

## CRASSULACEAE (C. A. Backer, Heemstede)

Herbs or undershrubs, usually succulent, perennial, less often annual or biennial. *Leaves* spirally arranged, opposite or whorled, exstipulate, simple or compound, entire, dentate, crenate, serrate or deeply incised. *Flowers* ♀, rarely unisexual, actinomorphic, usually cymose or cymose-paniculate, rarely spicate or solitary in leaf-axils, pedicelled or sessile, mostly 4–5-, rarely 3- or polymericous. Sepals free or nearly so, or united into a distinct tube, after anthesis marcescent and persistent as are the petals. *Petals* the same number as sepals, rarely more, hypogynous, free or variously connate. Stamens either as many as petals and alternate with them or twice their number, perigynous or all or partly inserted on the corolla; filaments free from each other; anthers 2-celled; cells introrse, dehiscing longitudinally. Hypogynous scales as many as carpels, placed singly at the back of them, free or at the base adnate to the base of the carpels. *Carpels* superior, the same number as petals, epipetalous, free or connate at the base, 1-celled. Ovules inserted on the adaxial side, mostly many, biseriate, rarely solitary or few. Styles as many as carpels, free, linear or subulate, short to long. *Fruit* follicular, membranous or leathery, opening on the adaxial side. Seeds minute, endosperm usually fleshy; embryo straight.

*Distr.* About 20 genera and upwards of 700 *spp.*, in the frigid, temperate and warm regions of Europe, Asia, Africa, northern and tropical America, rare in S. America and Australia, absent from Polynesia.

*Ecol.* Mainly plants of sandy, stony, rocky, sunny localities.

*Uses.* Some species are used for medicinal purposes, many are cultivated as ornamentals.

### KEY TO THE GENERA

1. Petals free or very shortly connate . . . . . 1. *Sedum*  
1. Petals united more than halfway up into a distinct tube . . . . . 2. *Kalanchoë*

### 1. SEDUM

LINNÉ, *Sp. Pl.* 1 (1753) 430; *Gen. Pl. ed. 5* (1754) *no* 513.

Annual or perennial, erect, ascending or prostrate, sometimes caespitose or muscoid, fleshy herbs, rarely undershrubs, glabrous or glandular pubescent. *Leaves* very variable, alternate, opposite or verticillate, entire or serrate, rarely lacinate, flat or subterete, often spurred at the back of the base. *Flowers* usually in terminal cymes, rarely spicate or solitary in leaf-axils, ♀ or by abortion unisexual. Sepals 4–5, free or almost so. Petals as many, rarely 6–7, free, yellow, white or purple. Stamens as many as petals or usually twice their number, perigynous; epipetalous ones often adnate at the base to the base of the petals. Filaments filiform or subulate; anthers short, 2-lobed. Hypogynous scales entire or emarginate. Carpels 4–5, free or connate at the base, each narrowed into a longer or shorter style. Styles stigmatose on the inner side of the apex. Ovules usually several, rarely solitary or few. *Follicles* 4–5, free, erect or spreading, 1–∞-seeded.

*Distr.* Species upwards of 350, mainly in the temperate and frigid zones of the N. hemisphere, a few in the S. hemisphere, absent from S. America S of Peru, Antarctica and Australia, in the tropics restricted to the mountains, also in Formosa. In *Malaysia* only one species in Luzon.

*Ecol.* Most species prefer sandy or rocky places. Many are cultivated as ornamentals.

1. *Sedum ambiflorum* R. E. CLAUSEN, *Cact. & Succ. J.* 18 (1946) 58.—*S. australe* MERR. *Gov. Lab. Publ.* 29 (1905) 16, *non* ROSE (1903); *Philip. J.Sc.* 5 (1910) Bot. 350; *En. Philip.* 2 (1923) 217; STEEN. *Bull. J.B.B.* III, 13 (1934) 195.

Succulent, entirely glabrous, probably perennial herb, 8–15 cm high, with a not very strong, creeping rootstock. Stems arising at intervals from the rootstock, erect or suberect, thin or thickish, simple or sparingly branched. Roots thin. *Leaves*

rather crowded, alternate, sessile, oblong-obovate-spathulate, flat, obtuse, quite entire, fleshy, at the back of the base produced into a downward pointing, short, broad, obtuse spur, 5–20 by 3–6 mm. Cymes rather small, 3- to many-flowered, rather dense. *Flowers* sessile, sometimes with 1 or more leaves at the base. Calyx 3–4 mm long, 5-fid to quite near the base; segments distinctly unequal, rather narrow, slightly tapering towards the very obtuse, thickened apex, marked with many short, in sicco purplish streaks. *Petals* 5, free, bright yellow, elongate-ovate, very acute, 5–7 mm long. Stamens 10; filaments rather long but distinctly shorter than the corolla; epipetalous ones with their base adnate to the base of the petals. Hypogynous scales small, subcuneate, slightly emargin-

ate. Carpels 5, shortly connate at the base. Styles  $\pm 2$  mm. *Follicles* widely spreading, ovoid, acuminate, gibbous at the base of their inner sides, crowned by the recurved styles,  $\pm .5$  mm long. Seeds (not seen) in each carpel 15 or fewer, oblong-cylindrical, shortly apiculate, minutely punctulate throughout,  $\pm \frac{3}{4}$  by  $\frac{1}{2}$  mm.

Distr. *Malaysia*: Philippines (Luzon).

Ecol. Boulders, crags, rock-crevices, 1200–2500 m.

Note. In the latest monograph of the genus by FRÖDERSTRÖM (Acta Hort. Göteborg. 10, 1935, App. 239) this species is tentatively reduced to *S. aizoon* L., which differs by *unspurred*, usually dentate leaves and larger dimensions. *S. aizoon* L. occurs in Siberia, China, and Japan.

## 2. KALANCHOË

ADANS. Fam. 2 (1763) 248 (*Calanchoë* AUCT.).—*Bryophyllum* SALISB. Parad. Lond. (1805) t. 3.

Erect or ascending, very succulent, herbaceous perennials, rarely woody up to 6 m. *Leaves* either simple and then entire or more or less deeply incised (often spuriously pinnate) or trifoliolate or pinnately 5-foliolate. *Flowers* terminal in corymbose or paniculate cymes, pedicelled. Calyx more or less deeply 4-lobed or 4-fid. Corolla distinctly gamophyllous, 4-lobed less than halfway down; segments patent or recurved. Stamens 8, inserted on the corolla-tube, 2-seriate. Hypogynous scales 4. Ovaries 4, in the Malaysian species erect, free or slightly connate at the base, each narrowed into an erect longish filiform style, many-ovuled. *Follicles* 4, enclosed by the withered calyx and corolla. Seeds  $\infty$  (often not developing in Malaysia).

Distr. Species  $\pm 60$  or more acc. to BERGER (in E. & P. ed. 2, 18a, 1930, 404), centering in Madagascar and Africa, few *ssp.* in Asia, one probably native in the drier parts of *Malaysia*, two introduced from tropical Africa and naturalized, sometimes on a large scale, and one exclusively (and rarely) cultivated.

Ecol. Mainly inhabitants of dry rocky or sandy, sunny or slightly shaded localities.

Uses. Sometimes cultivated for medicinal or ornamental purposes.

Notes. See for chromosome numbers BALDWIN, Am. J. Bot. 25 (1938) 572–579.

### KEY TO THE SPECIES

1. Flowers pendulous. Pedicels  $\frac{3}{4}$ –2 $\frac{1}{2}$  cm. Calyx divided much less than halfway down, 1 $\frac{1}{2}$ –4 cm long. Corolla-segments red; tube much constricted above the longitudinally furrowed base, widened above the constriction. Stamens inserted far beneath the middle of the corolla-tube at the apex of the basal widening. Hypogynous scales broadly ovate or subrectangular. Styles longer than the ovaries. Detached leaves producing young plants from the crenatures of their margins and sometimes also from the midrib.
2. Calyx terete, 2 $\frac{1}{2}$ –4 cm long. Corolla totalling 3–5 $\frac{1}{2}$  cm, its base with 8 deep folds; segments ovate-lanceolate, caudately acuminate, 1 $\frac{1}{4}$ –1 $\frac{3}{4}$  cm long. Stem under the inflorescence subterete or obtusely quadrangular. Leaves simple or 3- or 5-foliolate . . . . . 1. *K. pinnata*
2. Calyx quadrangular, 1 $\frac{1}{2}$ –2 cm long. Corolla totalling 2–2 $\frac{1}{2}$  cm, its base not deeply folded; segments shortly acuminate, 3–5 mm long. Upper part of the stem immediately under the inflorescence acutely quadrangular. Larger leaves deeply pinnately 5–11-fid . . . . . 2. *K. prolifera*
1. Flowers erect or erecto-patent. Pedicels 4–10 mm. Calyx divided almost to the very base, 4–12 mm long. Corolla-segments yellow or orange-yellow; tube lageniform, quadrangular, 1–2 cm long. Stamens inserted in the upper half of the corolla-tube. Hypogynous scales narrowly linear-subulate. Styles shorter than the ovaries. Stem terete or obtusely quadrangular. Detached leaves not producing plants from their margin, neither from the midrib.
3. Larger leaves deeply pinnatifid or bipinnatifid, with narrow segments . . . . . 3. *K. laciniata*
3. Leaves crenate-serrate-biserrate, not deeply incised . . . . . 4. *K. integra*

1. *Kalanchoë pinnata* (LAMK) PERS. Syn. (1805) 446; BL. Bijdr. (1826) 1138; MIQ. Fl. Ind. Bat. 1, 1 (1856) 728; Sum. (1860) 134; HAMET, Bull. Herb. Boiss. II, 8 (1908) 21; BACKER, Schoofl. (1911) 473; KOORD. Bull. J.B.B. III, 1 (1919) 171; HEYNE, Nutt. Pl. (1927) 687; PERR. DE LA BÂTH. Arch. Bot. 2 (1928) 20; BACKER, Bekn. Fl. Java, em. ed. 4 (1942), fam. 51, p. 2; STEEN. Fl. Sch. Indon. (1949) 193.—*Cotyledon pinnata* LAMK, Dict. 2 (1786) 141.—*Bryophyllum calycinum* SALISB. Parad. Lond. (1805) t. 3; SIMS, Bot. Mag. 34 (1811) t. 1409; DC. Prod. 3 (1828) 396. CLARKE in HOOK. f. Fl. Brit. Ind. 2 (1878) 413; BAILEY, Queensl. Fl. 2 (1900) 545; MERR. Philip. J.Sc. 3 (1908) Bot. 84; Fl. Manila (1912) 218; KOORD. Exk. Fl. 2 (1912) 299; GAGN. Fl. Gén. I.C. 2 (1920) 698, f. 71; RIDLEY, Fl. Mal. Pen. 1 (1922) 688.—*Cotyledon calycina* ROTH, Nov. Pl. Sp. (1821) 217.—*Cotyledon rhizophylla* ROXB. Fl. Ind. ed. CAREY 2 (1832) 456.—*Cotyledon paniculata* (non LINNÉ f.) BLANCO, Fl. Fil. (1837) 381.—*Bryophyllum germinans* BLANCO, Fl. Fil. ed. 2 (1845) 220; ed. 3, 2 (1878) 47, t. 147.—*Bryophyllum pinnatum* (LAMK) OKEN, Allg. Naturgesch. 3 (1841) 1966; KURZ, J. As. Soc. 40<sup>2</sup> (1876) 309; MERR. Philip. J.Sc. (1910) Bot. 351; Fl. Man. (1912) 218; Interpr. Herb. Amb. (1917) 243; Sp. Blanc. (1918) 161; En. Born. (1921) 286; En. Philip. 2 (1923) 217; BURK. Ec. Prod. (1935) 376.—Fig. 1.

Robust, unbranched herb, 0.3–2 m high, glabrous (barring outside of corolla-base; see beneath), in the basal part often somewhat woody, ascending from a rooting base or often quite erect; younger part of stem with swollen nodes, green with dark purple blotches. Adult plants leafy only in the upper half or, during anthesis, almost or quite leafless. Pairs of leaves in young plants rather crowded, in old ones remote; lowest leaves not deeply divided, middlemost ones of robust plants often palmately trifoliolate, less often pinnately 5-foliolate. Leaves or leaflets oval-oblong (the lateral ones from an oblique base), obtuse, crenate or doubly crenate, 5–20 by 2½–5 cm; highest floral leaves small, simple, narrow; all leaves thickly fleshy, bordered with purple. Petiole semi-amplexicaulous with a much broadened base, 1½–10 cm long; lateral petiolules short. *Cymes* paniced; panicles much varying in size, 10–80 cm long, rather lax; cymes often many-flowered, their peduncles erecto-patent, patent or ascending, 3–8 cm. Calyx terete from a rounded, in the centre slightly intruded base, green, strongly tinged with purple; segments ovate-triangular, very acutely acuminate, ¾–1¼ cm long, somewhat less wide. *Corolla* in lower half green, in upper half (especially the exerted part) red; tube much constricted above the ellipsoid or subglobose, 1–1¼ cm long, strongly 8-folded base, which bears on the outside, especially in the lowest part, numerous short, thickish glandular hairs; folds much prominent, alternately narrow and placed opposite the corolla-segments, and wide and alternating with these; constricted part short, narrow, quadrangular, gradually passing into the much widened, slightly ventricose, obtusely quadrangular upper part; segments recurved. *Fila-*

*ments* green at base, pinkish upward, up to 3½ cm long, slightly exerted. Hypogynous scales adhering at the base to the bases of the ovaries, subrectangular, yellow, 2–2½ by 1¾–2 mm. *Ovaries* ovoid-oblong, free or connate at the very base, green, glabrous, ¾–1 cm long, narrowed into

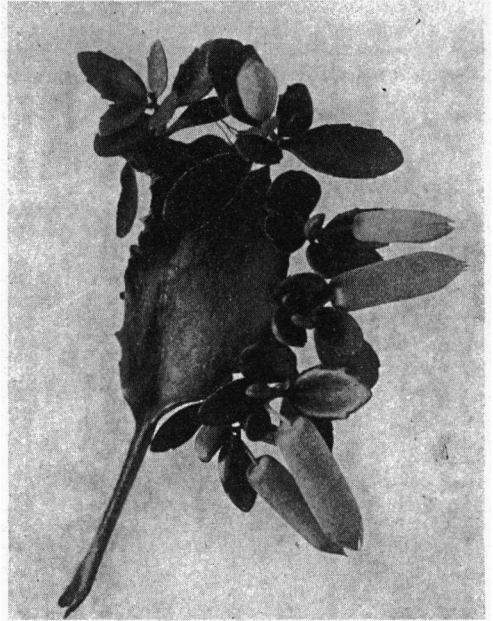


Fig. 1. *Kalanchoë pinnata* (LAMK) PERS. with 1-flowered plantlets on a leaf which was still attached to the plant (v. D. MEER MOHR).

the styles 2½–3½ cm long. Seeds (not seen) ellipsoid-oblong, obscurely longitudinally striate.

*Distr.* Supposed to have originated from trop. Africa, the centre of the genus, but since long carried over to other countries, at present pantropical. Introduced into *Malaysia* very long ago, at present throughout the Archipelago.

*Ecol.* From the plains up to ± 1000 m, in sunny or slightly shaded places, either stony or not, but always dry and never very far from human habitations, locally often gregarious. Not rarely cultivated, either as a medicinal plant or for its curious habit of producing single young plants from the crenatures of the leaves either still attached to the plant, or, more often, cut off and hung in a shaded spot on a wall.

*Uses.* Pounded leaves are used for headache and for poulticing, also as a remedy for fever. In N. Sumatra the plant is used in rice-ceremonies.

*Vern.* *Wonderblad* (= miracle leaf), D, *life-plant*, E, *buntiris*, S, *tjotjor bèbèk* (with many variants), M, *sosor bèbèk*, J; local names: *gegamed* (Gajo), *dingin dingin, kapal kapal* (Batak), *kunambol* (Minahassa), *buntiris keneng*, S, *daun tumbu-*

daun (Banka), *didindin banen* (Atjeh), *daun sêdjuk*, *M*, *sêphori* (Palemb.), *tjèkèr bèbèk*, *tj. itik*, *M*, *djampè*, *djukut kawasa*, *tèrè*, *S*, *suru bèbèk*, *sosor bèbèk*, *tèrè*, *tudju dèngèn*, *J*, *daun antjar bèbèk*, *d. ghamèt*, *djampè*, *tjorbèbè*, *tjotjor bhbihik*, *tj. ètèk*, *tombu daun*, *Md*, *kadju tèmor* (Kangean), *mamala* (Halmah.), *raoe kuftri* (Ternate), *kabi kabi* (Tidore); Philippines: *abisràna* (Ilk.), *angélica* (Sp.), *aritana* (Bik.), *balangbáng* (If.), *ihngiŋga* (Ig.), *kapal kapal* (Sul.), *karitana* (Bis.), *katakataká* (Tag.), *kokung* (Bon.), *lapak lapak* (Sul.), *putpútok* (Bon.), *siempreviva* (Sp.). Mal. Peninsula: *sédingin*, *séringin*, *kérenchong*, *sétawar padang*, *tumboh daun*, *ganti batang*, *rajaŋ bangun*.

Note. The young plants developing on the leaves fall off after having produced some roots and a thin stem bearing a few small leaves. They may be transported by rain-wash. In Malaysia the plant never fruits.

A precocious flowering of marginal plantlets was observed by FORBES in Java (Natur. Wand. 1885, 82) later affirmed on specimens from NE. Sumatra by J. KUYPER (Trop. Natuur 20, 1931, 96, fig.): each plantlet had 5–7 leaves and a terminal flower. Specimens of this peculiar race were cultivated at Bogor for some years by Dr F. W. WENT (fig. 1).

2. *Kalanchoë prolifera* (BOWIE) HAMET, Bull. Herb. Boiss. II, 8 (1908) 19; KOORD. Bull. J.B.B. III, 1 (1919) 172; BACKER, Bekn. Fl. Java, em. ed. 4 (1942) fam. 51, p. 3.—*Bryophyllum proliferum* BOWIE msc. in CURT. Bot. Mag. III, 15 (1859) t. 5147; Fl. des Serres 23 (1880) 209.

Robust, erect, quite glabrous, 1/2–2 m high. Lowest leaves and topmost ones of flowering specimens not deeply divided; middle ones profoundly pinnatisect, spuriously odd-pinnate, with 2–5 pairs of lateral segments and an odd one; segments oblong, slightly or rather deeply crenate, green, usually with purple borders, very fleshy, 5–22 1/2 by 2–8 cm; petiole robust, semi-amplexicaulous. *Panicle* terminal, erect, 50–80 cm long, many-flowered; rachises of inflorescence obtusely quadrangular or subterete. Calyx segments broad, cuspidate. *Corolla* 2–2 1/2 cm long, distinctly constricted above the subglobose, not deeply furrowed base, widened above the constriction, shortly 4-lobed; segments ovate, shortly acuminate, red, 3–5 mm long. Filaments slightly exerted from the corolla-tube. Hypogynous scales broadly ovate with a rounded apex, slightly broader than long, 1 1/2–2 mm long. *Ovaries* appressed against each other. Fruit?

Distr. Native of Madagascar, in Malaysia introduced into Java long ago (date unknown; collected there for the first time in Febr. 1894); at present copiously naturalized in some mountainous districts of the western part.

Ecol. Hedges, thickets, road-sides between 1000 and 1600 m, locally numerous and sometimes gregarious, but, on the whole rare. *Fl.* never in the lower regions and rarely (March–Aug.), but sometimes profusely, in the mountainous zone. Fruits seem never to be produced in Java.

Uses. Sometimes cultivated as a hedge-plant, also at much lower altitudes (down to 150 m).

Vern. *Buntiris*, *S*.

Notes. Young plantlets frequently develop at the bases of the pedicels and from the marginal crenations and the midrib of the leaflets (either still attached to the plant or not). A single leaf can give birth to as many as 50 plantlets, which soon fall off and may be distributed by rain-wash.

3. *Kalanchoë laciniata* (LINNÉ) PERS. Syn. (1805) 446; DC. Plant. Hist. Succ. (1799–1829) t. 100; BL. Bijdr. (1826) 1138; DC. Prod. 3 (1828) 395; ROXB. Fl. Ind. ed. CAREY 2 (1832) 456; MOR. Syst. Verz. (1845/46) 39; MIQ. Fl. Ind. Bat. 1, 1 (1856) 728; Sum. (1860) 134; BRITTEN, Fl. Trop. Afr. 2 (1871) 392; NAVES in BLANCO, Fl. Filip. ed. 3 (1878) t. 146; CLARKE in HOOK. f. Fl. Br. Ind. 2 (1878) 415; BACKER, Schoolfl. (1911) 473; KOORD. Exk. Fl. 2 (1912) 300; MERR. Fl. Man. (1912) 218; Interpr. Herb. Amb. (1917) 243; Sp. Blanc. (1918) 161; KOORD. Bull. J.B.B. III, 1 (1919) 173; RIDL. Fl. Mal. Pen. 1 (1922) 689; MERR. En. Philip. 2 (1923) 217; HEYNE, Nutt. Pl. (1927) 686; BURK. Ec. Prod. (1935) 1277; BACKER, Bekn. Fl. Java, em. ed. 4 (1942) fam. 51, p. 2.—*Planta anatis* RUMPH. Herb. Amb. 5, 275, t. 95.—*Cotyledon laciniata* LINNÉ, Sp. Pl. (1753) 430; BURM. f. Fl. Ind. (1768) 106.—*Kalanchoë acutiflora* HAW. Syn. Pl. Succ. (1819) 109; DC. Prod. 3 (1828) 395; SPAN. Linnaea 15 (1841) 207.—*Cotyledon lanceolata* BLANCO, Fl. Filip. (1837) 382, non FORSK.—*C. serrata* BLANCO, Fl. Filip. (1837) 382, non L.—*Bryophyllum serratum* BLANCO, Fl. Filip. ed. 2 (1845) 220; ed. 3, 2 (1878) 48.—*Bryophyllum triangulare* BLANCO, Fl. Filip. ed. 2 (1845) 221; ed. 3, 2 (1878) 48.

Erect, rather robust, not or sparingly branched, very fleshy, 1/3–1 1/4 m high. Stem terete, either glabrous (so in the few Malaysian specimens seen by me) or clothed, as well as the inflorescence, with scattered minute crisped hairs; lower internodes short, intermediate and higher ones gradually long. *Leaves* numerous, very variable; the lowest simple, oval, undulate-dentate, shortly petioled or sessile; intermediate ones deeply pinnatifid or bipinnatifid, with narrow, oblong or linear, acute, more or less canaliculate, coarsely dentate-serrate segments, pale glaucous green, ± tinged with purple when young, 8–15 cm long; their petioles 2 1/2–4 cm, fleshy, flattened on the anterior side, with a much broadened, semi-amplexicaul base; upper leaves much smaller, narrow, often entire or almost so. *Panicles* 10–30 cm long, consisting of many-flowered rather dense cymes, the lower long peduncled; bracts linear, plano-convex, small. *Calyx* green, variable as to size, 4–10 mm long, glabrous or pubescent, segments erect or erectopatent, ovate-lanceolate, tapering towards the acute apex. *Corolla* salver-shaped; tube very distinctly widened downwards, ± 1 1/4 cm long, green at the base, yellowish upwards; segments 4, widely patent, bright yellow, oval or oval-oblong, glabrous (Malaysian specimens) or pubescent, acute, ± 1 cm long. Anthers slightly exerted. Hypogynous scales entire, 3–3 1/2 mm long. *Ovaries* lanceolate, glabrous,

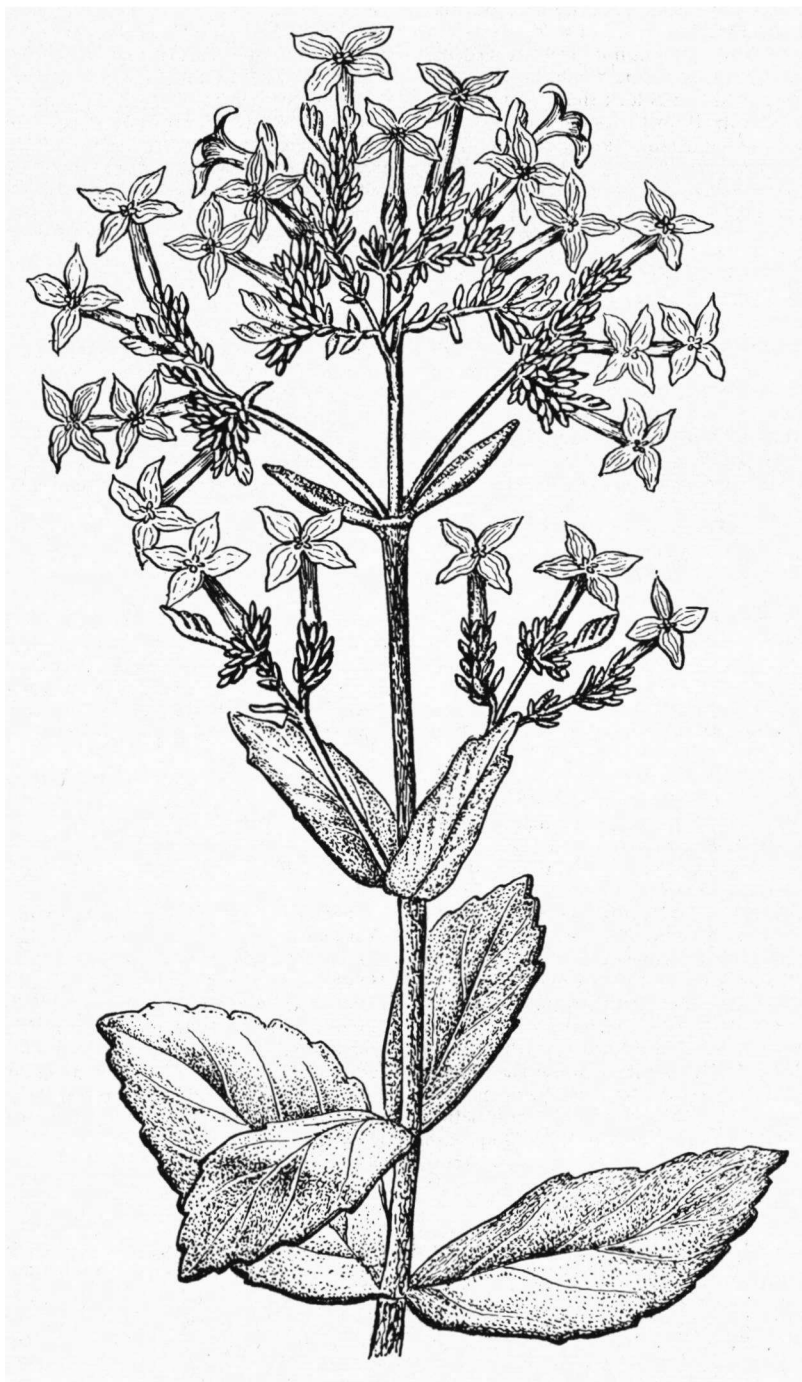


Fig. 2. *Kalanchoë integra* O.K. after a specimen from Mt Jang, E. Java, nat. size

green, 5–6 mm long. Styles glabrous, 2–4 mm. Follicles not seen.

Distr. Hindustan, Bengal, China, and Burma, in *Malaysia* locally cultivated, not wild.

Ecol. In the lower regions not rarely in gardens, often as a potplant near Chinese habitations.

Note. Detached leaves lack the power of producing young plants. But when a leaf is cut off with part of a stem there may arise a new plantlet from the axil.

4. *Kalanchoë integra* (MEDIK.) O.K. Rev. Gen. 1 (1891) 221.—*Cotyledon integra* MEDIK. Acta Acad. Theod. Palat. 3 (1775) 200, t. 9.—*Cotyledon crenata* VENT. Jard. Malm. (1803) t. 49; SIMS, Bot. Mag. (1811) t. 1436.—*Kalanchoë spathulata* DC. Pl. Hist. Succ. (1811) t. 65; PERS. Syn. (1805) 446; BL. Bijdr. (1826) 1138; DC. Prod. 3 (1828) 395; MIQ. Fl. Ind. Bat. 1, 1 (1856) 728; CLARKE in HOOK. f. Fl. Br. Ind. 2 (1878) 414; KOORD. Exk. Fl. 2 (1912) 299; Bull. J.B.B. III, 1 (1918) 174; GAGN. Fl. Gén. I.C. 2 (1920) 701; BURK. Dict. (1935) 1277; BACKER, Bekn. Fl. Java, em. ed. 4, (1942) fam. 51, p. 2.—*Kalanchoë crenata* HAW. (non HAMET) Syn. pl. Succ. (1812) 109; BRITTON, Fl. Trop. Afr. 2 (1871) 394.—*Kalanchoë acutiflora* HAW. Syn. Pl. Succ. (1812) 109; DC. Prod. 3 (1828) 395; MIQ. Fl. Ind. Bat. 1, 1 (1856) 728.—*Cotyledon spathulata* POIR. in LAMK, Enc. Suppl. 2 (1811) 373.—*Kalanchoë brasiliensis* CAMB. in A. ST. HIL. Fl. Bras. Merid. 2 (1829) 196; KOORD. Bull. J.B.B. III, 1 (1919) 173.—*Kalanchoë laciniata* DC. *ex parte sensu* HAMET, Bull. Herb. Boiss. II, 7 (1907) 897.—*Kalanchoë schumacheri* KOORD. Bull. J.B.B. III, 1 (1918) 180, t. 14, 15.—*K. sp.* BACKER, Bull. J.B.B. II, 12 (1913) 20.—Fig. 2.

Erect or ascending, rather robust, usually unbranched, fleshy,  $\frac{1}{2}$ – $1\frac{3}{4}$  m high, with a strong taproot. Stem terete or obtusely quadrangular, glabrous throughout or in the upper part beset with short, glandular hairs; old stems fistular; lower internodes short, highest much longer. Leaves (often falling off in or before beginning of the anthesis) oval-oblong-obovate-lanceolate-spathulate from a more or less cuneate base, or the upper lanceolate-linear, obtuse, lightgreen, glaucous or more or less tinged with purple, rather shortly to rather long petioled (lower), shallowly or coarsely crenate-serrate-dentate-biserrate, or the upper entire or almost so and sessile or subsessile, thickly coriaceous, glabrous (Malaysian specimens) or glandular pubescent, 4–30 by  $2\frac{1}{2}$ – $12\frac{1}{2}$  cm; petiole with a much broadened, semi-amplexicaulous base. Cymes subcorymbose or, in well-developed speci-

mens, united into a long peduncled, rather wide and comparatively short panicle, many-flowered, rather dense; the lower on long erecto-patent peduncles. Rachises of inflorescence glabrous (so in *Malaysia*) or glandular pubescent. Pedicels 4–8 mm, glabrous or glandular pubescent. Calyx 4–12 mm long; segments erect or erecto-patent, elongate-triangular, acute, glabrous or shortly ciliate or on the outside glandular pubescent. Corolla variable as to size, above the greenish base yellow or orange-yellow; tube in the lower half distinctly ventricose (especially when fruiting), much contracted upwards. Segments patent or subreflexed, after anthesis erect and twisted together, oval-elliptic-obovate with a recurved short apical point,  $\frac{3}{4}$ – $1\frac{1}{4}$  cm long, glabrous or ciliate or on the outside glandular pubescent. Filaments short, glabrous; anthers either all included or those of the upper series slightly exerted. Hypogynous scales entire,  $3\frac{1}{2}$ –5 mm long. Ovaries free or subconnate at the base, appressed against each other, glabrous,  $\frac{1}{2}$ –1 cm long. Styles included, filiform, glabrous. Follicles ovoid-oblong, acuminate by the style-bases, in their upper halves slightly recurved when fully ripe,  $1$ – $1\frac{1}{4}$  cm long.

Distr. Brazil, tropical and South Africa, S. and SE. Asia, in *Malaysia*: Java, Madura, Lombok, Celebes, Philippines.

Ecol. From the plains up to  $\pm$  2000 m, in sunny, stony or rocky places, frequently on almost bare rocks (e.g. of lava-streams), and in light *Casuarina* forest, locally often abundant. Flowers and fruits freely; very conspicuous when in full flower. In Java the distribution of the species is remarkable; the localities are confined to East Java (E of Malang) save some very local spots in Krawang on old-volcanic peaks. In East Java the localities are mostly situated on the eastern (hottest and driest) slopes of the mountains.

Uses. Ornamental.

Vern. *Buntiris*, S, *kayu urip*, J, *tampu taura* (S. Celebes).

Notes. Variable. Many forms differing only in characters of very slight taxonomic value have been described as species. They all pass into each other. HAMET (*l.c.*) regards this species as a form of *K. laciniata* in which he may be right. I have provisionally kept it apart because in *Malaysia* no transitional forms have been found. Separated leaves lack the power of producing new plants, but when a leaf is cut off with a bit of the stem, there arise from the axil first some roots, afterwards a leafy stem.