

SYNOPSIS OF AMARYLLIDACEAE
FROM THE FLORA ZAMBESIACA AREA

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SUMMARY

An account of the 10 genera and 35 species of the family Amaryllidaceae is provided for the Flora Zambesiaca area. *Crinum* is the largest genus with 16 species, followed by *Ammocharis* and *Cyrtanthus* each with four species, and *Scadoxus* with three species. *Pancratium* and *Nerine* each have two species, and *Brunsvigia*, *Cryptostephanus*, *Boophone* and *Gethyllis* contain one each. Several names are reduced to synonymy. Keys to genera and species are provided along with notes on distribution.

KEY WORDS: Amaryllidaceae – Flora Zambesiaca – taxonomy

INTRODUCTION

Major monographic studies on the family Amaryllidaceae have been carried out by Hebert (1837), Baker (1888) and Pax & Hoffman (1930). Important floral studies include those by Baker (1896, 1898) in South Africa and tropical Africa, respectively, Nordal (1982, 1987, 1997) in East Africa, Cameroon and Ethiopia, respectively, and Hutchinson & Dalziel (1936) in West Africa.

Generic delimitation, except in the case of *Crinum* and *Ammocharis*, is straightforward. These two genera are separated on the basis of a single character (leaves bilabellate in *Ammocharis* and spiral in *Crinum*), but this character is difficult to ascertain on herbarium material.

Species delimitation is generally also straightforward. Problems are only found in the genus *Crinum*; consequently this genus has received considerable attention (Verdoorn 1973, Nordal, Rorslett & Laane 1977, Lehmillier 1997). The present study is largely based on herbarium collections housed at BM, K, PRE and SRGH, while some living material was studied in the field in Botswana, Malawi, Mozambique, Zambia and Zimbabwe.

AMARYLLIDACEAE

Herbaceous geophytes, with bulbs or rhizomes. Leaves simple, entire, linear to broadly lanceolate or strap-shaped, sometimes sheathing at base forming a pseudostem. Peduncle central or lateral, subtended by 2 or more spathe valves. Flowers bisexual, regular or nearly so, umbellate (rarely solitary) with one to many flowers, interrupted by ephemeral hyaline bracts. Perianth segments biseriate, equal or subequal, inserted above the ovary, free or united into a tube, sometimes bearing a false corona. Stamens 6, rarely more (*Gethyllis*), lying opposite the perianth segments, arising from the tube or base of the segments. Filaments filiform or expanded at base, connate into a pseudocorona; anthers 2-locular, basifixed,

introse, opening by longitudinal slits. Ovary inferior, 3-locular, with axile placentation, bearing one to many ovules per loculus; style slender, with a 3-lobed stigma. Fruit a loculicidal capsule or a berry; seeds globose or flattened, sometimes winged.

A family of about 60 genera and 800 species distributed mainly in temperate regions, with a centre of diversity in subtropical South Africa. Ten genera are recorded in the Flora Zambesiaca area. The family contains important horticultural and ornamental species.

Key to the genera

1. Fruit a berry 2
Fruit a capsule 4
2. Flowers solitary 1. *Gethyllis*
Flowers several to many 3
3. Leaves pseudopetiolate 2. *Scadoxus*
Leaves not pseudopetiolate 3. *Cryptostephanus*
4. Perianth with a pseudocorona 4. *Pancratium*
Perianth without a pseudocorona 5
5. Seeds irregularly shaped, somewhat flat, winged 5. *Cyrtanthus*
Seeds globose, without wings 6
6. Pedicel longer than the perianth tube; ovary triquetrous; perianth tube shorter than the segments; seeds less than 5 per capsule 7
Pedicels shorter than the perianth tube; ovary globose to subglobose; perianth tube longer than the segments; seeds more than 5 per capsule 9
7. Perianth segments more than 6 mm wide; peduncles more than 25 cm long at anthesis 6. *Brunsvigia*
Perianth segments narrower, less than 6 mm wide; peduncles short, less than 25 cm long at anthesis 8
8. Anthers dark, more than 3 mm long at anthesis; pedicels less than 3 cm long in fruit 7. *Nerine*
Anthers yellow, at most 3 mm long, usually shorter; pedicels more than 3 cm long in fruit 8. *Boophone*
9. Leaves spirally arranged, sheathing at the base 9. *Crinum*
Leaves biflabellately arranged, not sheathing at the base 10. *Ammocharis*

1. GETHYLLIS

Gethyllis L. Sp. Pl. **1**: 442 (1753). –Baker in Fl. Cap. **5**: 16 (1896). –Sölch & Roessl. in Prodr. Fl. SW Afr. **150**: 8 (1969). –Wilsenach in Plant Life **22**: 60 (1966).

A genus of about 32 species native to semi-arid areas in southern Africa. Only one species found in the Flora area.

- 1. *Gethyllis transkarooica*** D. Müller-Doblies in Wildenowia **15**: 470 (1986). –Manning, Goldblatt & Snijman, Colour Encycl. Cape Bulbs: 184 (2002). Type: South Africa, Western Cape, Slagboon near Gydopas, x.1942, *Müller-Doblies* 84104a (not yet deposited).

Botswana: SE: Lobatse, Pelosetla, SW of Lobatse, fl.19.ix.1982, *Edwards* s.n. (PRE).

Also in South Africa (Western Cape to North West Province). Open woodland or grassland; clumps of flowers appearing simultaneously are conspicuous.

2. SCADOXUS

Scadoxus Raf., Fl. Tell. **4**: 19 (1838). –Friis & Nordal in Norw. J. Bot. **23**: 64 (1976).
Demeusea De Wild. & T. Durand in Bull. Soc. Roy. Bot. Belg. **39**: 77 (1901).
Choanathus Rendle in J. Linn. Soc., Bot. **38**: 237 (1908).

Nine species described from tropical and southern Africa.

1. Perianth tube less than 5 mm wide, the segments 4 mm or more wide; filaments at most 10 mm long at anthesis; anthers more than 5 mm long 1. *S. pole-evansii*
 Perianth tube more than 5 mm wide, the segments less than 1.3 mm wide; filaments more than 11 mm long; anthers short, less than 3 mm long 2
2. Involucral bracts brownish, erect at anthesis, more than 16 mm wide; peduncle central 2. *S. puniceus*
 Involucral bracts purple-streaked, drooping at anthesis, less than 16 mm wide; peduncle lateral 3. *S. multiflora*

1. Scadoxus pole-evansii (Oberm.) Friis & Nordal in Norw. J. Bot. **23**: 64 (1976).
Haemanthus pole-evansii Oberm. in Kirkia **3**: 22 (1963); in Flow. Pl. Afr. **37**: t.1952 (1965). –Sealy in Bot. Mag. **178**: t.572 (1970). –Bjørnstad & Friis in Norw. J. Bot. **21**: 271 (1974). Type: Zimbabwe, Nyanga, 9.i.1961, *Pole-Evans* 6011 (PRE holotype, K, SRGH).

Zimbabwe. E: Nyanga Dist., mixed evergreen forest between Circular Drive and Pungwe R. gorge, fl. & fr. 7.xii.1966, *Müller* 561 (K).

A narrow endemic of evergreen montane forests in the Nyanga area. May also occur on the Mozambique side of the border.

2. Scadoxus puniceus (L.) Friis & Nordal in Norw. J. Bot. **23**: 64 (1976). –Nordal in F.T.E.A. Amaryllidaceae: 5 (1982); in Flora of Ethiopia **6**: 158 (1997).
Haemanthus puniceus L., Sp. Pl.: 325 (1753); –Baker in Fl. Cap. **6**: 171 (1896). –Bjørnstad & Friis in Norw. J. Bot. **21**: 244 (1974). Type: South Africa, in Herb. Linn. 408.2 (LINN lectotype).

Botswana. SE: Modipe hills, 16 km E of Gaborone, fl. & fr. 12.x.1978, *Woollard* 240, 323 (UB).

Zimbabwe. W: Matobo Dist., Matopos Nat. Park, Maleme Camp, fl. & fr. 22.x.1969, *Jacobsen* 4099 (K).

Mozambique. M. Maputo Dist., Marracuene, Bobole, Ilha de Chifecunze, fl. & fr. 14.xi.1979, *Schafer* 7044 (K).

A heterogenous and widespread species with a disjunct distribution in southern Africa north to Ethiopia. In montane forests, stream valleys and swamps and in various vegetation types at lower altitudes. It is possible the species is polyphyletic and that the traits of erect prominent involucral bracts has evolved independently in the different enclaves. More studies are needed.

3. Scadoxus multiflorus (Martyn) Raf., Fl. Tellur. **4**: 19 (1838). –Friis & Nordal in Norw. J. Bot. **23**: 64 (1976). –Nordal in F.T.E.A. Amaryllidaceae: 3 (1982). Type: Sierra Leone, original material lost; lectotype is plate by Nodder in Martyn, Monogr. (1795).
Haemanthus multiflorus Martyn in Miller's Garden. Dict. (1797).

Haemanthus delagoensis Herb. in Amaryllidaceae: 233 (1837). Type: Mozambique, Forbes 101 in Herb. Lindley (CGE holotype, P).

Haemanthus tenuiflorus Herb. in Bot. Mag. **67**: t.3870 (1841). Type: Mozambique; **t.3870** selected as lectotype by Friis & Nordal (1974).

Haemanthus tenuiflorus Herb. var. *delagoensis* (Herb.) Herb. in Bot. Mag. **67**: t.3870 (1841).

Haemanthus tenuiflorus var. *mocambicensis* Herb. in Bot. Mag. **67**: t.3870 (1841), nomen superfl. Type: Mozambique; **t.3870** selected as lectotype by Friis & Nordal (1974).

Haemanthus zambesiacus Baker in Fl. Trop. Afr. **7**: 387 (1898), syn. nov. Type: Mozambique, Boruma, Zambezi R., *Menyharth* 691 (K holotype).

Haemanthus nicholsonii Baker in Fl. Trop. Afr. **7**: 392 (1898). Type: N Malawi, no locality, ix.1896, *Nicholson* s.n. (K holotype).

Haemanthus ceciliae Baker in Bull. Misc. Inf. Kew **1906**: 28 (1906), syn. nov. Type: Zimbabwe, between Harare and Bulawayo, xi-xii.1899, *Cecil* 76 (K holotype).

Haemanthus otaviensis Dinter in Feddes Rep.: 258 (1931). Type: Namibia, *Dinter* 5251 (B holotype).

Botswana. N: Ngamiland, Hamoga Is., fl.& fr. 9.xi.1973, *P.A. Smith* 747 (K).

Zambia. N: Mbala Dist., Mbeshi river gorge, fl.& fr. 15.xi.1956, *Richards* 6993 (K). W: Mwinilunga Dist., c.120 km from Kapompo to Mwinilunga, fl.& fr. 29.x.1986, *Linder* 3958 (K). C: Lusaka Dist., 129 km E of Lusaka, Chakwenga headwaters, fl.& fr. 16.xi.1963, *Robinson* 5821 (K). E: Nyika Plateau, 3 km SW of rest house, fl.& fr. 21.x.1958, *Robson* 200 (K).

Zimbabwe. W: Victoria Falls, rainforest, fl.& fr. 18.xi.1949, *Wild* 3094 (K). N: Makonde Dist., Mhangura-Norah mine, fl.& fr. 26.xi.1966, *Jacobsen* 2951 (PRE). E: Chipinge Dist., Chirinda Forest, fl.& fr. i.1938, *Obermeyer* 2246 (PRE).

Malawi. N: Karonga Dist., c.64 km S of Karonga on Livingstonia road, fl.& fr. 9.i.1959, *Richards* 10571 (K). C: Dedza Dist., Dedza Mt. slopes, fl.& fr. 10.xi.1967, *Salubeni* 881 (K). S: Blantyre Dist., Mapeni house, E side of Soche Hill, fl.& fr. 11.xii.1903, *Lawrence* 526 (K).

Mozambique. T: Angonia Dist., Ulongue, fl.& fr. 26.xi.1980, *Macuacua* 1319 (K). Z: Namagoa Dist., Lugela-Mocuba, fl.& fr. x.1994, *Faulkner* 100 (K). MS: roadside W of Bandula, fl.& fr. 19.xi.1961, *Chase* 7558 (K). GI: Bazaruto Island, S end, near Jekere swamp, *Mogg* 28943 (K). M: Maputo Dist., Matutuine, Reserva de Maputo, "Niama", fl.& fr. 10.iv.1980, *Schafer* 7021 (K).

A widespread and variable species distributed throughout the Sudano-Zambesian region; in dry forest, woodland and grassland.

3. CRYPTOSTEPHANUS

Cryptostephanus Baker, in J. Bot. **16**: 193, t.197 (1878); in Fl. Trop. Afr. **7**: 383 (1898).

A genus of three species in tropical Africa, with a single species recorded for the Flora Zambesiaca area.

1. Cryptostephanus vansonii I. Verd. in Flow. Pl. S. Afr. **23**: t.885 (1943). Type: Zimbabwe, Vumba Mts, c.1700 m, x.1942, *van Son* s.n. in TRV 27032 (PRE holotype, K).

Zimbabwe. E: Chimanimani Dist., Haroni Valley, Tarka Forest Reserve, fl.& fr. iii.1973, *Goldsmith* 1/73 (SRGH).

Mozambique. MS: Carvalho's Estate, Himalaya Mts, fl.& fr. 28.xi.1966, *Dale* 447 (SRGH).

Largely restricted to forests in the Vumba Mountains, where it grows between rocks in deep shade.

4. PANCRATIUM

Pancratium L. in Sp. Pl. 290 (1753). –Sölch & Roessl. in Prodr. Fl. Pl. SW Afr. **150**: 19 (1969). –Bjørnstad in Norw. J. Bot. **20**: 281 (1973).

Chapmanolirion Dinter in Deutsch SW Afr. Fragm.: 49 (1909).

A genus of about 10 species, with a worldwide distribution.

- Corona shorter than the free filaments, less than 3 cm long, up to 1/3 perianth length; anthers more than 10 mm long 1. *P. parvicoronatum*
- Corona longer than the free filaments, more than 3 cm long, up to 2/3 perianth length; anthers less than 10 mm long 2. *P. tenuifolium*

1. *Pancratium parvicoronatum* Geerinck in Bull. Jard. Bot. Nat. Belg. **44**: 295 (1972). –Bjørnstad in Norw. J. Bot. **20**: 287 (1973). Type: D.R. Congo, along Haut-Katanga road, Kuibo, *van Oosten* 345 (BR holotype).

Malawi. C: Lilongwe Dist., Agric. Research Station, fl. 15.xi.1951, *Jackson* 647 (K).

Within the Flora area known only from two collections around Lilongwe in Malawi. Also recorded from the D.R. Congo.

2. *Pancratium tenuifolium* A. Rich. in Fl. Abyss. **2**: 312 (1850). –Bjørnstad in Norw. J. Bot. **20**: 283 (1973) & in F.T.E.A., Amaryllidaceae: 26 (1982). –Geerinck in F.A.C., Amaryll: 20 (1973). Type: Ethiopia, Taccaze valley, *Schimper* III 1695 (P lectotype, K isotype).

Botswana. N: Ngamiland, Kwebe Hills, fl. & fr. xii.1896, *Lugard* 39 (K). SE: Mahalapye, Morale Pasture Station, fl. & fr. 18.xi.1960, *Yalala* 117 (K). SW: Ghanzi Dist., 1.5 km from Ghanzi along road to Mamuno, fl. & fr. 27.x.1969, *Braun* 7006 (K).

Zambia. B: Kalabo Dist., Liuwa plain, Paramount Chief Game Reserve, 50 km N of Kalabo, fl. & fr. 14.xi.1959, *Drummond & Cookson* 6464 (K). C: Kafue Nat. Park, Namwala, Ngoma Camp, fl. & fr. 9.xi.1964, *Mitchell* 25/78 (K). S: Mazabuka Dist., fl. & fr. 19.xi.1961, *Trapnell* 510 (K).

Zimbabwe. W: Matobo Dist., E of Sun Yet Sen mine, on W border security road, fl. & fr. 31.xi.1973, *Grosvenor* 800 (K). N: Gokwe, Sengwa Res. Station, fl. & fr. 4.xi.1968, *Jacobsen* 283 (K). E: near Chirinda, fl. & fr. 16.xi.1895, *Swynnerton* 322 (K, BM). S: Chiredzi Dist., Gonarezhou Game Reserve, fl. 21.x.1971, *Kelly* 504 (K).

Malawi. S: W of Blantyre, fl. x.1861, *Kirk* 11 (K).

Mozambique: Z: Namagoa, 5.xii.1958, *Faulkner* 361 (K). M: Maputo, along road to Chinhanga mine, n.d., *Zunguze & Boane* 305 (K).

Several specimens from the Flora Zambesiaca area have wrongly been referred to *P. trianthum* Herb., a species from West Africa. *P. tenuifolium* is separated from *P. trianthum* by the single-flowered inflorescence and pubescence on the leaves and peduncle. The inflorescence of *P. trianthum* is often more than one-flowered and the leaves and peduncle always glabrous. All F.Z. material belongs in *P. tenuifolium* (Bjørnstad 1973).

5. CYRTANTHUS

Cyrtanthus L.f. in Aiton, Hort. Kew. **1**: 414 (1789). –Dyer in *Herbertia* **6**: 65 (1939). –Traub in *Plant Life* **19**: 58 (1963). –Gordon-Gray & Wright in *J. S. Afr. Bot.* **35**: 35 (1969). –Nordal in *Norw. J. Bot.* **26**: 183 (1979); in F.T.E.A., *Amaryllidaceae*: 23 (1982). –Reid & Dyer in *Am. Plant Life Soc.*: 47 (1984).

Anoiganthus Baker in *J. Bot.* **16**: 76 (1878).

Vallota Herb. in *App. Bot. Reg.*: 29 (1821).

A genus of 40–50 species, distributed mainly in southern Africa.

Key to the species

1. Flowers bright yellow 1. *C. breviflorus*
Flowers pink to purple 2
2. Flowers solitary, rarely 2; perianth tube narrow at base, widening to an open funnel 2. *C. galpinii*
Flowers 2–5; perianth tube narrow and curved 3
3. Flowers 3–3.5 cm long, tube ±erect, funnel-shaped 3. *C. welwitschii*
Flowers 3.5–5.5 cm long tube ±cylindrical, curved 4. *C. rhodesianus*

1. *Cyrtanthus breviflorus* Harv. in Dyer, *Fl. Cap.* **2**: 25 (1863). –Gordon-Gray & Wright in *J. S. Afr. Bot.* **35**: 35 (1969). –Ross in *Fl. Natal*: 131 (1973). –Geerinck in *F.A.C., Amaryll.*: 12, t.2 (1973). –Nordal in *F.T.E.A., Amaryllidaceae*: 26 (1982). Type: South Africa, Eastern Cape, Beaufort Dist., fl. & fr. 1860, *Cooper* 255 (K lectotype).

Zambia. N: Mbala Dist., dambo along Sumbawanga road, 16 km from Kawimbe, fl. & fr. 7.ix.1956, *Richards* 6136 (K). W: Solwezi Dist., Solwezi, fl. & fr. 24.vii.1964, *Fanshawe* 8838 (K, SRGH).

Zimbabwe. E: Chimanimani Dist., Chimanimani Mts, below chalet, fl. & fr. 16.ix.1956, *Taylor* 1759 (SRGH).

Malawi. N: Mzimba Dist., Luwawa dam, fl. & fr. 28.vii.1973, *Pawek* 7252 (K, SRGH). C: Dedza Dist., Kanjoli, Chongoni Forest Reserve, fl. & fr. 17.viii.1972, *Salubeni* 1821 (SRGH). Widespread from South Africa to D.R. Congo and Kenya. Along rivers and in marshes.

2. *Cyrtanthus galpinii* Baker in *Kew Bull.* **1892**: 83; in *Fl. Cap.* **6**: 227 (1896); in *Fl. Pl. Afr.* **4**: t.159 (1924). –Dyer in *Herbertia* **6**: 102 (1939). –Reid & Allen in *Am. Plant Life Soc.*: 48 (1984). Type: South Africa, Limpopo, Barberton, Berea ridge, fl. & fr. viii.1889, *Galpin* 409 (K holotype).

Zimbabwe. E: Mutare Dist., Nyamatshira mountain range, W of Chipondiomwe peak, fl. & fr. 25.ix.1960, *Chase* 7381 (SRGH). S: Mberengwa Dist., S face of Mt Bukwa, fl. & fr. 12.ix.1968, *Leach & Bullock* 13130 (K).

Mozambique. MS: Manica Dist., Makurupini Falls, fl. & fr. 11.vi.1971, *Biegel & Pope* 3589 (SRGH).

Closely related to *C. sanguineus*, which is a variable complex of numerous infraspecific taxa from South Africa to Kenya (see Nordal in *Nord. J. Bot.* **26**: 183-192, 1979).

3. *Cyrtanthus welwitschii* Baker in *J. Bot.* **16**: 197 (1878). –Dyer in *Herbertia* **6**: 91 (1939). Type: Angola, Huila, fl. & fr. vi.1878, *Welwitsch* 4028 (K holotype).

Malawi. S: Mt. Mulanje massif, Sombani basin, fl. & fr. 17.viii.1987, *Chapman* 8783 (K).

Also in Angola.

Within the Flora Zambesiaca area this species is known only from Mulanje Mountain in S Malawi. It looks very much like *C. breviflorus* in general appearance and might represent a red-coloured variety of that taxon. Otherwise it is known only from the type specimen in SE Angola, which is somewhat more robust and broad-leaved than the Mulanje population. Further comparisons are needed.

4. *Cyrtanthus rhodesianus* Rendle in J. Linn. Soc., Bot. **40**: 211 (1911). –Dyer in *Herbertia* **6**: 91(1939). Type: Zimbabwe, Chimanimani Mts, fl. 26.x.1906, *Swynnerton* 769 (K holotype).

Zimbabwe. N: Mazowe Dist., Mazowe, fl.& fr. ix. 1906, *Eyles* 416 (SRGH). C: Harare, Ruwa valley, fl.& fr. 5.xii.1970, *Linley* 573 (K). E: Nyanga Dist., Mutarazi Falls, fl.& fr. 3.x.1966, *Grosvenor* 274 (SRGH).

Mozambique. MS: Manica Dist., Chimanimani Mts, Camp Portage, fl.& fr. 28.ix.1966, *Grosvenor* 231 (SRGH).

Growing in grassland, in swamps and along rivers. The species is closely related to *C. contractus* N.E.Br., described from the former Transvaal. A decision on the status of these species awaits studies on living material.

6. BRUNSVIGIA

Brunsvigia Heist. in *Beschneu Geschl.* **3**: 31 (1753). –Baker in *Fl. Cap.* **6**: 204 (1896). –Dyer in *Herbertia* **6**: 63 (1950); in *Herbertia* **7**: 45 (1951).

A mainly southern African genus with about 20 species, with one species recorded in the Flora area.

1. *Brunsvigia radulosa* Herb. in *Amaryllid.*: 281 (1837). Type: South Africa, Colesberg, Cape, 6.iii.1813, *Burchell* 2703 (PRE holotype, K).

Botswana. SE: Morapedi Ranch, fl.& fr. 1.ii.1977, *Hansen* 3015 (K).

The species is represented by a single collection at Kew. Also widespread in N and E South Africa. Grassland and open woodland.

7. NERINE

Nerine Herb. in *Bot. Mag.* **47**: t.2124 (1820). –Baker in *Fl. Cap.* **6**: 209 (1896). –Traub in *Am. Plant Life Soc.*: 52 (1967). –Sölch & Rössler in *Prodr. Fl. SW Afr.* **150**: 11 (1969). –Snijman in *Novon* **5**: 103 (1995).

A genus of about 30 species endemic to southern Africa.

Leaves up to 10 cm long, less than 1 cm wide; flowers 12–22; filaments 1.4–1.7 cm long
 1. *N. gaberonensis*
 Leaves 12–30 cm long, 1–2 cm wide; flowers 15–50; filaments 4–5 cm long
 2. *N. laticoma*

1. **Nerine gaberonensis** Bremek. & Oberm. in Ann. Transv. Mus. **15**: 409 (1935). Type: Gaborone, SE Botswana, *G. Van Son* in PRE 28674 (PRE holotype).

Botswana. SE: Thamaga, fl. & fr. 25.iii.1977, *Camerick* 111b (UB).
Only recorded from SE Botswana, NW Limpopo and the Northern Cape.

2. **Nerine laticoma** T. Durand & Schinz in Consp. Fl. Afr. **5**: 256 (1893). Type: South Africa, Eastern Cape, *Codd* 431 (P holotype).

Botswana. SE: Central Dist., grass pan at Orapa Airport, fl. & fr. 1.i.1976, *Allen* 376 (K).
SW: Ghanzi & Kgalagadi Dist., Kwakai pan, fl. & fr. 23.xii.1977, *Skarpe* 206 (UB, K).

Zimbabwe. S: Gwanda Dist., Chafuche's village, 17 miles from Beitbridge, fl. & fr. 20.xii.1956, *Davies* 2329 (K).

Also recorded in South Africa and Namibia.

8. BOOPHONE

Boophone Herb., **Bot. Mag.** **48**, app.18: 20 (1821). –Milne-Redhead & Schweickerdt in J. Linn. Soc., Bot. **52**: 162 (1939).

A genus of 2 species in tropical and subtropical southern Africa. One species recorded in the Flora Zambesiaca area.

1. **Boophone disticha** (L.f.) Herb. in Bot. Mag. **52**: t.2578 (1825). –Baker in Fl. Cap. **6**: 242 (1896) & in F.T.A. **7**: 392 (1898). –Dyer in Flow. Pl. Afr. **29**: t.1141 (1953). –Geerinck in F.A.C. Amaryllidaceae: 6 (1973). Type: South Africa, Cape, *Thunberg* (UPS holotype).

Botswana. SE: Kweneng, Matlolakgang ranch, fl. & fr. 14.xi.1978, *Hansen* 3540 (K, SRGH, PRE). SW: Ghanzi Dist., 30 miles NE Ghanzi, fl. & fr. 24.x.1969, *Brown* 7000 (K, SRGH).

Zambia. B: Mankoya Dist., fl. & fr. 21.x.1964, *Fanshawe* 9001 (SRGH). N: Mporokoso Dist., Kipoma Falls, 3 km NW of Mporokoso, fl. & fr. 18.x.1967, *Simon & Williamson* 1091 (SRGH). E: Nyika Plateau, near turnoff to Chelinda Camp, fl. & fr. 27.xi.1955, *Lees* 100 (K). C: Lusaka Dist., between Lusaka and Chilanga, fl. & fr. 12.xi.1963, *van Rensburg* 2627 (SRGH). S: Mumbwa Distr., Chunga, Kafue Nat. Park, fl. & fr. 12.xi.1961, *Mitchell* 10/92 (SRGH).

Zimbabwe. W: Tsholotsho Dist., Nyamandhovu, fl. & fr. 29.xi.1949, *West* 3121 (SRGH). N: Guruve Dist., fl. & fr. 11.x.1978, *Nyariri* 402 (SRGH). C: Mvuma Dist., Mtao Forest, fl. & fr. 26.x.1931, *Brain* 6601 (SRGH). E: Mutare Dist., Nyamaganu Mt., fl. & fr. 30.x.1960, *Chase* 7395 (SRGH). S: Gwanda Dist., no locality, fl. & fr. 20.xii.1956, *Davies* 2329 (SRGH).

Malawi. N: Nkhata Bay Dist., Vipya Plateau, c.60 km SW of Mzuzu, fl. & fr. 22.xi.1975, *Pawek* 10350 (K, SRGH). C: Dedza Dist., fl. & fr. 10.xi.1958, *Jackson* 2262 (SRGH).

Mozambique. T: Angonia Dist., fl. & fr. 20.xi.1980, *Macuacua* 1278 (K).

9. CRINUM

Crinum L., Sp. Pl.: 291 (1753); in Gen. Pl., ed.5: 141 (1754). –Baker in Handb. Amaryllid.: 74 (1888); in Fl. Cap. **6**: 198 (1896); in F.T.A. **7**: 373 (1898). –Uphof in *Herbertia* **9**: 63 (1942). –Verdoorn in *Bothalia* **11**: 27 (1973). –Nordal in Polhill, F.T.E.A. Amaryllidaceae:

15 (1982). –Lehmiller in *Herbertia* **52**: 44-65 (1997). –Meerow et al. in *Bot. J. Linn. Soc.* **141**: 349-363 (2003).

A cosmopolitan genus of between 60 and 70 species, with a centre of variation in southern Africa. Sixteen species have been recorded in the Flora Zambesiaca area.

Key to species:

1. Flowers actinomorphic; perianth tube straight at anthesis, the segments spreading abruptly and recurving; stamens not declinate (*Stenaster* group) 2
Flowers zygomorphic; perianth tube arcuate rather than curved at anthesis, the segments connivent into a funnel or bell; stamens declinate (*Codonocrinum* group) 4
2. Leaves rosulate, prostrate, not forming a false stem 1. *C. subcernuum*
Leaves distichous, erect or suberect, with or without a pseudostem 3
3. Leaves with entire apices; thickly succulent, up to 2.5 cm wide, without a distinct pseudostem; occurring in swamps 2. *C. binghamii*
Leaves without entire apices, not thickly succulent, broader than 3 cm, forming a distinct pseudostem; usually in drier habitats 3. *C. buphanoides*
4. Leaves less than 7 mm wide with glabrous margins; most often 1-flowered 5
Leaves more than 7 mm wide; flowers mostly more than 2 per umbel 6
5. Peduncle above ground; tepals widely reflexed; fruits not beaked 4. *C. minimum*
Peduncle below ground; tepals not widely reflexed; fruits beaked 5. *C. walteri*
6. Leaves with ciliate margins; anthers yellow, brown or grey 7
Leaves with glabrous or scabrid margins; anthers blackish (with a narrow longitudinal cream-coloured stripe in *C. jasonii*) 10
7. Perianth segments with a distinct purplish or red keel; fruits glossy, rarely beaked, vivid yellow, orange, red to scarlet; seeds smooth, greyish 8
Perianth segments with a faint pink keel; fruits dull, greenish, tinged with yellow or red, most often beaked; seeds papillose, turning black when exposed to air 9
8. Anthers greyish, fruits conspicuously bright yellow to orange 6. *C. aurantiacum*
Anthers yellowish to brown, fruits red to scarlet 7. *C. stuhlmannii*
9. Leaves glaucous; inner perianth segments broader than 2 cm; seeds with a foetid smell 6. *C. crassicaule*
Leaves pure green, not glaucous; inner perianth segments up to 1.5 cm broad; seeds without a foetid smell 9. *C. papillosum*
10. Leaves with a scabrous dorsal median ridge, showing thick woolly fibres when torn; flowers sessile; involucre bracts erect at anthesis 10. *C. verdoorniae*
Leaves without a scabrous dorsal median ridge and thick woolly fibres; flowers sessile or pedicellate; involucre bracts reflexed at anthesis 11
11. Plants occurring in seasonally flooded pans; leaves rosulate or distichous; perianth segments suffused with purplish pink (not restricted to a distinct keel) or green-keeled with pinkish reticulation 12
Plants occurring in dambo grassland or on floodplains; leaves rosulate; perianth segments white with a distinct pink keel 15
12. Leaves distichous 11. *C. rautanenianum*
Leaves rosulate 13
13. Flowers distinctly pedicellate, pedicels 2.5–3.5 cm; perianth segments white with a green keel and pink reticulation in sun-exposed areas; anthers black with a cream-coloured stripe 12. *C. jasonii*

- Flowers sessile to subpedicellate, pedicels rarely up to 1 cm; perianth segments suffused or flushed pink at anthesis, turning more or less purplish thereafter; anthers yellow, brown to grey 14
14. Leaves more than 3 cm wide; umbels more than 3 flowered 13. *C. paludosum*
 Leaves less than 3 cm wide; umbels not more than 3 flowered 14. *C. carolo-schmidtii*
15. Leaves glaucous or green, more than 2.5 cm wide 15. *C. macowanii*
 Leaves green, less than 2.5 cm wide 16. *C. lugardiae*

1. *Crinum subcernuum* Baker in Gard. Chron. **16**: 180 (1881); in P.O.A.C. 145 (1895); in F.T.A. **7**: 396 (1898). –Nordal in Norw. J.Bot. **24**: 188 (1977). Type: Mozambique, mouth of Zambezi, confluence with Kongone River, i.1861, *Kirk* 317 (K lectotype).

Crinum menyharthii Baker in Bull. Herb. Boiss. **2**: 559 (1901). Type: Mozambique, Boruma, lower Zambezi River, ii.1879, *Menyharth* 690 (K holotype).

Crinum crassicaule sensu Verdoorn non Baker in Bothalia **10**: 56 (1969); in Bothalia **11**: 42 (1973).

Caprivi Strip: Mpola, 15 miles from Katima Mulilo on road to Ngoma, fl. 5.i.1959, *Killick & Leistner* 3296 (PRE).

Botswana. N: Mohembo, near Okavango R., fl. & fr. 6.ii.1979, *P.A.Smith* 2673 (K).

Mozambique. Z: Kongone, mouth of Zambezi R., confluence with Kongoni R., fl. & fr. i.1861, *Kirk* 317 (K lectotype).

Also in SE Tanzania, where it is mainly found on floodplains.

2. *Crinum binghamii* Nordal & Kwembeya in Kew Bull. **59**: 599-603 (2004). Type: Zambia, Senanga Dist., Sana plain along Lyabwa canal, near Muoyo village, 30.xi.2003, *Nordal & Kwembeya* 4789 (O holotype, K, SRGH).

Zambia. B: Kalabo Dist., Kalabo, near resthouse, swamp bordering river, 13.xi.1959, *Drummond & Cookson* 6429 (K); Mongu Dist., Bulozhi floodplain, fl. 7.xii.1995, *Bingham & Luwiika* 10703 (K, MRSC); Senanga Dist., Sana plain along Lyabwa canal, near Muoyo village, 15°34'23.5" S, 23°15'7.8"E, alt.1035 m; locally abundant in black wet clay soils, 30.xi.2003, *Nordal & Kwembeya* 4789 (K, O, SRGH).

Crinum binghamii is so far only known from the Western Province of Zambia, where it grows in swampy areas.

3. *Crinum buphanoides* Baker in J. Bot. **16**: 195 (1878); in Handb. Amaryllid.: 80 (1888); in F.T.A. **7**: 398 (1898). –Verdoorn in Flow. Pl. Afr. **23**: t.887 (1943). –Sölch & Roessler in Prodr. Fl. SW Afr. **150**: 6 (1969). Type: Angola, Pungo Andongo, 18.x.1856, *Welwitsch* 4014 (BM, K).

Crinum leucophyllum Baker in Bot. Mag. **110**: t.6783 (1884). Type: Damaraland, 8.viii.1881, cult. Hort. Kew (K holotype).

Crinum amboense Baker in Bull. Herb. Boiss. **3**: 666 (1903). Type: Namibia, Amboland, Olukonda, 1900, *Rautanen* 774 (K holotype).

Botswana. SE: Mahalapye, fl. & fr. xii.1913, *Rogers* 6113 (SRGH).

Zimbabwe. W: Gwanda Dist., 161 km on Mbalabala/Zvishavane road, fr. 20.i.1998, *Zimudzi* 515 (SRGH).

Malawi. S: Mangochi Dist., dambo near Mkudzi, fl. & fr. 12.xii.1968, *Eccles* 206 (SRGH). Widespread in southern Africa, frequently on river banks or beds of temporary streams.

4. *Crinum minimum* Milne-Redh. in Kew Bull. **2**: 33 (1947). –Lehmiller in *Herbertia* **52**: 48-50 (1997). Type: Zambia, Mwinilunga, 14.x.1937, *Milne-Redhead* 2761 (K holotype).

Zambia. N: Shiva Ngandu, near Kapshya Hot Springs, 11°10'15.8"S, 31°36'6.0"E, fr. 12.xiii.2005, *Nordal & Hoell* 5325 (O). C: Mfuwe area, 13°6'5"S, 31°53'51"E, fl. 1.xii.2005, *Nordal & Bjorå* 5030 (O). W: Mwinilunga Dist., Cha Mwana (Chibara's) Plain, fl.& fr. 14.x.1937, *Milne-Redhead* 2761 (K holotype).

Also occurs in D.R. Congo and Tanzania. On sandy or stony soils.

Crinum minimum was recorded from Tanzania in Flora of Tropical East Africa, but is said to have smooth seeds. The Tanzanian plants may represent another form of this species or different species. More field studies are required.

5. *Crinum walteri* Overkott, Mitt. Bot. München **1**: 444-445 (1954). –Lehmiller in *Herbertia* **52**: 47-49 (1997) Type: Namibia, Kunene Region, Kamanjab Dist., Farm Beulah, 2.ii.1953, *Schwerdtfeger* in Herb. Walt 1/302 (M holotype).

Crinum minimum sensu Sölch & Roessler in Prodr. Fl. SW Afr. **150**: 5 (1969); sensu Verdoorn in Flow. Pl. Afr. **40**: t.1577 (1969); in *Bothalia* **11**: 40 (1973); sensu Rossler in Mit. Bot. München **11**: 523-544 (1974).

Botswana. SE: Gaborone, Aedume Park, W of Gaborone dam, fl.& fr. 3.xi.1978, *Hansen* 3542 (SRGH). SW: Ghanzi Dist., Bosobologo pan, fl.& fr. 1.ii.1978, *Skarpe* 231 (SRGH).

Zimbabwe. N: Guruve Dist., Nyamunyeche Estate, fl.& fr. 3.xi.1978, *Nyariri* 462 (SRGH). W: Hwange Dist., Hwange Nat. Park, Sinamatella, fl.& fr. 10.xii.1968, *Bullock* 19/726 (SRGH). C: Harare Dist., fl.& fr. 6.xi.1924, *Eyles* 4013 (SRGH). E: Chipinge Dist., Hippo Mine, Save R. valley, fl.& fr. 16.xi.1966, *Plowes* 2599a (K). S: Bikita Dist., near Devure R., c.8 km W of Birchenough Bridge, fl.& fr. 17.xi.1969, *Plowes* 3422 (K, SRGH).

Mozambique. MS: Manica Dist., fl.& fr. 12.xi.1965, *Chase* 8325 (K).

Also in South Africa (Limpopo and North West Provinces) and Namibia. On deep sand or stony soils.

6. *Crinum aurantiacum* Lehmiller in *Herbertia* **57**: 71-76 (2002-2003). Type: Zambia, Mwinilunga Dist., near Kasompa R., 8.x.1937, *Milne-Redhead* 2672 (K holotype).

Zambia. N: Kaputa, E of Mununda, Luntomfwe School football field, 09°04'10"S, 29°07'45.7"E, 6.xii.2002, *Kwembeya & Nordal* 5 (SRGH). W: Mwinilunga Dist. near Kasompa R., *Milne-Redhead* 2672 (K holotype). S: Zimba South, Munachongwe farm, 17°25'43"S. 26°06'1.5"E, fr. 24.xii.2003, *Kwembeya & Nordal* 10 (O, SRGH).

Malawi. N: Karonga Dist., 2 miles N of Chilumba, Vinthuku Forest Res., 1800 ft, 29.xii.1976, *Pawek* 12065 (K).

So far known from Zambia and Malawi, where it grows in wooded savanna or disturbed areas on sandy loam soils.

This species often grows in sympatry with *C. crassicaule*, and might be difficult to separate without fruits and seeds. Hybridization is suspected, but further field studies are needed.

7. *Crinum stuhlmannii* Baker in F.T.A. **7**: 578 (1898). –Nordal in Norw. J. Bot. **24**: 187 (1977); in F.T.E.A., Amaryllidaceae: 12 (1982). Type: Tanzania, Dar es Salaam, 1894, *Stuhlmann* 8536 (B holotype).

Crinum stuhlmannii is a widespread species in tropical Africa, ranging from South Africa to Kenya in grasslands or wooded grasslands, frequently occurring on sandy soils along the eastern coast. Two closely-related species have been recognized, the northern *C. stuhlmannii*

Baker (1898) found in Kenya and Tanzania, and the southern *C. delagoense* I. Verd. (1962). The two are only separated on the basis of the width of the perianth segments and their geographical distribution. The two forms are closely related but vicariant taxa, which here are recognized at subspecific level.

Perianth segments up to 1.8 cm wide subsp. *stuhlmannii*
 Perianth segments more than 2 cm wide subsp. *delagoense*

Subsp. **delagoense** (I. Verd.) Kwembeya & Nordal, **comb. nov.**

Crinum delagoense I. Verd. in Flow. Pl. Afr. **35**: t.1389 (1962); in *Bothalia* **11**: 44 (1973).

Type: Mozambique, Inhaca Is., fl. xi.1961 *Mogg* 29010 (PRE lectotype, designated here).

Crinum forbesianum Herbert in Herb. Amaryllid.: 267 (1837), nom. illeg. –Baker in Curt. Bot. Mag. **37**: t.6545 (1881).

Crinum forbesii (Lind.) Schultes emend. Herb. sensu Lehmillier in *Herbertia* **48** (1992) and **52** (1997). Lindley described this species from bulbs collected by John Forbes in Delagoa Bay which flowered at Chiswick near London. No type specimen or drawing exists. Further, the original description does not fit, as the leaves are said to be narrow and glaucous. Verdoorn (1962) and Archer & Archer (in *Bothalia* **26**: 153, 1996) argue convincingly that *C. forbesii* is a nomen incertum.

Botswana. SE: Shoshong, fl. & fr. 14.x.1965, *Smithers* 166.082 (SRGH).

Zimbabwe. N: Hurungwe Dist., Msukwe R., Kanyonga stream, fl. 18.xi.1953, *Wild* 4191 (K). W: Matobo, Farm Besna Kobila, fl. & fr. xi.1953, *Miller* 1948 (K, SRGH). C: Makoni Dist., 6 miles NW of Rusape, fl. 20.xi.1961, *Plowes* 2212; Rusape, 12 km W of Rusape, fl. & fr. 15.x.1961, *Methuen* 313 (K). E: Mutare Dist., at top of Burma Valley Pass, fl. & fr. 25.xi.1962, *Plowes* 2280; Chimanimani Dist., Charleswood Estate, near stream, fl. & fr. 27.xi.1955, *Drummond* 5038 (K); Chirinda Dist., fl. 20.x.1947, *Wild* 2092 (K). S: Buhera Dist., Machua turnoff on Buhera Road, 32 miles from Birchenough Bridge, fl. & fr. 3.xii.1964, *Masterson* 158.844 (K); Masvingo Dist., Tokwe R., near bridge, 23 miles S of Masvingo, fl. & fr. 18.xii.1957, *Leach* 8073.

Mozambique. M: Maputo Dist., Maputo (Delagoa) Bay, Inhaca Is., fl. & fr. 13.viii.1959, *Watmough* 382 (K, PRE, SRGH). GI: Limpopo valley, near Xai-Xai, fl. & fr. 21.i.1981, *Jansen* 7678 (K). Inhambane Dist., near Inhambane, fl. & fr. x.1937, *Gomes e Sousa* 2057 (K).

Also in South Africa (Limpopo and KwaZulu-Natal), particularly frequent along the coast on sandy soils.

Two specimens, *Chase & Leach* 10498 and *Methuen* 349 from Manica and Sofala Province, Mozambique (both K), appear to have tepals which are more or less intermediate between the narrow-flowered taxon from East Africa and the broad-flowered taxon from the south (S Mozambique, former Transvaal, KwaZulu-Natal). More field studies are needed to establish where these two taxa actually meet.

8. *Crinum crassicaule* Baker in Handb. Amaryllid.: 85 (1888). –Lehmiller in *Herbertia* **52**: 54 (1997). Type: Botswana, Köbis, between Lake Ngami and Ghanzi, x-xi.1861, *Baines* s.n. (K holotype).

Crinum foetidum I. Verd. in *Bothalia* **10**: 56 (1969); in *Bothalia* **11**: 42 (1973). Type: South Africa, 112 km N of Vaalwater, 13.xi.1964, *Louw* 3460 (PRE holotype).

Botswana. N: Chobe Dist., Chobe Nat. Park, between Serondella and Ngwezumba R., fl. & fr. 17.x.1972, *Pope, Biegel & Gibbs Russell* 810 (K, SRGH). SW: Ghanzi Dist., 15 km S of Takatshwane, along track to Maitli-a-Phuduhudu, fl. & fr. 7.xi.1979, *Skarpe* 342 (SRGH).

Zambia. B: Sesheke Dist., 30 km E of Sesheke, fr. 26.xi.2003, *Kwembeya & Nordal* 15 (O, SRGH).

Zimbabwe. N: Binga Dist., 48 km from Kamativi on Binga road, fl. & fr. 4.xii.1968, *Cannell* 65 (SRGH). W: Hwange Dist., Dom Pan, Main Camp, Hwange Nat. Park, fl. & fr. 23.xi.1968, *Rushworth* 1288 (K). C: Chegutu Dist., Poole Farm, fl. & fr. 10.xii.1949, *Hornby* 3111 (SRGH). E: Chimanimani Dist., Chirinda, fl. & fr. 20.x.1947, *Wild* 2092 (SRGH). S: Gutu Dist., Gutu, fl. & fr. 6.xii.1964, *Plowes* 2506 (SRGH).

Malawi. C: Dedza Dist., Mua Escarpment, fl. & fr. 13.xi.1967, *Salubeni* 884 (SRGH).

The species is widespread in southern Africa, in disturbed areas on sandy soils.

9. *Crinum papillosum* Nordal in Norw. J. Bot. **24**: 185 (1977); in F.T.E.A., Amaryllidaceae: 14 (1982). Type: Tanzania, Iringa Dist., Ruaha Nat. Park, 2 km NE of Msembe, 820 m on sandy gravelly soils in open *Combretum* bushland, 30.xi.1971, *A. Bjørnstad* 1108 (O holotype).

Zambia. N: Luapula Prov., Samfya Dist., sand dunes near Samfya along L. Bangweulu, 11°21'09.3"S, 29°33'27.3"E, 1131 m, fl. & fr. 15.iii.2004, *Dessein, Archer et al.* 547 (BR, PRE); 1190 m, 11° 20'50.7"S, 29°33'31.2"S, 1190 m, fl. & fr. 5.xii.2005, *Nordal & Hoell* 5305 (O).

The species grows in almost pure sand, and within the Flora area is known only from one large population on the sand dunes bordering SE Lake Bangweulu.

The Zambian population differs slightly from the type material of *C. papillosum* from SW Tanzania in that the colour of the dorsal keel of the perianth segments is darker and the seed surface less papillose. Subspecific recognition may be justified.

10. *Crinum verdoorniae* Lehmillier in *Herbetia* **52**: 57-59 (1997). Type: Zambia, Barotseland, Nangweshi, on Zambezi R., fl. ii.1955, *Codd* 7141 (PRE holotype).

Crinum kirkii sensu Verdoorn non Baker (1880) in *Bothalia* **11**: 38-39 (1973).

Caprivi Strip: Mpilila Is., fl. 15.i.59, *Killick & Leistner* 3384 (PRE).

Zambia. N: Mbala Dist., Lumi Marsh, fl. & fr. 7.ii.1955, *Richards* 4395 (K); N of Mukuku bridge in floodplain, fl. 4.xii.2002, 1185 m, *Kwembeya & Nordal* 1 (SRGH); B: Nangweshi on Zambezi R., *Codd* 7141 (PRE holotype); Zambezi R. floodplain, 6°21'9.2"S, 23°16'34.5"E, 1006 m, 29.xi.2003, *Kwembeya & Nordal* 23 (SRGH); W: Mwinilunga Dist., Lunga R., fl. & fr. 1.xii.1972, *Milne-Redhead* 3482(K).

Malawi. N: Nkhata Bay Dist., c. 16 km N of Nkhata Bay, fl. & fr. 19.xi.1977, *Phillips* 3102 (K).

Mozambique. MS: Kongone R. mouth on Zambezi R., fl. & fr. 30.xi.1859, *Kirk* 140 (K).

Occurring in sandy to sandy-clay soils on floodplains. So far only known to occur in E Caprivi and the Zambezi floodplain in W Zambia.

This species is morphologically very similar to *C. ornatum* (Aiton) Bury, described from Guinea and otherwise widespread across W Africa. They differ mainly by the leaf median ridge being scabrous in *C. verdoorniae* and glabrous in *C. ornatum*, a character difficult to interpret from herbarium specimens.

11. *Crinum rautanenianum* Schinz. in Bull. Herb. Boiss. **4**: 48 (1896). –Baker in F.T.A. **7**: 402 (1898). –Sölch & Roessler in Prodr. Fl. SW Afr. **150**: 8 (1969). –Verdoorn in Flow. Pl. Afr. **42**: t.1643 (1972); in *Bothalia* **11**: 36 (1973). –Lehmiller in Herb. **52**: 62 (1997). Type: Namibia, Olukonda, Ovamboland, i.1886, *Schinz* 822 (Z holotype).

Crinum euchrophyllum I. Verd. in Flow. Pl. Afr. **42**: t.1642 (1972). Type: Namibia, E Caprivi, fl. i.1972, *McFerren* in PRE 31940 (PRE holotype).

Botswana. N: Chobe Dist., Tsantsarra Pan, Chobe Nat. Park, fl. & fr. 22.i.1978, *P.A.Smith* 2193 (K, SRGH); NE of Gwetsha Is., 22.ii.1973, *P.A.Smith* 409; Boteti R. below Samedupe bridge, 5.ii.1977, *P.A.Smith* 1897; Okavango, 4 miles E of Masari Camp Exp., 5.i.1966, *De Winter* 4106 (K).

Zambia. B: Bulozhi plain, Zambezi floodplain, 15°10'48"S, 22°52'10"E, 1030 m, *Kwembeya & Nordal* 33 (O, SRGH). E: Luangwa Valley, between Chipata and Petauke, 13°5'S, 31°58'E, fl. 7.xii.2005, *Nordal & BJORÅ* 5060 (O).

12. *Crinum jasonii* BJORÅ & Nordal in *Kew Bull.* (in press). Type: Zambia: Mambwe Dist., Mfuwe area, 1 km SW of Nsendamilla village, 30.ii.2004, *Nordal, BJORÅ, Bingham & Alfonsi* 5032 (O holotype, K isotype).

Zambia. C: Mfuwe area, 1 km SW of Nsendamilla Village, 13°07'05"S, 31°47'26"E, in small seasonal swamps in heavy clay depressions within mopane woodland, 30.ii.2004, *Nordal, BJORÅ, Bingham & Alfonsi* 5032 (O holotype, K isotype); main road to S Luangwa Area Mgmt. Unit, 13°07'14"S, 31°46'50"E, in seasonally flooded heavy clay dambo within meander belt of Luangwa R., 3.xii.2004, *Nordal, BJORÅ, Bingham & Alfonsi* 5046 (O); Luangwa Nat. Park, on main road N near Mfuwe Lagoon, on heavy black clays within meander belt of Luangwa R., 5.xii.2004, *Nordal, BJORÅ, Bingham & Alfonsi* 5052 (O).

Crinum jasonii is so far only known from Luangwa Valley in SE Zambia, where it grows in seasonal swamps on heavy clays within mopane woodland.

This species, which ecologically belongs with the pan species, is superficially similar to *C. macowanii*, but has white flowers which are green-keeled, with veins turning reddish. It has less flowers per inflorescence, 3-6 (not up to 20), and pedicels mostly longer (2.5-3.5 cm) than *C. macowanii*. In addition, the anthers are black, but with a cream-coloured longitudinal line and the fruits are not beaked.

13. *Crinum paludosum* I. Verd. in *Flow. Pl. Afr.* **39**: t.1523 (1968); in *Bothalia* **11**: 35 (1973). Type: South Africa, Natal, Ingwavuma, Opondwini stream, fl. 1963, *Codd & Verdoorn* 10297 (PRE holotype).

Botswana. N: Ngamiland, 15 km N of Tsau, fl. & fr. 30.iii.1987, *Rae & Long* 501 (K). SE: near Limpopo R., Tuli Block, fl. & fr. i.1967, *McNeil* s.n. (K).

Zambia. B: Senanga Dist., 10 km S of Senanga, flats on E side of Zambezi R., fl. & fr. 31.i.1975, *Brummitt, Chisumpa & Polhill* 14194 (K).

Mozambique. MS: on road to Catandica (Vila Gouveia) from Macequesse, fl. xii.1947, *Erens* 476.

Zimbabwe. E: Chipinge Dist., Chibuwe irrigation scheme, 29.xii.1964, *Plowes* 2544 (PRE).

Growing in seasonally flooded dambos. Also in Namibia (Maltahöhe Dist.).

Crinum sp. A of F.T.E.A. from Tanzania appears to be similar to *C. paludosum*, but more filed studies are required for confirmation.

14. *Crinum carolo-schmidtii* Dinter in *Neue Pfl. SW Afr.*: 26 (1914). ! Sölch in *Beiträge Fl. SW Afr.*: 95 (1960). ! Sölch & Roessler in *Prodr. Fl. SW Afr.* **150**: 7 (1969). Type: Namibia, Guntus, 14.i.1912, *Dinter* 2307 (B holotype).

Caprivi Strip: Katima Mulilo area, *Killick & Leistner* 3112 (K, PRE).

Botswana. N: Nwaku pan valley, fl. & fr. 10.i.1980, *P.A.Smith* 2965 (K); Matsebe R., 6.xi.1976, *P.A.Smith* 1810; Ngamiland, near Xudum R., Okavango, 15.iii.1961, *Richards* 14726 (K, PRE).

In dambos and seasonally inundated areas on the floodplains of the Okavango and Zambezi rivers.

15. *Crinum macowanii* Baker in Gard. Chron. **9**: 298 (1878); in Handb. Amaryllid.: 94 (1888); in Fl. Cap. **6**: 202 (1896). ! Uphof in *Herbertia* **9**: 80 (1942). ! Verdoorn in J.S.Afr. Bot. **22**: 79 (1956); in *Bothalia* **11**: 46 (1973). ! Nordal in Norw. J. Bot. **24**: 182, fig.6 (1977). ! Lehmillier in *Herbertia* **52**: 62 (1997). ! Archer & Condy in Fl. Pl. Afr. **56**: 30 (1999). Type: South Africa, Eastern Cape, No Man's Land, 1884, *MacOwan* 2122 (K lectotype, GRA).

Crinum pedicellatum Pax in Engl. Bot. Jahrb. **15**: 142 (1892). Type: Tanzania, Kwimba Dist., Magu-Kagehi. xi.1885, *Fischer* 592 (B holotype).

Crinum johnstonii Baker in Bot. Mag. **128**: t.7812 (1902). Type: Malawi, Mt. Zomba, 40 miles N of Blantyre, cultivated in Kew, i.1899, *McClounnie* s.n. (K holotype).

Crinum macowanii Baker subsp. *kalahariense* Hannibal in Louis. Soc. Hort. Res. **3**: 256 (1972), nom. nud. described from Shoshong, SE Botswana.

Botswana. SE: 20 km SW of Shoshong (Shooshung) nom. nud.; N: 10 km from Francistown on road to Ramokwebane Border Post, in mopane woodland, fl.& fr. 21.i.1999, *Zimudzi* B203 (CAH).

Zambia. B: Machili, fl.& fr. 18.xi.1960, *Fanshawe* 5904 (SRGH). E: Mpika Dist., Mpika, Luangwa Valley Game Res., fl.& fr. 17.xii.1966, *Prince* 29 (SRGH). W: Kitwe, fl.& fr. 4.x.1970, *Fanshawe* 10926 (SRGH). C: Serenje Dist., Kundalila Falls, fl.& fr. viii.1965, *Williamson* 1105 (SRGH). S: Kalomo Dist., near Kalomo, fl.& fr. 16.xii.1961, *Whellan* 1896 (SRGH).

Zimbabwe. N: Makonde Dist., Lion's Den near Chinhoyi, fl.& fr. vii.1958, *Leach & Clarkson* 10578 (K). W: Bulawayo Dist., fl.& fr. ii.1944, *Martineau* 183 (SRGH). C: Harare, Univ. Zimbabwe (Rhodesia) vlei, fl.& fr. 6.xii.1968, *Grosvenor* 462 (K). E: Mutare, Hillside Golf Club, in vlei soils, fl.& fr. 25.x.1960, *Plowes* 2130 (K). S: Chivi Dist., on road to Hippo Pools near Runde R., fl.& fr. 3.ii.1973, *Grosvenor* 805 (SRGH).

Malawi. N: Nkhata Bay Dist., 3 km E of Chikangawa, fl.& fr. 28.x.1978, *Phillips* 4146 (K). S: Mangoche Dist., Nankumba, fl.& fr. 23.xi.1954, *Jackson* 1398 (K).

Mozambique. MS: 96 km N of Sofala, fl. 2.vi.1965, *Methuen* M129 (K). Manica, fl.& fr. 18.xii.1954, *Erens* 476 (K); Espungabera, fl.& fr. 5.vii.1962, *Methuen* M42 (K); Roadside to Gogoi, fl.& fr. 20.xi.1960, *Leach & Chase* 10498 (K).

A widespread species common in grassland or dambos from South Africa north to southern Ethiopia.

16. *Crinum lugardiae* N.E. Brown in Gard. Chron. **34**: 49 (1903); in Kew Bull. **1909**: 142 (1909). ! Uphof in *Herbertia* **9**: 82 (1942). –Sölch & Roessler in Prodr. Fl. SW Afr. **150**: 7 (1969). Type: Botswana, Kwebe Hills, Ngamiland, 9.xii.1897, *Lugard* 43 (K holotype).

Crinum carolo-schmidtii sensu Verdoorn in Flow. Pl. Afr. **41**: t.1629 (1972); in *Bothalia* **11**: 37 (1973), non Dinter.

Botswana. SW: Ghanzi Dist., in pan 15 km N of Maitlo-a-Phuduhudu, along track to Takatshwane, fl.& fr. 7.xi.1979, *Skarpe* 345 (SRGH, K). SE: Gaborone, 3.5 km S of Agric. Res. Station, fl.& fr. 16.iv.1973, *Kalaole* A163 (SRGH).

Also in Namibia, South Africa (North-West, Gauteng, Limpopo and Northern Cape Provinces) in clay soils in grassy depressions or black turf flats, usually in *Acacia* veld.

Excluded names

Crinum parvum Baker in Kew Bull. **1897**: 284 (1897) is a poorly known species. The holotype at Kew (*Buchanan* s.n., v.1896) consists of a single leaf and flower, and was collected on the banks of the Zambezi River in Mozambique. No specific locality is given. The leaf margin is 1.2 cm wide and toothed; flowers sessile, perianth tube 7 cm, perianth segments 8.5 cm long, anthers yellow. These are characteristic features of *C. acaule* Baker (Flora Capensis **6**: 532, 1897), which is found close to but not in the Flora area.

Crinum vassei D.Boisse in Bull. Mus. Hist. Nat. Paris **13**: 444 (1907). From the description and painting at Kew the following characters are discernable: Leaves scabrid, arching with a midrib; flowers with a dark red keel, curved backwards with a persistent spathe valve. *C. vassei* could be a synonym of *C. kirkii*. Incomplete specimens (*J. Kirk* 136 & 140 (K)) were collected in 1861 from the Kongone mouth of the Zambezi in Mozambique, and may also belong to *C. kirkii*. Agreement over the status of this taxon among researchers may be unrealistic in the light of incomplete taxonomic information on the type specimen.

10. AMMOCHARIS

Ammocharis Herb. in App. 17 (1821), emend. Milne-Redh. & Schweick. in J. Linn. Soc. **52**: 169 (1939). –Nordal in F.T.E.A., Amaryllidaceae: 19 (1982).

Stenolirion Baker in Hook., Ic. Pl. **25**: t.2493 (1896) & in F.T.A. **7**: 385 (1898).

A genus of about 5 species in Africa, with 4 of the species recorded in the Flora area.

- | | |
|---|-------------------------|
| 1. Leaves narrow and ±erect | 1. <i>A. baumii</i> |
| Leaves distichous, biflabellately spreading on the ground | 2 |
| 2. Pedicels less than 0.5 cm long; filament less than 1 cm long; style included; apex of perianth never spirally recurved at anthesis | 2. <i>A. angolensis</i> |
| Pedicels more than 0.5 cm long; filaments more than 1 cm long; style exerted; apex of perianth lobes spirally recurved at anthesis | 3 |
| 3. Perianth tube less than 4 cm long; pedicels as long as or longer than the perianth tube | 3. <i>A. coranica</i> |
| | 4. <i>A. tinneana</i> |
| Perianth tube more than 4 cm long; pedicels shorter than the perianth tube | |

1. Ammocharis baumii (Harms) Milne-Redh. & Schweick. in J. Linn. Soc., Bot. **52**: 187 (1939).

Crinum baumii Harms in Warb., Kunene-Samb. Exped.: 199 (1903). –Verdoorn in Fl. Pl. Afr. **36**: t.1432 (1964). –Sölch & Roessler in Prodr. Fl. SW Afr. **150**: 6 (1969). Type: Angola, Chirumbu, 14.x.1899, *Baum* 273 (K).

Caprivi Strip: Mukwanyati Omuramba, fl. 30.x.1966, *Watt* s.n. (PRE). **Botswana**. N: without locality, fl. & fr. 17.iii.1980, *P.A. Smith* 3228 (SRGH). **Zambia**. C: Mumbwa Dist., fl. & fr. 21.xi.1959, *Drummond & Cookson* 6740 (K). **Zimbabwe**. C: Kadoma Dist., Sanyati communal lands, fl. & fr. 5.ix.1957, *Cleghorn* 297 (SRGH).

The species closely resembles other *Ammocharis* in its inflorescence structure. In the absence of fresh material, it is difficult to ascertain whether leaf arrangement is biflabellate (*Ammocharis*), or distichous or rosulate (*Crinum*). The material examined might as well

belong in *Ammocharis*, a view strongly supported by molecular data (Meerow, Lehmillier & Clayton in Bot. J. Linn. Soc. **141**: 349-363, 2003). We therefore place the species here as this reflects its relationship in the *Ammocharis* clade.

2. *Ammocharis angolensis* (Baker) Milne-Redh. & Schweick. in J. Linn. Soc., Bot. **52**: 186 (1939). –Geerinck in F.A.C., Amaryll.: 4, t.1 (1973). –Nordal in F.T.E.A., Amaryllidaceae: 20 (1982). Type: Angola, Huilla, 1859, *Welwitsch* 4012 (BM holotype, K isotype).

Zambia. W: Mwinilunga Dist., c.6 km SE of Angola border, SW of Mujileshi R., fl. & fr. 7.xi.1962, *Richards* 16923 (K). N: Kawambwa Dist., Ntenke, fl. & fr. 19.ix.1963, *Mutumushi* 437 (K, SRGH).

3. *Ammocharis coranica* (Ker Gawl.) Herbert in App. Pl.: 17 (1821). –Roemer in Amaryllidaceae: 62 (1849). –Kunth in Enum. **5**: 613 (1850). –Phillips in Flow. Pl. S. Afr. **6**: t.230 (1926); in Flow. Pl. S. Afr. **18**: t.712 (1938). Type: South Africa, Klipfontein, Griqualand West, *Burchell* s.n. (K holotype).

Botswana. SE: 6 km SSE of Gaborone, fl. & fr. 28.x.1978, *Hansen* 3514 (K, SRGH).

Zimbabwe. W: Bulilamangwe Dist., Thornville Ranch, fl. & fr. 8.xi.1951, *Plowes* 1306 (SRGH). S: Gwanda Dist., Tuli Expt. Station, fl. & fr. 6.xii.1964, *Norris-Rogers* 421 (SRGH).

4. *Ammocharis tinneana* (Kotschy & Peyr.) Milne-Redh. & Schweick. in J. Linn. Soc., Bot. **52**: 177 (1939). –Nordal in F.T.E.A. Amaryllidaceae: 19 (1982). Type: Sudan, banks of Bahr el Ghasal, towards Dembo and Bongo, *Tinne* 7a (W lectotype).

Crinum bainesii Baker in Gard. Chron. **1881**(2): 39; in F.T.A. **7**: 394 (1898). Type: Botswana, Koobie wells, Kobe, x-xii.1861, *Baines* s.n. (K holotype).

Crinum rhodantum Baker in F.T.A. **7**: 397 (1898). Type: Botswana, Kwebe Hills, xii.1896, *Lugard* 40 (K holotype).

Botswana. N: Ngamiland, alongside Xanakuno-Moshu road, fl. & fr. 11.xii.1974, *P.A.Smith* 1222 (K, SRGH).

Zambia. B: Kalabo, Liuwa Plain, Paramount Chief Game Res., fl. & fr. 14.xi.1959, *Drummond & Cookson* 6463 (SRGH). W: Mwinilunga Dist., c.32 km E of Mwinilunga, fl. & fr. 26.x.1967, *Leach & Williamson* 13489 (SRGH). N: Mpika, Luangwa Valley Game Res., fl. & fr. 19.xii.1966, *Prince* 38 (SRGH). C: Kabwe Dist., 96 km N Lusaka, fl. & fr. 5.xi.1967, *Simon & Williamson* 1236 (SRGH). S: Mazabuka Dist., Kafue Flats, 48 km S of Lusaka, fl. & fr. 8.xii.1957, *Noak* 286 (SRGH).

Zimbabwe. W: Hwange Dist., Main Camp, Hwange Nat. Park, fl. & fr. 26.xi.1968, *Rushworth* 1303 (K). N: Kariba Dist., 19 km ESE of Chirundu, fl. & fr. 24.xi.1959, *Drummond & Cookson* 6773 (K, SRGH). C: Chegutu Dist., Poole Farm, fl. & fr. 14.ix.1952, *Hornby* 3316 (SRGH). E: Chipinge Dist., Save Valley Expt. Station, fl. & fr. 18.xi.1966, *Plowes* 2830 (K, SRGH). S: Mwenzi Dist., Maliapati, fl. & fr. 2.xi.1955, *Wild* 4711 (SRGH).

Malawi. S: Mangochi Dist., Monkey Bay, fl. & fr. 20.xii.1968, *Eccles* 217 (SRGH).

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