. 1841; Endl. *ex* Hassk. in Miq. Pl. Jungh. 1: 150. 1852. *Tradescantia thyrsiflora* Bl. Enum. Pl. Java ed. 1: 6. 1827. *Stems* 3-9 dm long. *Leaves* oblanceolate, 15-35 × 4-9 cm, glabrous or puberulus beneath; petioles 2.5-5 cm long; sheaths pubescent. *Panicles* dense, ovoid, 2-7 cm long with numerous 10-15 mm long branches; peduncles 1-4 cm long; bracts ovate; pedicels glabrous, fruiting 5-10 mm long, squarrose. *Sepals* hairy at the tip; petals *ca* 6 mm long, white or pale blue-violet; stamens 6. *Fruits* ellipsoid, 5-7 mm long, cells many-seeded.

Frts.: February; 400-600 m.
TRIPURA.

3. **P. secundiflora** (Bl.) Backer in Ann. Jard. Bot. Btzg. 32: 166. 1922; Bakh. *f.* in Blumea 6: 399. 1950. *Commelina secundiflora* Bl. Enum. Pl. Java, ed. 1: 5. 1827. *P. sorzogonensis* Steud. Nom. ed. II. 2: 368. 1841. *Aclisia sorzogonensis* E. Mey. in Presl, Rel. Haenk. 1: 138. t. 25. 1827. *A. secundiflora* Bakh. *f.* Fl. Java 3: 658. 1968.

Perennial herbs, sometimes stoloniferous. *Stems* 0.3-1.3 m long. *Leaves* lanceolate or oblong-lanceolate, 10-30 × 2.5-8 cm, cuneate, glabrous or scaberulous above, hairy beneath; sheaths 2-4 cm long, 3-10 mm broad, hairy. *Panicles* ovoid, 3-14 cm long, few-many-flowered; fruiting pedicels 2.5-3 mm long. *Sepals* elliptic, 4 mm long; petals white (or pale pink); filaments 1.5 mm long; fertile anthers white, sterile smaller, yellow. *Fruits* globose, 6-8 mm dia., cells many-seeded; seeds greyish, *ca* 2 mm long.

Fls.: May-July; *frts.*: Sept.-July; 150-1600 m.

ARUNACHAL PRADESH: Subansiri; Tirap. ASSAM: Kamrup; Lakhimpur; Sibsagar.

MEGHALAYA: Garo hills; K. & J. hills. NAGALAND: TRIPURA.

4. **P. subumbellata** Clarke in J. Linn. Soc. Bot. 11: 451. 1870.

Stems 3-15 dm long. *Leaves* elliptic or oblong-lanceolate, glabrous or scaberulous on either surface; petioles 1-3 cm long; sheaths 2-3 cm long, *ca* 5 mm broad, pubescent. *Rhachis* 10-15 mm long, bearing about 5-15 subumbellate, decurved, 3-6 cm long, pubescent branches; bracts amplexicaul, persistent. *Sepals* rotundate, *ca* 3 mm long, glabrous; petals white; stamens 3. *Fruits* globose, 4-5 mm dia., cells many-seeded; seeds 1 mm long, greyish-brown.

Fls.: May-Aug.; *frts.*: July-Feb. In forest shade; 150-1700 m.

ARUNACHAL PRADESH: Kameng; Subansiri; Tirap. ASSAM: Sibsagar; Lakhimpur. MEGHALAYA: Garo hills.

5. **P. pentasperma** Clarke in DC. Mon. Phan. 3: 129. 1881.

Erect herbs. *Leaves* elliptic, short-petioled, 7-15 × 2.5-4.5 cm, glabrous or scaberulous above, pubescent beneath; sheaths pubescent. *Peduncles* and panicle-branches hairy; bracts oblong, hairy, persistent. *Sepals* 3 mm long, puberulus; stamens 3; staminodes 2. *Fruits* crustaceous, glossy brown, ovoid, narrowed into a long beak, including the beak, *ca* 12 mm long, beak *ca* as long as the main body; seeds compressed, rugulose.

Fls.: June.

NAGALAND.

2. **Commelina** L. Sp. Pl. 40. 1753 *et* Gen. Pl. ed. 5. 58. 1754.

Slender, trailing herbs, usually rooting at the lower nodes. *Leaves* sessile or short-petioled. *Flowers* in bifid or simple cincinni, embraced by navicular or funnel-shaped spathes, bisexual (or male and bisexual), zygomorphic, usually emerging one at a time and again retracted into the spathes, those of

the upper branch (if present) barren and caducous; pedicels recurved and thickened in fruits; spathes terminal or leaf-opposed, solitary or in capituliform clusters; sepals membranaceous, two inner sometimes connate below; petals obovate or suborbicular, 2 posterior clawed, the third anterior sessile, smaller; stamens 3, anterior; staminodes 2-3,

posterior; filaments naked; anthers oblong, the middle usually larger. *Capsules* 2- or 3-celled, 2 anterior cells dehiscent, 1-2-seeded, the third cell, if present, usually indehiscent, 1-seeded or empty, or the two anterior cells empty, connate, indehiscent and forming a persistent ligulate body from which the posterior cell falls away.

- 1a. Spathes navicular, in natural folded condition, 2-6-times longer than broad, margins free or connate at the very base only.
- 2a. Leaves linear-lanceolate, about 9-13-times longer than broad. Seeds smooth, appendiculate at both ends.
 - 3a. Spathes glabrous inside. Seeds subglobose, ca 3 mm dia. ... *C. longifolia*-3.
 - 3b. Spathes hairy inside. Seeds ovoid, 4-5 mm long ... *C. appendiculata*-7.
- 2b. Leaves lanceolate or ovate-lanceolate, about 3-4-times longer than broad. Seeds not appendiculate.
 - 4a. Seeds smooth ... *C. hasskarlii*-4.
 - 4b. Seeds rugose.
 - 5a. Leaves 7-15 × 2-5 cm. Spathes solitary or several, clustered; cincinni unbranched. Capsules 2-celled, 2-seeded ... *C. suffruticosa*-8.
 - 5b. Leaves 3.5-10.5 × 0.9-2.4 cm. Spathes solitary or rarely paired; cincinni bifid. Capsules 3-celled, 5-seeded.
 - 6a. Leaf-base equally rounded. Seeds oblong, terete, glabrous, dark brownish black, with subhexagonal reticulations and granular depressions ... *C. diffusa*-1.
 - 6b. Leaf-base, at least in well-developed leaves, obliquely rounded. Seeds pyramidal, slightly compressed, pubescent, greyish-brown, irregularly rugulose or pitted ... *C. sikkimensis*-2.
- 1b. Spathes funnel-shaped, in natural folded condition, about as long as broad, margins connate almost to the top.
 - 7a. Leaves acute, obtuse or rounded at tips, pubescent to villous on both the surfaces ... *C. benghalensis*-3.
 - 7b. Leaves subcaudate-acuminate at tips, glabrous above, glabrous or pubescent beneath.
 - 8a. Spathes cuneate, mostly not very unequal sided, sessile or on upto 6 mm long peduncles. Seeds smooth ... *C. paludosa*-6.
 - 8b. Spathes cordate or truncate, very unequal sided, on 10-20 mm long peduncles. Seeds plicate-rugose ... *C. suffruticosa*-8.

1. *C. diffusa* Burm. f. Fl. ind. 18. t. 7. f. 2. 1768. *C. nudiflora* Auct. non L.

Stems 3-10 dm long, red-brown streaked and dotted. *Leaves* sessile, 3.5-7.5 × 0.9-2.3 cm, acute or acuminate, glabrous or puberulus beneath; sheaths 12-20 mm long, glabrous or sparsely ciliate. *Spathes* terminal or leaf-opposed, 17-35(-50) mm long, cordate, glabrous or pubescent; peduncles 1-3 cm long. *Flowers* blue or white; sepals 3-4 mm long; posterior petals 5-10 mm long, anterior 3-5 mm long; staminodes 2-3. *Capsules* oblong, mucronate, 5-6 mm long; seeds of 2-seeded cells ca 1.5 mm long and those of 1-seeded cell ca 2.5 mm long.

Fls. & frts.: Jan.-Oct. In moist clay or sandy alluvium, near water, in grasslands, or as forest-undergrowth; 100-500 m.

ARUNACHAL PRADESH: Subansiri. ASSAM: Darrang; Kamrup; Lakhimpur; N. Cachar & Mikir hills; Nowgong; Sibsagar. MIZORAM,

2. *C. sikkimensis* Clarke, Comm. et Cyrt. Beng. t. 6. 1874.

Stems 1-3 m long, red-brown streaked and dotted. *Leaves* sessile, 5-10.5 × 1.2-2.5 cm, acuminate, upper surface glabrous or scaberulous, lower surface glabrous or puberulus, margins, particularly towards the apex, scaberulous; sheaths 17-20 mm long, glabrous or hirsute, ciliate at mouth and fusion commissure. *Spathes* terminal or leaf-opposed, 25-45 mm long, cordate, glabrous or pubescent; peduncles 2-3 cm long. *Flowers* blue, ca 15 mm across; petals suborbicular. *Cap-*



Commelinaceae. Figs. 1-7 : 1. *Pollia hasskarlii* Rolla Rao. 2. *Commelina paludosa* Bl. 3. *Murdannia hookeri* (Clarke) Brueckn. 4. *Amischotolype mollissima* (Bl.) Hassk. var. *marginata* (Bl.) Rolla Rao. 5. *Cyanotis vaga* (Lour.) J. A. & J. H. Schultes. 6. *Streptolirion volubile* Edgew. 7. *Floscopa scandens* Lour.

sules oblong, 5-6 mm long, narrowed at both ends; seeds *ca* 2 mm long.

Fls. & frts.: April-Nov. In moist sandy alluvium, near streams and roadside ditches; 900-1500 m.

ARUNACHAL PRADESH: Kameng; Lohit; Subansiri; Tirap. MEGHALAYA: Garo hills; K. & J. hills.

3. **C. longifolia** Lamk. Illustr. Gen. 1: 129. 1791; Rolla Rao in Notes Roy. Bot. Gard. Edinb. 25: 179. 1964. *C. salicifolia* Roxb. Fl. Ind. 1: 176. 1820.

Stems upto 1 m long. *Leaves* sessile, 7-17 × 0.5-1.2 cm, acute, glabrous or puberulus beneath, often scaberulous-margined; sheaths 15-20 mm long, red-brown dotted, ciliolate. *Spathes* solitary, leaf-opposed, 3-5.5 cm long, glabrous or puberulus, subcordate at base, peduncles 1.5-2(-5.5) cm long. *Flowers* blue, in bifid cincinni, posterior branch of the cincinni 15-25 mm long; anterior 7-15 mm long; sepals 5-8 mm long; petals 10-14 mm long; staminodes 3. *Capsules* quadrate, *ca* 6 mm long; two anterior cells 2-seeded, dehiscent, third posterior cell 1-seeded or empty, indehiscent; seeds subglobose, *ca* 3 mm dia., blackish, with short membranaceous appendage at both ends.

Fls. & frts.: July. In moist waste-lands; 100 m.

ASSAM: Kamrup.

4. **C. hasskarlii** Clarke, Comm. et Cyrt. Beng. 13. t. 3. 1874.

Stems much branched, sometimes scaberulous. *Leaves* lanceolate, 2.5-8 × 1.2-1.7 cm, acute; sheaths *ca* 12 mm long, ciliate. *Spathes* solitary, leaf-opposed, 1-2.5 cm long, cordate at the base, glabrous or hispid; peduncles 12-25 mm long. *Flowers* in unequally bifid cincinni. *Capsules* quadrate, apiculate, *ca* 6 mm long; seeds cylindric, 3-4 mm long, truncate at one end, subacute or rounded at the upper end.

Fls. & frts.: Sept.; 150 m.

ASSAM: Kamrup.

5. **C. benghalensis** L. Sp. Pl. 41. 1753.

Stems 3-10 dm long, glabrous or villous below the nodes. *Leaves* sessile or with upto 1 cm long petiole, elliptic-ovate or suborbicular, 1.2-8 × 0.8-4 cm; base usually rounded, sometimes cuneate, often ciliate; sheaths 9-15 mm long, villous, usually ciliate on margins with rufous hairs. *Spathes* 1-3-together, terminal or leaf-opposed, 8-17 mm long and broad, gibbous, peduncles absent or upto 1 cm long. *Flowers* in bifid cincinni, blue or lilac; stamens 3-2; staminodes 3-1; sometimes there are leafless subterranean branches bearing cleistogamous white flowers which are solitary within a pubescent yellowish white bract, producing 5-seeded capsules. *Capsules* pyriform, *ca* 6 mm long, 5(or 3)-seeded; seeds ovoid, subcylindric, 1.5-2 mm long, greyish, ribbed-rugose.

Fls. & frts.: May-Oct. In wastelands and near water; 100-1300 m.

ARUNACHAL PRADESH: Kameng. ASSAM: Kamrup; Lakhimpur; N. Cachar & Mikir hills; Nowgong; Sibsagar. MEGHALAYA: K. & J. hills.

6. **C. paludosa** Bl. Enum. Pl. Java ed. 1. 2. 1827. *C. obliqua* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 45. 1825 (non Vahl, 1806).

Stems stout, ascending, 1-3 m long. *Leaves* sessile or subsessile, obliquely lanceolate, 6-19 × 1.7-5.5 cm, usually glabrous, sometimes puberulus beneath; sheaths 1.4-4 cm long, glabrous or puberulus, usually ciliate at the mouth. *Spathes* terminal or leaf-opposed, 3-8-together, clustered, 15-30 mm long and equally broad, usually red-brown-margined and filled with a glutinous liquid; peduncles absent or upto 5 mm long; posterior branch of cincinnus absent or short. *Flowers* violet, blue or white; posterior petals 11-12 mm long, anterior 6-7 mm long; middle stamen with lanceolate anther, laterals with smaller, oblong anthers; staminodes 3. *Capsules* subglobose, 4-5 mm dia., 2-3-celled, 1-3-seeded;

seeds ellipsoid, sub-compressed, *ca* 3.5 mm long.

Fls. & frts.: April-Nov. Creeping, or trailing among bushes, on sandy river-bed, along streams and other moist places; 100-1700 m.

ARUNACHAL PRADESH: Kameng; Lohit; Siang; Subansiri; Tirap. ASSAM: Goalpara; Kamrup; Lakhimpur; Sibsagar. MANIPUR. MEGHALAYA: Garo hills; K. & J. hills. MIZORAM. TRIPURA.

var. **viscida** (Clarke) Rolla Rao *et* Kammathy in Bull. Bot. Surv. Ind. 3: 168. 1961. *C. obliqua* var. *viscida* Clarke in DC. Mon. Phan. 3: 178. 1881.

Comparatively slender and smaller. The whole plant, particularly the leaves and spathes, usually densely viscid hairy, though sometimes glabrescent. *Stems* 0.3-1 m long. *Leaves* 3-10 × 1-3 cm. *Spathes* 10-15 mm long. *Seeds* *ca* 2 mm long.

Fls. & frts.: June-Nov.; 900-1300 m.

ARUNACHAL PRADESH: Lohit. MEGHALAYA: K. & J. hills.

7. **C. appendiculata** Clarke, Comm. et Cyrt. Beng. 13. 1874.

Erect or ascending. *Stems* 2-10 dm long. *Leaves* sessile, 5-16 × 0.5-1.7 cm, acute, smooth or ciliolate on the upper surface; sheaths *ca* 2 cm long, open, glabrous or pubescent, margins ciliate. *Spathes* solitary, terminal or leaf-opposed, glabrous or puberulus outside, hairy inside, including the long caudate-acuminate tip, 4-7 cm long; base deeply cordate with rounded lobes; peduncles 3-5 cm long. Flowers blue or white, *ca* 12 mm across, in

bifid cincinni. *Capsules* ovoid, *ca* 7 mm long, 2-celled, 2-seeded; seeds brownish-black with whitish membranaceous conical appendage at both ends.

Fls. & frts.: April-June; 100-500 m.

ARUNACHAL PRADESH: Kameng. ASSAM: Darrang; Goalpara; Kamrup.

8. **C. suffruticosa** Bl. Enum. Pl. Java ed. 1. 3. 1827.

Stout, suberect, usually tufted. *Leaves* subsessile or with upto 7 mm long petiole, 7-15 × 2-5 cm, glabrous or pubescent beneath; sheaths 2-4 cm long, hirsute. *Spathes* solitary or upto 8-together in dense clusters, terminal or also opposite the uppermost leaves, 10-15 mm long, acute, hairy; peduncles 10-20(-25) mm long. *Flowers* white, 6-12 in unbranched cincinni. *Capsules* 4-5 mm long; seeds ellipsoid, 3-3.5 mm long, brown.

Fls. & frts.: May-July; 100-900 m.

ASSAM: Kamrup; N. Cachar & Mikir hills. MEGHALAYA: K. & J. hills. TRIPURA.

3. **Ancilema** R. Br. Prodr. 270. 1810.

Erect or scandent herbs. *Leaves* all cauline, sessile or short-petioled, oblong-lanceolate, acuminate. *Flowers* in terminal paniced cincinni, bisexual, zygomorphic, bracteate; sepals 3, free, oblong, persistent; petals 3, obovate-oblong; 3 anterior stamens (2 antesealous and 1 antepetalous) fertile while 3 or 2 posterior ones transformed into staminodes, or staminodes absent, rarely one of the anterior (antepetalous) stamen also transformed into a staminode; filaments naked. *Capsules* 2-3-celled, cells 1-many-seeded.

1a. Leaves, at least the well-developed ones, petioled. Capsules glabrous, shortly beaked.

2a. Staminodes present. Capsule cells 5-9-seeded

2b. Staminodes absent. Capsule cells 1-seeded

1b. Leaves sessile. Capsules villous, obtuse

... *A. thomsoni*-1.

... *A. conspicuum*-2.

... *A. scaberrimum*-3.

1. **A. thomsoni** Clarke in J. Linn. Soc. Bot. 15: 121. 1877.

Erect or sometimes ascending, 3-5 dm high. *Stems* and panicle branches glabrous to villous. *Leaves* with upto 1 cm long petiole,

5-20 × 2-6 cm, usually scaberulous; sheaths 7-25 mm long, glabrous or hairy, mouth ciliate. *Panicles* 5-20 cm long with widely spreading branches, few-many-flowered. *Flowers* pink or purplish blue; sepals 5-6 mm

long; petals *ca* 8 mm long; stamens 3, the two lateral always fertile with longer filaments, while the middle one with shorter filament bearing fertile or sterile anther; staminodes 3. *Seeds* *ca* 2 mm long, with slightly raised radiating lines, black with whitish powder.

Fls. & frts.: June-Nov.; 500-2300 m.

ARUNACHAL PRADESH: Kameng; Lohit; Tirap. NAGALAND.

2. **A. conspicuum** (Bl.) Kunth, Enum. Pl. 4: 69. 1843. *Commelina conspicua* Bl. Enum. Pl. Java ed. 1. 4. 1827.

Ascending, 3-10 dm high, rooting at the lower nodes. *Leaves* 8-25 × 2.5-7 cm, glabrous or puberulus beneath. *Panicles* subsessile, 4-15 cm long with suberect, spreading or decurved branches, few-many-flowered; bracts caducous. *Flowers* nodding, blue-violet; sepals *ca* 3 mm long; petals 3.5-4.5 mm long; stamens 3, anthers yellow, the middle one largest. *Capsules* ovoid with a short conical beak; seeds ellipsoid, rugose.

NAGALAND.

A. montanum Wt. distinguished by laxer, few-flowered panicles may not be a distinct species and requires further detailed population studies. In our area it has been reported from Upper Assam, Naga hills and Manipur. The Naga hill collection of Clarke in the Calcutta herbarium is *A. conspicuum*; it has not been possible to check the identity of Upper Assam and Manipur collections.

3. **A. scaberrimum** (Bl.) Kunth, Enum. Pl. 4: 69. 1843. *Commelina scaberrima* Bl. Enum. Pl. Java ed. 1. 4. 1827.

Erect or ascending, upto 3 m high. *Stems* and panicle-branches glabrous or hairy. *Leaves* 7-17 × 1.5-5 cm, hispid above, glabrous or pubescent beneath, cuneate or rounded; sheaths 1.5-4 cm long, mouth ciliate. *Panicles* very lax, with a long slender peduncle and spreading branches; bracts funnel-

shaped, *ca* 2 mm long, persistent. *Flowers* few at the tips of the branchlets, pinkish or purplish blue; sepals 2-3 mm long, reflexed in fruits; two lateral petals clawed, 7-10 mm long, anterior subsessile, smaller; stamens 3; staminodes 3; filaments united below for about 1 mm. *Capsules* shortly stipitate, globose-subtrigonal, pale yellow, 3(or 1-2)-seeded; seeds *ca* 2.5 mm long, greyish-brown, rugose.

Fls. & frts.: Sept.-Jan. In forest-pockets, sometimes trailing among the bushes; 150-1700 m.

ARUNACHAL PRADESH: Lohit; Siang; Subansiri; Tirap. ASSAM: Lakhimpur. MEGHALAYA: K. & J. hills. NAGALAND. TRIPURA.

4. **Murdannia** Royle, Illustr. Bot. Himal. 403. t. 95. 1839.

Usually perennial, sometimes annual, erect or suberect or creeping and rooting below with ascending tips; roots usually uniformly slender, sometimes fusiform. *Leaves* all cauline or some in a radical cluster with a few shorter leaves scattered on the flowering stems, sometimes the leaves on the stem reduced to bladeless sheaths, sessile, linear, lanceolate or ovate-oblong, usually acute or acuminate, rarely obtuse. *Flowers* usually in terminal paniced cincinni, sometimes solitary or few and axillary, bisexual, actinomorphic, bracteate; sepals 3, free, elliptic-oblong, purplish green, persistent; petals 3, obovate-oblong or suborbicular, subequal; 3 antesealous stamens fertile alternating with usually 3, sometimes 2, 1 or 0 antepetalous staminodes, sometimes one of the antesealous stamen also transformed into a staminode or absent, staminodes usually with shorter filament terminated by a usually 3-lobed, sometimes 2-lobed, white or yellow body; filaments of the stamens bearded with pinkish-blue hairs, of staminodes bearded or naked. *Capsules* globose-ellipsoid, apiculate, 3-celled, cells 1-many-seeded, or sometimes one of the cells empty by abortion.

- 1a. Leaves on the stem reduced to bladeless sheaths ... *M. scapiflora* 1.
 1b. Leaves on the stem with well-developed blades.
 2a. Flowers axillary ; pedicels twice jointed. Cells of the ovary 1-ovuled, of the capsules 1-seeded or empty ... *M. vaginata*-12.
 2b. Flowers in terminal panicles or axillary ; pedicels not- or once-jointed. Cells of the ovary 2-many-ovuled, of capsules 1 or more-seeded.
 3a. Pedicels once-jointed in the middle. Seeds biseriate ... *M. blumei*-11.
 3b. Pedicels not jointed. Seeds uniseriate.
 4a. Flowers 1 or 2, on axillary peduncles ... *M. triquetra*-6.
 4b. Flowers more than 2-together, usually many, in terminal panicle, or sometimes also in the axils of the upper leaves.
 5a. Leaves cauline and in radical rosettes.
 6a. Radical leaves ovate-lanceolate or oblong, 2-6 cm broad ; base rounded or cordate ... *M. elata*-4.
 6b. Radical leaves linear-lanceolate, 1-2 cm broad ; base cuneate.
 7a. Stem solitary, arising from the centre of the radical rosette of leaves and enclosed within their sheaths at the base, erect ... *M. gigantea*-10.
 7b. Stems several, from the axils of the radical leaves, scandent and spreading in all directions and rooting at lower nodes.
 8a. Roots fusiform. Capsules 6-7 mm long ; seeds 2 mm long ... *M. simplex*-9.
 8b. Roots uniformly slender. Capsules 4-5 mm long ; seeds 1.5 mm long ... *M. loriformis*-8.
 5b. Leaves all cauline, radical rosette of leaves absent.
 9a. Bracts caducous. Stamens 2. Seeds 2 in each cell ... *M. nudiflora*-7.
 9b. Bracts persistent. Stamens 3. Seeds 3-6 in each cell.
 10a. Roots fusiform. Leaves 10-25 × 1-2 cm ... *M. divergens*-2.
 10b. Roots uniformly slender. Leaves 1-6.5 × 0.4-1.5 cm.
 11a. Sepals ca 5 mm long ; petals ca 8 mm long. Capsules 5-7 mm long ... *M. hookeri*-3.
 11b. Sepals ca 2.5 mm long ; petals ca 3 mm long. Capsules 3-4 mm long ... *M. spirata*-5.

1. *M. scapiflora* (Roxb.) Royle, Illustr. Bot. Himal. 403. t. 95. 1839. *Commelina scapiflora* Roxb. Fl. Ind. 1: 175. 1820. *Aneilema scapiflorum* Kostel. in Allg. Med.-Pharm. Fl. 1: 127 ; Wt. Ic. t. 2073. 1853. Erect herbs ; roots fusiform, 3-5 mm thick.

Radical leaves lanceolate, 10-25(-30) × 0.3-1.5 cm, glabrous or puberulus beneath, wavy-margined. Stems solitary or upto 5-together from the same stock, 20-40 cm high, with few, remote, 2-5.5 cm long, apiculate sheaths. Panicles terminal, 5-15 cm long ; bracts amplexicaul, ovate, acuminate, persistent. Flowers solitary or more-together, blue-mauvé ; pedicels 4-6 mm long ; sepals 5-6 mm long, glabrous or sparsely hairy ; petals 8-12 mm long ; stamens 3 ; staminodes 3 ; filaments all bearded. Capsules ellipsoid, 6-8 mm long ; seeds 3-6 per cell, uniseriate, ca 1 mm long, greyish stramineous, reticulate.

Fls. & frts.: April-May ; 150-300 m.
 ASSAM: Goalpara.

2. *M. divergens* (Clarke) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930.

Aneilema divergens Clarke, Comm. et Cyrt. Beng. t. 16. 1874.

Erect, 0.3-1 m high. Stems branched at the base, together with the leaves, glabrous or viscid hairy. Leaves all cauline, linear or linear-lanceolate, ascending, rather wavy-margined ; sheaths 2-4 cm long, ciliolate on the fusion commissure. Panicles terminal, much-branched, lower branches alternate, upper ones opposite or sub-whorled. Flowers pink-blue ; sepals 5-6 mm long ; petals 7-10 mm long ; staminodes 3 ; filaments all bearded. Capsules ellipsoid, 8-11 mm long ; seeds 4-6 per cell, ca 1 mm long, greyish-brown, punctulate.

Fls. & frts.: June-Oct. ; 900-1600 m.

MANIPUR. MEGHALAYA: K. & J. hills. NAGALAND.

3. *M. hookeri* (Clarke) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Aneilema hookeri* Clarke, Comm. et Cyrt. Beng. 171. 1874.

Stems creeping and rooting below, 15-30 cm long. Leaves lanceolate with broad amplexicaul base, 3-6.5 × 0.8-1.5 cm, glabrous.

us or puberulus beneath; sheaths 10-15 mm long, hairy on the fusion commissure. *Panicles* terminal, repeatedly dichotomously branched and spreading; bracts persistent. *Flowers* white; stamens 3; staminodes 3; filaments all bearded. *Capsules* ellipsoid; seeds 3-4 per cell, greyish, rugulose.

Fls. & frts.: Aug.-Sept.; 1800-1950 m.

MEGHALAYA: K. & J. hills.

4. **M. elata** (Vahl) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Commelina elata* Vahl, Enum. Pl. 2: 178. 1806. *Aneilema lineolatum* Kunth, Enum. Pl. 4: 69. 1843. *C. lineolata* Bl. Enum. Pl. Java ed. 1. 3. 1827.

Erect, 0.5-1.3 m high; roots fusiform, ca 10 cm long, 3-5 mm thick. *Stems* 1-3, arising from the axils of the radical leaves, together with panicle-branches, glabrous or pubescent, reddish-green. *Radical leaves* 4-6, suberect, the young one pinkish green beneath, cauline leaves 3-5, smaller; sheaths 1-2 cm long, glabrous or pubescent, ciliate at mouth. *Panicles* terminal, stout, dichotomously branched. *Flowers* blue or white; sepals 6 mm long; petals 7 mm long; stamens 3 or 2; staminodes 3 or 4; filaments all bearded. *Capsules* subglobose, 6-7 mm long, glossy rosy-red, ultimately black; seeds 3-4 per cell, ca 2 mm long, greyish, reticulate.

Fls. & frts.: April-Sept.; 100-1600 m.

ARUNACHAL PRADESH: Kameng. ASSAM: Darrang; Goalpara; Kamrup; Nowgong; Sibsagar. TRIPURA.

5. **M. spirata** (L.) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Commelina spirata* L. Mant. 2: 176. 1771. *Aneilema spiratum* R. Br. Prodr. 271. 1810.

Erect or ascending, usually profusely branched from the base. *Stems* 5-30 cm long, usually with longitudinal rows of hairs, sometimes glabrous. *Leaves* ovate or oblong-lanceolate, cordate or auricled, am-

plexicaul, 1-4 × 0.4-1 cm, usually wavy-margined; sheaths 2-5 mm long, pubescent, truncate. *Panicles* terminal and in the axils of the upper leaves, 1.5-4 cm long, mostly divaricately branched, laxly few-flowered. *Flowers* pink, blue or purple (or sometimes white); staminodes 3; filaments all bearded (or sometimes of staminodes naked). *Capsules* ellipsoid; seeds 3-7 per cell, greyish-brown, rugulose.

Fls. & frts.: July-Oct.; 100-1000 m.

ASSAM: Lakhimpur. MEGHALAYA: K. & J. hills.

6. **M. triquetra** (Wall. ex Clarke) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Aneilema triquetrum* Wall. ex Clarke in DC. Mon. Phan. 3: 208. 1881.

Slender, suberect or ascending. *Stems* 30-45 cm long, pinkish green. *Leaves* lanceolate or ovate-lanceolate, 2.5-8 × 0.6-1 cm, amplexicaul; sheaths 6-8 mm long. *Flowers* axillary, pink or white, on 5-10 mm long, ultimately decurved peduncles; sepals 5 mm long, the tips hispidulous; petals slightly larger; stamens 3; staminodes 3; filaments all bearded. *Capsules* ellipsoid, 6-8 mm long; seeds 3-5 per cell, 1.2 mm long, yellowish-brown, rugulose.

Fls. & frts.: Oct. In marshy places; 300-1700 m.

ARUNACHAL PRADESH: Subansiri. ASSAM: Lakhimpur.

7. **M. nudiflora** (L.) Brenan in Kew Bull. 1952: 189. 1952. *Commelina nudiflora* L. Sp. Pl. 41. 1753, *p. p.*; Merrill in J. Arn. Arb. 18: 64-66. 1937. *Aneilema nudiflorum* Wall. Cat. 5224. 1830; Hook. f. Fl. Brit. Ind. 6: 378. 1892. *M. malabarica* Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Tradescantia malabarica* L. Sp. Pl. ed. 2. 412. 1762.

Slender, creeping and ascending, diffusely branched, sometimes dwarf and tufted. *Stems* 10-50(-110) cm long, glabrous or rarely

pubescent. *Leaves* usually linear-lanceolate, 3-10(-43) × 0.3-0.8(-2) cm, rarely ovate-lanceolate, glabrous or hairy beneath, the base narrowed, rounded or cordate; sheaths 5-10 mm long, pubescent, deeply split. *Panicles* terminal or also in the upper leaf-axils. *Flowers* 2-12 in each cincinnus at the tips of 1-7 cm long branches, white, pink, blue or purple; pedicels 4-5 mm long; sepals 2.5 mm long; petals 4-5 mm long; stamens 2; staminodes 4; filaments all bearded or those of staminodes naked. *Capsules* subglobose, 2.5-4(-6) mm dia.; seeds 1 mm long, brown, reticulate.

Fls. & frts.: June-Jan. In moist places along streams and ditches, and among rocks and pebbles in shallow flowing water; 100-1700 m.

ARUNACHAL PRADESH: Kameng; Subansiri; Tirap. ASSAM: Goalpara; Kamrup; Lakhimpur; Sibsagar. MEGHALAYA: K. & J. hills. TRIPURA.

8. ***M. loriformis*** (Hassk.) Rolla Rao *et* Kam-mathy in Bull. Bot. Surv. Ind. 3: 393. 1961. *Aneilema loriforme* Hassk. in Miq. Pl. Jungh. 143. 1852. *A. nudiflorum* var. *terminalis* (Wt.) Clarke, Comm. *et* Cyrt. Beng. 211. 1874. *A. terminalis* Wt. Ic. t. 2076. 1853 (*non* Haines, 1824).

Stems 2-6 dm long, arising from the axils of the radical leaves and spreading in all directions, glabrous or pubescent. *Radical leaves* 7-16.5 × 1-1.5 cm, glabrous or hairy beneath, the cauline ones smaller; sheaths 7-12 mm long, hairy. *Panicles* laxly branched or unbranched. *Flowers* 3-22 in each cincinnus towards the tips of 2.5-6 cm long branches, pink or purplish blue; pedicels 3-4 mm long; sepals 4 mm long; petals 5 mm long; stamens 2; staminodes 4; filaments of stamens bearded, of staminodes naked. *Capsules* ellipsoid; seeds 2 per cell, pale brown, rugose.

Fls. & frts.: June-Oct.; 150-1600 m.

ARUNACHAL PRADESH: Subansiri; Tirap.

ASSAM: Kamrup; Lakhimpur; Sibsagar. MEGHALAYA: K. & J. hills.

9. ***M. simplex*** (Vahl) Brenan in Kew Bull. 1952: 186. 1952. *Commelina simplex* Vahl, Enum. Pl. 2: 177. 1806. *Aneilema sinicum* Ker-Gawl in Edward, Bot. Reg. t. 659. 1822. *M. sinica* Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930.

Stems about 4-6 arising from the axils of the radical leaves, spreading and rooting below with ascending tips. *Radical leaves* linear, 20-50 × 0.5-1.3 cm, pinkish in age, cauline leaves 7-10 × 1-1.4 cm; sheaths hairy throughout or only at the mouth and fusion commissure, green or purplish. *Panicles* dense-flowered, branches pinkish. *Flowers* pink-purple; pedicels 5-7 mm long; sepals 6 mm long; petals 9-11 mm long; stamens 2; staminodes 4; filaments of stamens bearded, of staminodes bearded or naked. *Capsules* ellipsoid-subglobose, purplish-red on maturity; seeds 2 per cell, subcylindric, whitish-brown, rugulose.

Fls. & frts.: May-Oct.; 1500 m.

MEGHALAYA: K. & J. hills.

10. ***M. gigantea*** (Vahl) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Commelina gigantea* Vahl, Enum. Pl. 2: 177. 1806. *Aneilema giganteum* R. Br. Prodr. 271. 1810.

Roots fusiform. *Stems* erect, 0.3-1 m high. *Radical leaves* few, linear, (15-)20-40 × 0.5-1(-2) cm, glabrous or puberulus beneath, cauline ones shorter; sheaths 2-3 cm long, glabrous. *Panicles* stout, sparingly branched; bracts caducous. *Flowers* blue-violet; pedicels *ca* 7 mm long; sepals 7-8 mm long; petals *ca* 11 mm long; stamens 2; staminodes 4; filaments naked or bearded. *Capsules* ellipsoid, 8-10 mm long; seeds 2 per cell, *ca* 3 mm long, dark brown, faintly pitted.

Fls. & frts.: Aug.-Oct.; 800-1600 m.

MEGHALAYA: K. & J. hills.

11. **M. blumei** (Hassk.) Brachn in Hook. Ic. Pl. t. 3578. 1962. *Dichdespermum blumei* Hassk. Comm. Ind. 41. 1870. *Aneilema hamiltonianum* Wall. ex Clarke in DC. Mon. Phan. 3: 213. 1881. *A. blumei* Bakh. f. in Blumea 6: 398. 1950.

Stems stout, 15-40 cm long; spreading and rooting below. Leaves linear-lanceolate, (1-4.8 × 0.15-1.5) cm, amplexicaul, glabrescent; sheaths 5-7 mm long, glabrous or pubescent, the mouth ciliate. Flowers 1-4 in axillary and terminal clusters, white or pink; pedicels 5-8 mm long; sepals 4 mm long; petals 4-5 mm long; stamens 3; staminodes 3. Capsules oblong, ca 6 mm long; seeds 15-20 per cell, biseriate, ca 1 mm long, black, pubescent or flocculent.

Fls. & frts.: Oct.-Nov. In open moist places; 150-700 m.

The combinations *Aneilema terminalis* (Bl.) Haines (in Bot. Bihar & Orissa pt. 6: 1080. 1924) and *Murdannia terminalis* (Bl.) Raizada (in Ind. For. 84: 499. 1958) based on *Tradescantia terminalis* Blume (in Enum. Pl. Java ed. 1. 6. 1827) with citation of *Aneilema hamiltonianum* Wall. ex Clarke as their synonym have been mistakes, probably because of wrong understanding of *Tradescantia terminalis* Blume, which is altogether different from *A. hamiltonianum* and is now considered synonymous to *Cyanotis moluccana* (Roxb.) Merr. (in Philipp. J. Sci. 2: 266. 1907).

ASSAM: Lakhimpur. MEGHALAYA: K. & J. hills.

12. **M. vaginata** (L.) Brueckn. in E. & P. Pflanzenfam. ed. 2. 15a: 173. 1930. *Commelina vaginata* L. Mant. 2: 177. 1771. *Aneilema vaginatum* R. Br. Prodr. 271. 1810.

Slender, erect or suberect. (7-) 15-45 cm high, sometimes rooting at the lower nodes. Leaves linear-lanceolate, 4-20 × 0.4-1 cm, glabrous or sparsely hairy beneath; sheaths 8-10 mm long, split almost to the base, mar-

gins ciliate. Flowers 1-3-together, fascicled in the axils of a few, distant, 8-15 mm long, linear-lanceolate sheathing bracts, blue-violet; pedicels 1-1.5 cm long, pubescent; sepals 4-5 mm long, pubescent; petals ca 5 mm long; stamens 2; staminodes 4; filaments of stamens bearded, of staminodes usually naked. Capsules globose, 3-4 mm dia.; seeds ellipsoid, ca 2 mm long, black, rugose.

Fls. & frts.: July. In muddy places along rivers; 150 m.

ASSAM: Darrang.

5. **Amischotolype** Hassk. in Flora 46: 391. 1863.

A. mollissima (Bl.) Hassk. var. **marginata** (Bl.) Rolla Rao in Maharashtra Vidnyan Mandir Patrika 6(2): 53. 1971. *Campelia mollissima* Bl. Enum. pl. Java 1: 7. 1827; *C. marginata* Bl. *ibid.* 1: 7. 1827. *Forrestia hispida* Less. & Rich. Sert. Astrolab. 2. t. 1. 1834. *F. mollis* Hassk. in Flora 47: 628. 1864. *F. mollissima* (Bl.) Kds. var. *hispida* (A. Rich.) Backer in Handbook Fl. Java 3: 33. 1924. *F. mollissima* (Bl.) Kds. forma *marginata* (Bl.) Backer, Fl. Java, 3: 15. 1968.

Robust perennials. Stems 0.5-3.3 m high, 5-20 mm thick; erect, creeping and rooting at the lower nodes, yellowish-brown inside, with 3-8 cm long internodes. Leaves elliptic or obovate-oblong, caudate, 15-36 × 3-12 cm, base gradually narrowed into the sheath or a short petiole, upper surface glabrous, lower surface usually with a fringe of hairs along nerves but sometimes obscurely so; margins fringed with hairs; blades caducous leaving the persistent tubular sheaths covering almost the whole of the stem; sheaths about as long as the internodes, brownish-green, pubescent or subvilous; mouth ciliate. Flowers about 6-12-together, insubsessile, capitate cymes, actinomorphic, usually red-violet, sometimes pale or almost white; bracts ovate, ca 2 mm

long, hairy; sepals 5-8 mm long, pubescent or glabrescent; petals lanceolate, 4-6 mm long; stamens 6; filaments short, bearded; anthers narrowly ovoid; ovary 3-celled; style simple, filiform. *Capsules* ellipsoid, 3-valved, 10-18 mm long, shortly beaked, glabrous, pink-red or purple; seeds 2 per cell, superposed, ovoid, *ca* 4 mm long, bright red, rugose.

Fls.: March-July; *frts.*: July-Jan. Common as forest undergrowth; 100-1400 m.

Highly variable in pubescence and size of parts. Numerous varieties recognised originally under *Forrestia* have been merely transferred to the new name *Amischotholype* Hassk., on the Committee of Nomenclature adopting this name, rather than conserve the illegitimate homonym *Forrestia* A. Rich. Rolla Rao (*l.c.*) has explained the position and made some nomenclatural changes. Backer (in *Fl. Java* 3: 15, 1968, under *Forrestia* A. Rich.) has treated the three varieties *glabrata*, *marginata* and *mollissima* as only forms of *F. mollissima*. The species needs a detailed review and a biosystematic study of populations in its large area of distribution.

ARUNACHAL PRADESH: Kameng; Lohit; Subansiri; Tirap. ASSAM: Darrang; Kamrup; Lakhimpur; N. Cachar & Mikir hills; Sibesar. MEGHALAYA: Garo hills; K. & J. hills.

6. **Cyanotis** D. Don, Prodr. Fl. Nepal. 45. 1825, *nom. cons.*

Annuals or perennials, creeping with ascending tips, rooting at lower nodes. *Leaves* all cauline or cauline and in radical clusters, sessile. *Flowers* embraced by spathaceous bracts, bisexual, actinomorphic, usually only just the top emerged, the rest hidden within the bracts; bracts several, biserial, imbricate, in curved terminal and axillary cincinni; sepals subequal, lanceolate, free or connate below; petals subequal, united below into a tube, lobes ovate-suborbicular; stamens 6, subequal; filaments bearded, thickened at tips; anthers oblong; ovary 3-celled, ovules 2 per cell, superposed; style slender, thickened at tip, usually bearded. *Capsules* 3-celled, hairy at tips; seeds usually 2 per cell, sometimes 1 or absent, truncate at both ends, rugose or pitted.

1a. Bracts and sepals glabrous or ciliolate on the margins only ...

C. cristata 1.

1b. Bracts and sepals floccosely silky.

2a. Perennials, bulbiferous. Leaves radical and cauline, linear-ensiform, 5-30 × 0.4-1.5 cm, about 10-20-times longer than broad ...

C. vaga-2.

2b. Annuals. Leaves all cauline, ovate-lanceolate or linear-lanceolate, 1-8 × 0.5-1.2 cm, about 2-8-times longer than broad ...

C. fasciculata-3.

1. **C. cristata** (L.) D. Don, Prodr. Fl. Nepal. 46. 1825. *Commelina cristata* L. Sp. Pl. 42. 1753.

Perennials. *Stems* 1-6 dm long, glabrous or with a longitudinal row of hairs. *Leaves* lanceolate or oblong-lanceolate, 3-10 × 0.7-2 cm; base rounded or cordate; margins ciliolate; sheaths ciliolate at mouth. *Cincinni* 1-2.5 cm long, sessile or on upto 12 cm long peduncles; bracts falcate, ovate-lanceolate, 8-15 mm long, apiculate. *Flowers* blue-violet; sepals free or shortly connate; corolla-tube

5-7 mm long; lobes 3-4 mm long. *Capsules* oblong-ellipsoid, 2.5-3.5 mm long, truncate; seeds subtrigonous, *ca* 1 mm long, greyish-black, striate, in mature seeds with two large pits on two of their outer faces.

Fls. & frts.: June-Sept. In moist and muddy places, along streams and ditches; 100-1600 m.

ARUNACHAL PRADESH: Kameng; Tirap. ASSAM: Goalpara; Kamrup; N. Cachar & Mikir hills. MEGHALAYA: Garo hills; K. & J. hills. NAGALAND. TRIPURA.

2. **C. vaga** (Lour.) J. A. & J. H. Schultes in R. & S. Syst. Veg. 7: 1153. 1830; Rolla Rao in Notes Roy. Bot. Gard. Edinb. 25: 186. 1964. *Tradescantia vaga* Lour. Fl. Cochinch. 1: 239. 1790. *C. barbata* D. Don, Prodr. Fl. Nepal. 46. 1825.

Perennials, usually almost the whole plant floccosely silky. *Bulbs* ovoid, 1.5-2 cm long, pinkish-brown outside, brownish-white inside. *Stems* 1-10 dm long, creeping with ascending tips. *Leaves* 3-5 radical, the rest cauline; radical ones 12-30 × 0.4-0.8 cm; cauline leaves 5-18 × 0.4-1.5 cm; sheaths 2-3.5 cm long; mouth ciliate. *Cincinni* 1-3 cm long, sessile or on upto 7 cm long peduncles; bracts falcately ovate, 7-9 mm long, acute. *Flowers* blue; sepals shortly connate; corolla-tube ca 7 mm long; lobes ca 4 mm long. *Capsules* subquadrate, ca 3 mm long; seeds ca 1.5 mm long, greyish-brown, pitted.

Fls. & frts.: July-Nov. In waste-lands, often colonising; 200-1700 m.

ARUNACHAL PRADESH: Subansiri. ASSAM: Nowgong. MEGHALAYA: K. & J. hills. NAGALAND: .

3. **C. fasciculata** (Heyne ex Roth) J. A. & J. H. Schultes in R. & S. Syst. Veg. 7: 1152. 1830. *Tradescantia fasciculata* Heyne ex Roth, Nov. Pl. Sp. 189. 1821.

Annuals, floccosely silky throughout or only near nodes, bracts and sepals. *Stems* 5-30 cm long. *Cincinni* 6-16 mm long; peduncles solitary or more together, 0.5-3 cm long; bracts ovate-lanceolate, 5-8 mm long. *Flowers* blue, purple or pink; sepals ca 4 mm long; corolla-tube 5-6 mm long; lobes ca 3 mm long; filaments blue- or white-bearded. *Capsules* oblong, ca 4 mm long; seeds rugulose.

Fls. & frts.: Sept.; 900-1300 m.

ARUNACHAL PRADESH: Kameng. MEGHALAYA: K. & J. hills.

7. **Amischophacelus** Rolla Rao et Kammathy in J. Linn. Soc. Bot. 59: 305-306. 1966.

- A. axillaris** (L.) Rolla Rao et Kammathy, l.c. 306. *Commelina axillaris* L. Sp. Pl. 42. 1753. *Cyanotis axillaris* D. Don, Prodr. Fl. Nepal. 46. 1825.

Perennials, slender, diffusely branched, creeping and rooting below, with suberect or ascending branches, 15-75 cm long. *Leaves* linear or ensiform, 4-15 × 0.3-1.2 cm, glabrous or sparsely hairy; sheaths 6-10 mm long, swollen and enclosing the flowers, glabrous or ciliate at mouth. *Flowers* 1-6, in sessile, axillary fascicles, only their tops emerging from the leaf-sheaths, blue or pink; bracts minute, linear-lanceolate, glabrous or ciliate; sepals lanceolate, hyaline, keeled, 8-10 mm long; corolla-tube 8-12 mm long; lobes broadly ovate, 4-6 mm long; filaments blue-bearded, together with style, thickened at the tip. *Capsules* 3-celled, oblong-ellipsoid, beaked, 6-7 mm long, hairy at the tip; seeds subcylindric, ca 1.5 mm long, glossy brown-mottled, scrobiculate.

Fls. & frts.: Sept.-Nov. In moist places, near ditches; 150-800 m.

ASSAM: Kamrup. MEGHALAYA: K. & J. hills.

8. **Streptolirion** Edgew. in Proc. Linn. Soc. 1: 254. 1845 et in Trans. Linn. Soc. 20: 90. t. 2. 1846.

- S. volubile** Edgew. in Trans. Linn. Soc. 20: 90. t. 2. 1846.

Climbers or stragglers, upto 10 m high, sometimes creeping and rooting at the lower nodes. *Stems* branched, glabrous or sparsely hairy. *Leaves* broadly ovate or suborbicular, 5-10 cm long, cordate, abruptly acuminate to 10-25 mm long tip, curvinnerved; upper and lower surfaces glabrous, puberulus or hairy, often with a pattern of dark blotches at base (usually not seen when dry), on the upper surface; margins fringed with hairs; petioles 5-16 cm long, glabrous or hairy; sheaths 15-35 mm long, glabrous or hairy, ciliate at mouth. *Flowering branches* arising from the base of the leaf-

sheaths, with a tubular sheath near its base and a foliaceous bract upwards just below the floriferous part. *Flowers* in paniced cincinni, white, pink or lilac; sepals oblong, 4-5 mm long; petals linear, 4-5 mm long; stamens 6; filaments *ca* 2 mm long, bearded with yellow hairs; connectives as broad as or even broader than long with narrow anther-cells on its margins; ovary 3-celled; ovules 2 per cell, superposed; style filiform; stigma obconic, ciliolate. *Capsules* oblong, trigonous, beaked, *ca* 8 mm long, glabrous or hairy; seeds ovoid, *ca* 2 mm long, rugose.

Fls. & frts.: June-March; 600-2000 m.

var. **khasiana** Clarke (in DC. Mon. Phan. 3: 261. 1881) distinguished on the more hairy nature of the Khasi hill plants, as compared to the Himalayan plants, may not be distinct because of the high variability in hairiness, as observed in the Himalayan plants from Arunachal Pradesh. However, on the basis of cytological studies Rolla Rao *et al.* (in Bull. Bot. Surv. Ind. 6: 1-6. 1964) considered it to be a distinct variety, but later (in J. Linn. Soc. Bot. 60: 370. 1968) modified their opinion and state "it is probable that stabilization of a new variety is in progress through aneuploidy and alteration in the morphology of the chromosomes."

ARUNACHAL PRADESH: Kameng; Lohit; Siang; Subansiri; Tirap. MEGHALAYA: K. & J. hills. NAGALAND.

9. **Floscopa** Lour. Fl. Cochinch. 192. 1790.

F. scandens Lour. l.c. 193.

Perennials. *Stems* creeping and rooting below, glabrous or hairy. *Leaves* elliptic-lanceolate, 4-15 × 1-3.5 cm, scaberulous above, glabrous or pubescent beneath; sheaths loose, 1-2.5 cm long, glabrous or hairy, mouth ciliate. *Cymes* terminal and in the axils of the upper-most leaves, dense, much-branched, densely glandular hairy, the whole forming a pyramidal, 3-15 cm long inflorescence. *Flowers* bisexual, zygomorphic, on 1.5-3 mm long pedicels; sepals free, 2-3 mm long, persistent; petals free, slightly longer than the sepals, white, pink or lilac, two posterior ones obovate, the third anterior narrower, lanceolate; stamens 6, all fertile, subequal (or sometimes 3 smaller); filaments naked, purplish; ovary shortly stipitate, 2-celled, compressed, cells 1-ovuled; style simple. *Capsules* suborbicular-ellipsoid, compressed, 2-valved, *ca* 3 mm long, crustaceous, acute; seeds 1 per cell, elliptic, *ca* 1.5 mm long, whitish.

Fls. & frts.: Jan.-Sept. In marshy places; 100-2000 m.

ARUNACHAL PRADESH: Kameng; Lohit; Siang; Subansiri; Tirap. ASSAM: Cachar; Lakhimpur; N. Cachar & Mikir hills; Sib-sagar. MEGHALAYA: Garo hills; K. & J. hills. MIZORAM. TRIPURA.