

The Genus *Zantedeschia*

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ABSTRACT

A revision of the genus *Zantedeschia*, with special reference to Southern Africa, is presented and a key is provided as a guide to the six species and two subspecies recognized. The new combinations and subspecies are: *Z. albomaculata* (Hook.) subsp. **macrocarpa** (Engl.) Letty and subsp. **valida** Letty. Each species and subspecies is illustrated in colour.

INTRODUCTION

Although the genus *Zantedeschia* Spreng. has been revised as recently as 1915 by Engler in *Das Pflanzenreich* and in 1948 by Traub in *Plant Life*, these authors appear to have cleared up little of the confusion existing, chiefly through lack of a wide range of properly documented material and the opportunity for field work.

Most of the previous taxonomical studies in the genus deal with specimens from Africa with scanty or no information, or from plants grown in European gardens and hot-houses. The inevitable consequence is that species were described without knowledge of the variation found in nature while some, e.g. *Z. elliotiana*, may be of hybrid origin.

For this reason a revision is tentatively offered, and will, it is hoped, point out features for study of the plants occurring naturally in Southern Africa and further afield.

Species of *Zantedeschia* are commonly known as Arum Lilies, Pig Lilies, Cape Arums, Black-eyed Arums, Yellow Arums, Pink Arums and in Afrikaans as Varkblomme, Varkore and Aronskelke.

The use of the term Arum results from a superficial resemblance of the South African plants to members of the genus *Arum* L. occurring in Europe and western Asia.

The genus was named by Sprengel in 1826 in honour of a Professor Zantedeschi; there is uncertainty, however, whether Giovanni or Francesco Zantedeschi was intended. Engler states that it was the latter but Marloth and contemporary Italian botanists feel sure that it was the former. According to a letter from Professor Rodolfo Pichi-Sermolli of the University of Florence: "As regards the question of *Zantedeschia* I believe that you are wrong in thinking that the genus is named in honour of Francesco Zantedeschi. According to Saccardo (*La Botanica in Italia*, Mem. R. Ist. Veneto Sc. Lett. Art. 25, 4: 176, 1895) the genus *Zantedeschia* is dedicated to Giovanni Zantedeschi (1773-1846), a botanist of Brescia. I think that Saccardo is right. In fact in 1826 when Sprengel established the genus, Giovanni Zantedeschi was aged enough to be known, and had published already several botanical papers. On the contrary Francesco Zantedeschi (1797-1872) in 1826 was 29 years old only, and probably was completely unknown to Sprengel, above all because he was not a botanist."

Sprengel based the genus on three species: *Z. aethiopica* (L.) Spreng. from South Africa and two Asiatic species, *Z. aromatica* (Roxb.) Spreng. and *Z. occulta* (Lour.) Spreng. Although further Asiatic species were added by C. Koch, *Ind. Sem. Hort. Berol.* (1854), it is generally accepted that *Zantedeschia* should be restricted to the African species, while the Asiatic species are mainly accommodated in the genus *Homalomena* Schott. Engler, *Pflanzenr.*



FIG. 1.—*Zantedeschia aethiopica*, illustrated by Commelin in *Horti medici Amstelædamensis*, Vol. 1, Plate 50 (1697).

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4, 23 Da: 24 (1912), places *Homalomena* in the tribe *Philodendreae* and *Zantedeschia* in the tribe *Zantedeschiaceae*.

Until Elsie Garret Rice published the book *Wild Flowers of the Cape of Good Hope* in 1952, the striking Cape Arum seems to have been too common for inclusion in the numerous publications of Cape Flowering Plants. It received earlier recognition in Europe. Probably the first illustration of the plant was made by Commelin in *Horti medici Amstelædamensis Rariorum Plantarum Historia* (1697), page 95, plate 50, in 1697, from a plant raised from tubers which, to translate his words, he had the honour of receiving from his Excellency, Simon van der Stel, Governor of the Cape of Good Hope. He describes it as a Calf's-foot from the land of the Moors (Morelandse kalfsvoet) literally: *Arum aethiopicum*. This is the *Calla aethiopica* of Linnaeus, *Species Plantarum* p. 968 (1753), where he cites *Hortus Cliffortianus* 453 (1737) among other references.

In Link, *Diss. Bot.* (1795), the species was transferred to the genus *Colocasia*, while Kunth (1815) made use of the phrase name of Hermann and renamed it *Richardia africana*. Since the generic name *Richardia* had been used by Linnaeus for a plant in Rubiaceae, Sprengel (1826) established the genus *Zantedeschia* and reverted to the correct specific epithet *aethiopica*. After further vicissitudes in the genera *Arodes*, *Richardia* and *Calla* the name *Zantedeschia aethiopica* (L.) Spreng. was upheld by Engler in *Das Pflanzenreich* in 1915. Eventually the name *Zantedeschia* was conserved against earlier generic names.

As far as is known, the genus is confined to the African continent and is concentrated mainly in Southern Africa.

Six species, with two subspecies, are recognized. In addition to the common Arum Lily, *Z. aethiopica*, which is widespread in the Cape Province and Natal and ranges as far afield as Clanwilliam, Lesotho and north-eastern Transvaal, there are the Black-eyed Arums (*Z. albomaculata* with its two subspecies *macrocarpa* and *valida*), the Pink Arum (*Z. rehmannii*) and the Yellow Arums (*Z. pentlandii*, *Z. jucunda* and *Z. elliottiana*). The last mentioned is tentatively upheld at this stage though its status will remain uncertain until material matching the type has been located in the wild state.

The Black-eyed Arums or Albomaculata group show great variation in size, shape and maculation of the leaf, the size, shape and colouring of the spathe, the size of the berries and number of ovules. Their classification presents one of the greatest problems in the genus and a broad view of the species limits appears to be justified.

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PRE-LINNAEAN HISTORY

1687. The first reference made to our popular Cape Arum, which is now known as *Zantedeschia aethiopica*, appears to have been by Paul Hermann in his *Horti Academici Lugduno-Batavi Catalogus*, page 60 (1687) where he used the phrase: "Arum aethiopicum flore albo odorato, moschum redolente."

1697. Commelin produced the first known illustration of the species, accompanied by a description in Latin and Dutch in his *Horti Medici Amstelodamensis Rariorum Plantarum Historia*, p. 95, plate 50 (1797).

1705. Paul Hermann referred again to the species in his *Paradisus Batavus*, p. 74 (1705), under the appellation "Arum africanum, flore albo odorato."

1720 (?). There is a good picture of *Zantedeschia aethiopica* in a book of wild-flower facsimile paintings (probable year of painting about 1720), annotated in 1755 by Johannes Burman, in the Library of the Botanical Research Institute, Pretoria.

1737. Linnaeus quotes earlier literature references when he describes this plant, which he places in the genus *Calla*, in his list of the *Hortus Cliffortianus*.



FIG. 2.—*Zantedeschia aethiopica*, from a folio of early eighteenth century water-colour illustrations in the library of the Botanical Research Institute, Pretoria. The artist is not known but the illustrations were annotated by Johannes Burman in 1755.

POST-LINNAEAN HISTORY

1753. Linnaeus described the species as *Calla aethiopica* in his *Species Plantarum* ed. 1: 968 (1753). He gives its habitat as Aethiopia, a name often used for Africa. It may be noted that the genus *Calla* is now restricted to Europe.

1763. The genus *Aroides* Heister ex Fabricius, in *Enum. Plant Hort. Helmst.* ed. 2, 2 : 42 (1763), was separated from *Calla* to accommodate the species *aethiopica*.

1768. In his *Dictionary*, ed. 8: no. 1 (1768), Miller adds: "Found at the Cape of Good Hope", to his quotation from former literature.

1790. The identity of *Colocasias* Neck., *Elem.* 3: 289 (1790), is uncertain and it is treated as a *nomen dubium*.

1795. Link, *Diss. Bot. Sverin* 77 (1795), lists our species as *Colocasias aethiopica*. The name *Colocasias* was used by pre-Linnaean authors, even as early as 1601 (Clusius, *Rar. pl. hist.*, XXV), for a different plant.

The above publication by Link was the first time that the name *Colocasias* was used in post-Linnaean times. The fact that Link lists the combination *Colocasias aethiopica* together with a reference to Commelin, *Hort. Med. Amstel. Rar. Pl.* 95, t 50 (1697), where a description is provided, would probably validate *Colocasias* Link in the above publication as a monotypic genus under the International Code of Botanical Nomenclature, Art. 42 (1961 Code), based on *Calla aethiopica* L.

1805. John Sims, in *Curtis's Botanical Magazine* t. 832 (1805), published a description and a life-like plate by Syd. Edwards of this species and followed Linnaeus by naming the plants *Calla aethiopica*.

Sims throws doubt on Miller's identification of the plant because the latter says "the pistils and stamens are so intermixed as not to be easily distinguished without the aid of glasses and that a few of the flowers situate near the extremity of the spadix are succeeded by berries . . .".



FIG. 3.—*Zantedeschia aethiopica*, from a slide taken by Mr. E. G. H. Oliver of a specimen in Hort. Cliff. Herb. (BM).

1818. Kunth, in Mem. Mus. Nat. Paris 4: 443 (1818), apparently also unaware of the genera created by Fabricius (1763) and Link (1795), established the genus *Richardia* to accommodate *Calla aethiopica* L., renaming it *Richardia africana* Kunth, probably alluding to the phrase in Hermann (Paradisus Batavus 74, 1705) "Arum africanum flore albo odorato." The epithet "africana" is superfluous and therefore illegitimate according to our present International Code of Botanical Nomenclature, and *Richardia* Kunth is also inadmissible, being a homonym of *Richardia* L. (1753), (Rubiaceae), which he renamed *Richardsonia* Kunth.

1826. Sprengel, Syst. Veg. 3: 765 (1826), created the genus *Zantedeschia*, making the combination *Z. aethiopica* (L.) Spreng. and including together with it certain other Aroids which, according to our present views, belong in other genera. The name *Zantedeschia* was given in honour of a contemporary scientist, either Giovanni or Francesco Zantedeschi of Italy (see Introduction).

1829. Link, Handb. 1: 267 (1829), continues to use the generic name *Colocasias* for our species.

1837. Rafinesque, New Flora Amer. 2: 90 (title page 1836, published 1837 according to Merrill, Index Rafin. 1949), states: "*Calla aethiopica* is a peculiar genus, which I call *Otosma*." In Flora Teluriana 4: 8 (1836) he gives a Latin description of "this well-known plant of Africa . . .".

1837. Endlicher reverted to the name *Richardia* in Gen. Plant. p. 238 (1837).

1841. Kunth continued to use the name *Richardia* in Enum. 3: 58 (1841) retaining the epithet *africana* in place of *aethiopica*.

1856; 1858. Schott, Syn. 131 (1856) and Gen. Aroid. t. 62 (1858), follows Kunth by using the name *Richardia africana*.

1859. W. J. Hooker in Curtis's Botanical Magazine t. 5140 (1859) described a plant with a deep purple eye at the base of the spathe and with spotted leaves as *Richardia albo-maculata* which was received from "Messrs Backhouse of York Nurseries . . . from Natal." This is the second species known from South Africa.

1859. Lindley described a species on the same day as the foregoing as *Calla oculata* in the Gardeners Chronicle 40: 788 (1859) stating that "Messrs Veitch received it from Natal in 1857 . . . spathe yellowish green with a deep purple eye."

1860. Schott, Prodr. Aroid. 324, still upheld *Richardia africana* for the Cape plant.

1860. W. J. Hooker published a plate and description in Curtis's Botanical Magazine t. 5176 (1860) of another plant with a dark eye and cream spathe which he named *Richardia hastata*, though he thought it might be a form of *R. albomaculata* with immaculate leaves.

1865. Schott described a plant (*Welwitsch* 230) in Journal of Botany 3: 35 (1865) which was "common in deep ponds between the islands of Calemba and Quisonde on the right banks of the river Cuanza in Pungo Andongo district of Angola. He named it *Richardia angustiloba* Schott.

1869. *Richardia melanoleuca* was described by J. D. Hooker, with a plate, in Curtis's Bot. Mag. t. 5765 (1869). Its type locality is given as Natal, the plants having been imported and grown by "Mr Bull of Chelsea."

1879. Engler in DC., Mon. Phan 2: 327, upholds the genus *Richardia* and refers to the Cape plant as *Richardia africana* Kunth.

1880. Baillon in Bull. Soc. Linn. Paris 1: 254 (1880) discusses the confusion in nomenclature of the Aroid genus which wrongly received the name *Richardia* Kunth (1815), a name previously given to a plant in the Rubiaceae by Linnaeus (1753) but changed to *Richardsonia* by Kunth, and comes to the conclusion that the *Calla aethiopica* L. which Kunth named *Richardia africana* should bear the name *Zantedeschia aethiopica* as given by Sprengel in 1826. He also published the combination *Z. albo-maculata* (Hook.) Baill.

1883. Benthams and Hook. f., Gen. Pl. 3: 982 (1883), uphold *Richardia* Kunth, under which *Zantedeschia* Spreng. (partly) is placed in synonymy.

1883. Engler, when describing the species *Zantedeschia rehmannii* Engl. and *Z. macrocarpa* Engl. in Bot. Jahrb. 4: 63 (1883), followed Baillon, explaining that he had previously used Kunth's generic name *Richardia* to prevent confusion but, after taking everything into consideration and carrying out the rules of priority in nomenclature, he agreed with the findings of Baillon.

1889. Engler continues to use the generic name *Zantedeschia* in Engler and Prantl, Pflanzenfamilien 2, 3: 136 (1889).

1891. Otto Kuntze, Rev. Gen. Pl. 2: 739-40 (1891), seems to have been the first to realise the priority of the generic name *Aroides*, but he changed it to *Arodes* for grammatical reasons. He made the combinations *A. aethiopicum* (L.) Kuntze, *A. albomaculatum* (Hook.) Kuntze, *A. angustilobum* (Schott) Kuntze, *A. hastatum* (Hook.) Kuntze and *A. melanoleucum* (Hook.f.) Kuntze.

1915. Engler, in his revision of the genus *Zantedeschia* in Pflanzenreich 4, 23 Dc: 61 (1915), recognizes 8 species. He, however, wrongly places the species *Z. pentlandii* (Whyte ex Watson) Wittm. in synonymy under *Z. angustiloba* (Schott) Engl.

1948. Traub in Plant Life Vol. 4 (1948) revised the genus on the same lines as Engler in Pflanzenreich (1915). He also upheld 8 species and, as in the case of Engler, he suffered from lack of knowledge of the plants in the field, with the result that his revision perpetuates much of the earlier confusion.

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ZANTEDESCHIA

Zantedeschia Spreng., Syst. Veg. 3: 765 (1826); Baill. in Bull. Soc. Linn. Paris 1: 254 (1880); Engl. in Bot. Jahrb. 4: 64 (1883); Pflanzenr. 4, 23 Dc: 61 (1915); Marloth, Fl. S. Afr. 4: 52 (1915); Bailey, Cycl. Hort. p. 3534 (1963); Traub, Plant Life 4: 12 (1948); Adamson & Salter, Fl. Cape Penins. 132 (1950); Phill., Gen. S. Afr. Flow. Pl. ed. 2: 161 (1951); nom. cons. Type species: *Z. aethiopica* (L.) Spreng.

Calla L., Sp. Pl. 968 (1753), pro. parte.

Aroides Heist. ex Fabricius, Enum. Pl. Hort. Helmst. ed. 2, 2: 42 (1763); Kuntze, Rev. Gen. 2: 737 (1891) (as "Arodes").

Colocasias Link, Diss. Bot. Sverin 77 (1795); Handb. 1: 267 (1829).

Richardia Kunth in Mem. Mus. Hist. Nat. Paris 4: 433, t. 20 (1818); Engl. in DC., Mon. Phan. 2: 326 (1879); N.E. Br. in Fl. Cap. 7: 36 (1897); Fl. Trop. Afr. 167: 8 (1901); Phill., Gen. S. Afr. Flow. Pl. ed. 1: 125 (1926).

Perennial herbs with fleshy rhizomes. *Leaves* deciduous or evergreen, petiolate, radical, contemporary with flowers; petioles long, sometimes stained or mottled with purple, sometimes setulose, clasping at the base to form a short neck; leaf blades varying with age and species from lanceolate to orbicular, maculate or immaculate, base cuneate, truncate, hastate, sagittate or cordate, apex acute or obtuse with a subulate tip. *Peduncle* as long as, or longer than, the leaves, green, sometimes stained or mottled with purple, sometimes setulose. *Spathes* subcylindrical to funnel-shaped, convolute at the base up to 17 cm long, ivory-white, cream, yellow, pink or rosy-purple, often with a purple blotch at the base inside, persistent; limb spreading, oblique, truncate to acute, terminating in a subulate tip. *Spadix* monocious, free, sessile or sometimes more or less stipitate, shorter than the spathe; staminate and pistillate sections distinct, with male flowers in the upper sections; staminodes sometimes interspersed among the ovaries, other sterile organs absent. *Perianth* O. *Stamens* free, crowded together haphazardly; anthers sessile, oblong, laterally compressed, truncate at the apex, opening by terminal pores from which pollen is emitted in long beaded strings. *Ovaries* numerous, spirally arranged, 3-locular; ovules 1-8 per locule, attached dorsally to the central placenta; style short;

stigma discoid. *Fruit* a berry; berries clustered, few to many seeded, green or orange-coloured when ripe, up to 2 cm in diam., usually surrounded by and contained in, the withering spathe. *Seed* leathery, subglobose or ovoid, often compressed.

The genus is restricted to the African continent extending from the Cape Province to the eastern Orange Free State, Natal, Lesotho, Swaziland, Transvaal, Rhodesia, Malawi, Zambia and Angola, with a recent gathering from northern Nigeria which has not been examined. Six species are recognized, one of which, *Z. elliottiana*, has not been recorded with certainty in the wild state and is suspected of being of hybrid origin. The plants grow in marshy places, on grassy slopes and at forest margins.

The species fall into two distinct sections: (a) the typical section containing one species, *Z. aethiopica*, in which the plants do not die down in winter, the female flowers in the lower part of the spadix are interspersed with staminodes, and the fruits turn orange in colour and become soft and later mucilaginous on maturity; and (b) a section consisting of the remaining five species in which the plants die down in winter, there are no staminodes among the female flowers, and the fruits remain firm and green until they finally wither and rupture or decompose on the ground.

Key to Species

- Plants evergreen; female flowers interspersed with staminodes.....1. *Z. aethiopica*
- Plants deciduous; female flowers not interspersed with staminodes:
 - Leaves narrowly lanceolate, cuneate at the base.....2. *Z. rehmannii*
 - Leaves hastate to cordate at the base:
 - Spathes golden yellow to lemon yellow:
 - Leaves triangular-hastate, always maculate; spathe golden yellow.....3. *Z. jucunda*
 - Leaves oblong-hastate to ovate-orbicular, cordate, maculate or immaculate:
 - Leaves ovate-orbicular, maculate; spathe without a purple blotch at base.....4. *Z. elliottiana*
 - Leaves oblong-hastate, usually immaculate; spathe usually with a purple blotch at base.....5. *Z. pentlandii*
 - Spathes white, cream, ivory, pale greenish-yellow or rarely coral-pink:
 - Leaves either immaculate or conspicuously maculate, usually oblong-hastate, rarely ovate-hastate (and then white-spotted), lower lobes short to triangular-spreading or strap-shaped; spathes with limb more or less spreading, usually tapering gradually to the apex
 - 6a. *Z. albomaculata* subsp. *albomaculata*
 - Leaves immaculate or slightly maculate, rarely conspicuously maculate, triangular-hastate to ovate-orbicular-cordate, lower lobes bluntly triangular; spathes more or less truncate, abruptly apiculate:
 - Leaves usually triangular-hastate, usually slightly maculate; spathes more or less truncate; berries large (up to 2 cm diam.)
 - 6b. *Z. albomaculata* subsp. *macrocarpa*
 - Leaves ovate-cordate to ovate-orbicular-cordate, immaculate; spathes large, limb somewhat spreading; berries medium-sized (up to 1 cm in diam.)
 - 6c. *Z. albomaculata* subsp. *valida*

1. *Zantedeschia aethiopica* (L.) Spreng., Syst. Veg. 3: 765 (1826); Baill. in Bull. Soc. Linn. Paris 1: 254 (1880); Engl. in Bot. Jahrb. 4: 64 (1883); Pflanzenr. 4, 23 Dc: 62 (1915); Marloth, Fl. S. Afr. 4: 52 (1915); Traub in Plant Life 4: 12 (1948); Adamson & Salter, Fl. Cape Penins. 132 (1950); Letty in Flow. Pl. Afr. 30: t. 1190 (1954-55). Lecto-type: Specimen in Hort. Cliff. Herb. (BM; PRE. photo.).

Calla aethiopica L., Sp. Pl. 968 (1753); Mill., Dict. ed. 8 (1768); Ait., Hort. Kew. ed. 1, 3: 318 (1789); Sims in Bot. Mag. t. 832 (1805).

Aroides aethiopicum (L.) Heist. ex Fabric., Enum. Pl. ed. 2: 42 (1763); Kuntze, Rev. Gen. 2: 740 (1891) (as "Aroides").

Colocasias aethiopica (L.) Link, Diss. Bot. Sverin 77 (1795); Handb. 1: 267 (1829).

Otosma aethiopica (L.) Rafin., New Fl. Amer. 2: 90 (1836); Fl. Tellur. 4: 8 (1836).

Richardia africana Kunth, Mem. Mus. Hist. Nat. Paris 4: 433, t. 20 (1818); Engl. in DC., Mon. Phan. 2: 326 (1879); N.E. Br. in Fl. Cap. 7: 36 (1897); nom. illegit. Type: same as *Z. aethiopica*.

Zantedeschia aethiopica var. *minor* Engl. in Pflanzenr. 4, 23 Dc.: 63 (1915). Type: based on Gard. Chron. 27: 755, fig. 153 (1890) of *Z. aethiopica* "Little Gem."—var. *umganiensis* Leicht. & Engl. in Pflanzenr. 4, 23 Dc: 64 (1915). Type: Natal, Howick Falls, 1899, Nelson.

Plants glabrous up to 60 cm tall (sometimes up to 2.5 m under trees). *Leaves* evergreen, up to 60 cm long; petiole green; blade usually immaculate, characteristically more or less spreading and leathery, varied in shape but usually broadly ovate-cordate or hastate, 15-20 cm long, 10-15 cm broad at the base, apex obtuse or acute, the length of the blade above the basal lobes usually less than twice the width. *Peduncle* 30-60 cm long, green, glabrous,

triangular in cross-section, 2,5 × 2 cm at base. *Spathe* about 15 cm long, 12 cm broad, ivory-white inside, bright green at base outside merging into white upwards, longitudinally veined, folded from slightly below the insertion of the spadix into a wide-mouthed funnel, limb obliquely spreading, ending in a green recurving 2 cm long apiculus. *Spadix* sessile, male zone about 7 cm long, anthers bright yellow, 1,5–2 mm long, 1–1,5 mm broad with 2 pores, pollen white; female zone about 1,8 cm long, ovaries interspersed with numerous mushroom-shaped staminodes; ovaries about 4 mm long, globose, grooved, pale yellow-green grading to whitish at the tip, tapering to a short style 1,5 mm long, 3 locular, each locule with 1–4 ovules. *Fruits* numerous 1,2 cm long, 1–1,2 cm in diam. across the top, green at first, becoming soft and orange coloured at the base and greenish at the apex when ripe, tapering to a triangular base with a short persistent style at the apex, seeds 1–12.



FIG. 4.—*Zantedeschia aethiopica*, grown in Pretoria from tubers collected at Robertson, Cape Province (Letty 324).

Plants of this species grow in marshy depressions from sea level to high altitudes, extending from the western Cape Province as far north as Clanwilliam and eastwards through Eastern Province and Natal to Lesotho and the Woodbush area in north-eastern Transvaal.

Its main flowering period is from August until January, but in Natal and the Transvaal occasional flowers are found from February to July.

TRANSVAAL.—2329 (Pietersburg): Woodbush (–CD), *Van Dam s.n.*; *Jenkins s.n.*; *Mogg s.n.*; Moss 15589 (K). 2530 (Lydenburg): 19 km S.E. of Lydenburg, *Letty* 320; *Codd* 8301. 2531 (Komatipoort): between Barberton and Badplaas (–CC), *Aves s.n.*; Nelshoogte Forestry Station (–CC), *Codd* 8120. 2730 (Vryheid): Wakkerstroom (–AC), *Van Dam s.n.*; farm Oshoek, near Wakkerstroom (–AC), *Letty* 488; *Devenish* 134.

NATAL.—2829 (Harrismith): Oliviershoek Pass (–CB), *Thode* 2998 (STE). 2830 (Dundee): Little Berg, on farm Solitude (–AA), *West* 1862. 2831 (Nkandla): Eshowe (–CD), *Rogers s.n.*; Mtunzini (–DD), *Mogg* 4446. 2929 (Underberg): 35 km from Donnybrook on road to Bulwer (–CB), *Killick & Marais* 2092; Umzimkulu River, 10 km from Underberg (–CD), *Marais* 341; 16 km S.W. of Underberg (–CD), *Dyer* 3299. 2930 (Pietermaritzburg): Rosetta (–AC), *Young s.n.* (NH); Dargle (–AC), *Marais* 813; Glen Arum, Balgowan (–AC), *Mogg* 5629; Lidgetton (–AC), *Dixon s.n.*; Rosetta (–AC), *Letty* 312; *Codd* 8519; *Moll* 1182; 24 km N.E. of Howick (–AC), *Prosser* 1460; Chase Valley, Alberton (–CB), *Mogg* 6544; Sweetwaters (–CB), *Dyer* 3129; near Pietermaritzburg (–CB), *Giddy s.n.*; Ndwedwe (–DB), *Strey* 7533; Sheffield Beach (–DD), *Bruce* 164; Isipingo (–DD), *Ward* 599; Bothas Hill (–DD), *Forbes & McClean* 33 (NH). 2931 (Stanger): Thrings Post, Mapumulo (–AA), *Moll* 2319. 3030 (Port Shepstone): Ixopo (–AA), *E. Mogg s.n.*; Dumisa Station (–CB), *Rudatis* 699 (K); near Shelly Bay (–CB), *Mogg* 12861; Margate (–CB), *De Winter* 768; Beach Terminus Siding (–CB), *Letty* 263; South Coast (–CB), *Strey* 5838. 3130 (Port Edward): 5 km N. of Port Edward (–AA), *Codd* 8001.

LESOTHO.—2828 (Bethlehem): Leribe (–CC), *Dieterlin* 583. 2927 (Maseru): near Mamathes (–BC), *Jacot-Guillarmod* 1817.

CAPE.—Without locality, *Burchell* 4047 (K). 3126 (Queens-town): Hangklip Mountain (–DD), *Galpin* 1643. 3129 (Port St. Johns): 9 km E. of Libode (–CA), *Codd* 10689; Ngqueleni (–CA), *Killick & Marais* 2037. 3218 (Clanwilliam): Pakhuisberg (–BB), *Schlechter* 10810; Drift of Olifants River N. of Clanwilliam (–BB), *Verdoorn & Dyer* 1904. 3227 (Stutterheim): Kei River Mouth (–DB), *Codd* 6344; near Komgha (–DB), *Flanagan* 3243. 3228 (Butterworth): 17 km S.W. of Idutywa (–AB), *Codd* 9258; Kentani (–CB), *Pegler* 159; Mazeppa Bay (–CB), *Plowes* 2416. 3318 (Cape Town): Camps Bay (–CD), *Thode* A 168; Stellenbosch Mountain (–CD), *Bos* 9 (STE); around Cape Town (–CD), *Pappe s.n.* (K); Tigerberg, Bellville (–CD), *Drège s.n.* (K). 3319 (Worcester): Skoongesig, Ceres (–CB), *Hanekom* 734; Robertson (–DD), *Letty* 324. 3326 (Grahamstown): between Kasuga River and Port Alfred (–DB), *Van Dam s.n.*; near Port Alfred (–DB), *Tyson s.n.* 3327 (Peddie): near East London (–BB), *Comins* 1285; *Thode* 6574; 6575 (STE); 3418 (Simonstown): *Marloth* 5944. 3419 (Caledon): Elgin (–AB), *K.A. Dahlstrand* 1170. 3420 (Bredasdorp): Fonteintjieskloof, Bontebok National Park (–AB), *Barnard* 675. 3421 (Riversdale): *Albertinia* commonage (–AB), *Muir* 195; Zoetmelks River (–AB), *Gill s.n.*

The first reference to this species appears to be in Hermann's work *Horti Academici Lugduno-Batavi Catalogus* of 1687. He describes it as "*Arum aethiopicum flore albo odorato moschum redolente*." The first illustration of the plant was made by Commelin in *Hort. Med. Amstel.* 1: 95, t. 50 (1797). Linnaeus cites this figure under *Calla aethiopica* in *Species Plantarum* p. 968 (1753) together with *Hortus Cliffortianus* p. 435 (1737).

The essential characters of *Z. aethiopica* are that it is a robust evergreen plant up to 60 cm high, without a dark purple area at the base of the spathe inside; the ovaries are interspersed with staminodes; and the limb, which is consistently ivory-white is broad and widely spreading backwards. In typical plants the spadix is bright yellow. On the south coast of Natal, however, plants were collected which



PLATE 1.—*Zantedeschia aethiopica* (L.) Spreng. From Flowering Plants of Africa, Vol. 30, Pl. 1190 (1955).



FIG. 5.—Fruit of *Zantedeschia aethiopica* from plants grown in Rivonia, Transvaal.

agree in all except the last characters, for example *De Winter* 768 from Margate, *Letty* 263 from Beach Terminus and *Codd* 8001, all from near Port Shepstone, and *Bruce* 164 from Sheffield Beach near Durban, have the spadix creamy white and a more deeply folded spathe which turns purplish on fading, a character which suggests a tendency towards the purple blotch which occurs in all the species except *Z. aethiopica*, *Z. rehmannii* and the as yet not located *Z. elliottiana*.

Young and depauperate plants, such as *Codd* 8001 mentioned above, are widespread and differ only in size. The spathes are often smaller in proportion to the length of the peduncle, which can reach up to 2,5 m long in marshy ground under trees. Hybrids of *Z. aethiopica* are not often found in the wild state, perhaps because the species is almost completely confined to the eastern and southern coastal belt, although occasional plants of obvious hybrid origin do occur in the Transvaal and Lesotho, where *Z. aethiopica* overlaps with *Z. albomaculata*. Horticultural hybridization is general and many varieties in size, colour and scent have been produced. Abnormalities, such as a branched spadix, multiple spathes and modification of leaves into large bi-coloured additional spathes are, occasionally, found in the field, but mostly in cultivated plants. There is a form with a green and white leafy spathe which is very popular in gardens and greenhouses. Plants with maculate leaves are found in gardens but are seldom collected in the wild.

2. *Zantedeschia rehmannii* Engl. in Bot. Jahrb. 4: 63 (1883) (as "Rehmanni"); Pflanzenr. 4, 23 Dc: 65, fig. 30 A–D (1915); Marloth, Fl. S. Afr. 4: 53, t. 13 (1915); Traub in Plant Life 4: 25 (1948); Letty, Wild Flows. Tvaal. 8, t. 3 (1962). Type: "New Castle", *Rehmann* 80 (*Z. holo.*) (See note below).

Richardia rehmannii (Engl.) N.E.Br. ex Harrow in Garn. Chron. 4: 570 (1888), as "Lehmanni"; Watson in Gard. Chron. 12: 124 (1892); N.E.Br. in Gard. Chron. 13: 568 (1893), as "Rhemannii"; Krelage in Gard. Chron. 14: 564, t. 94 (1893), as "Lehmannii"; Watson in Gard. Chron. 16: 364 (1894); Krelage in Gartenfl. 43: 12, fig. 7 (1894); Hook.f. in Bot. Mag. t. 7436 (1895); N.E.Br. in Fl. Cap. 7: 36 (1897); Spreng. in Wien 111. Garten Zeit. 415 (1901), as "Stehmannii"; Medley Wood, Natal Plants 6: t. 512 (1912); Phill. in Flow. Pl. S.Afr. 1: t. 15 (1921).

Plants glabrous from 24–80 cm tall but usually between 40–60 cm. *Leaves* deciduous, petiolate, up to 40 cm long; petioles 10–20 cm long, clasping at the base; blade dark green, immaculate, lanceolate, acuminate, subulate at the apex, cuneate at the base, 15–40 cm long, 2–7 cm broad. *Peduncle* up to 60 cm long, green, glabrous, channelled. *Spathe* 11–12 cm long, 1,5–2 cm broad, folded from the base for two thirds of its length into a narrow funnel, colour ranging from white through shades of pink to dark maroon (almost black), immaculate at base within, limb slightly spreading, recurved, with a tapering tip. *Spadix* usually stipitate about half as long as the spathe; male zone about 2,2 cm long, anthers yellow, pollen white; female zone about 0,8 cm long. *Fruit* with 2–4 ovules; up to 6 seeds.

Zantedeschia rehmannii grows among rocks on grassy hillsides at medium and quite high altitudes from Harrismith in the Orange Free State, northern Natal, through Swaziland to southern and eastern Transvaal. It is often found in semi-shade at forest margins and in sandy runnels.

The flowering period is, more or less, from September until February with a peak in November, December and January; in cultivation it blooms occasionally out of season.



FIG. 6.—*Zantedeschia rehmannii*, growing wild in Utrecht District; flowers pink. (Codd & Dyer 6268). Photo by Dr R. A. Dyer.

TRANSVAAL.—2430 (Pilgrim's Rest): Pilgrim's Rest (-DD), Strey 3252. 2530 (Lydenburg): Oshoek (-AB), Letty 331; Belfast (-CA), Leendertz 9210; 9212; 45 km N. of Belfast (-CA), Prosser 1936; Dalmanutha (-CA), Codd 8084; S.E. of Machadodorp (-CA), Bruce 474; between Belfast and Machadodorp (-CA), Van der Schijff 5818; Machadodorp (-CA), Galpin 12962; Donkerhoek (-CA), Letty 392; Dullstroom (-CA), Van der Merwe s.n. 2531 (Komatipoort): Barberton (-CC), Thornecroft 4976. 2629 (Bethal): Joubert's farm, Ermelo (-DB), Henrici 1707; farm Nooitgedacht, Ermelo (-DB), Henrici 1171; Mockford's farm Blairmore (-DB), Gunn s.n.; Ermelo (-DB), Leendertz 7840; 2630 (Carolina): Steynsdorp (-AA), Diepenink s.n. 2730 (Vryheid): Wakkerstroom (-AC), Devenish 219; farm Oshoek (-AC), Mauve 4487.

SWAZILAND.—2631 (Mbabane): Mbabane (-AC), Rogers 11664; 9 km E. of Oshoek on road to Forbes Reef (-AC), Codd 6395; Little Usutu River, (-AC), Compton 28456.

NATAL.—2729 (Volksrust): farm "The Elms", Droogdal (-DD), Schweikerdt 134; Majuba Mt., near Charlestown (-BD), Haygarth s.n.(NH). 2730 (Vryheid): near Paulpietersburg (-BD), Galpin 9690; Utrecht (-BD), Wahl s.n.; 24 km N. of Utrecht (-BD), Codd & Dyer 6257; 9 km S.E. of P.O. Groenvlei (-BD), Codd & Dyer 6268, 2731 (Louwsburg): Ngome (-CD),

Gerstner 5188; Codd 9592. 2830 (Dundee): Glencoe (-AA), Sheperd 97 (NH); near Nqutu (-BA), Codd 8917; Weenen County (-CC), Wood 5204.

O.F.S.—2829 (Harrismith): Koolhoek, Thode 2674 (STE).

CULTIVATED.—Cambridge Botanic Garden 1888, plant sent by Mr Adlam from Natal (K); Kew Gardens 1894, type of Bot. Mag. t. (7436 K).

The character that separates *Z. rehmannii* from all other species is its lanceolate leaves which are cuneate at the base, not lobed. The colour range of the spathe, from ivory-white, through pink to dark maroon, also seems to be unique. The plants are not as robust as the majority of species; the spathe is more tightly folded into a narrow tube with the limb tapering into a recurved apiculus. The maturing fruits enlarge and their weight bends the withering peduncle until the spathe tip touches the ground where the seeds germinate and sometimes disappear underground.



FIG. 7.—Hybrid crowd of *Zantedeschia rehmannii* x *Z. albomaculata*, Utrecht District (Codd & Dyer 6286). Photo Dr R. A. Dyer.



PLATE 2.—*Zantedeschia rehmannii* Engl. From Wild Flowers of the Transvaal, Pl. 3 (1962).



FIG. 8.—Fruiting spathes of *Zantedeschia rehmannii* touching the ground, with a cluster of young plants in foreground. In a garden, Pretoria.

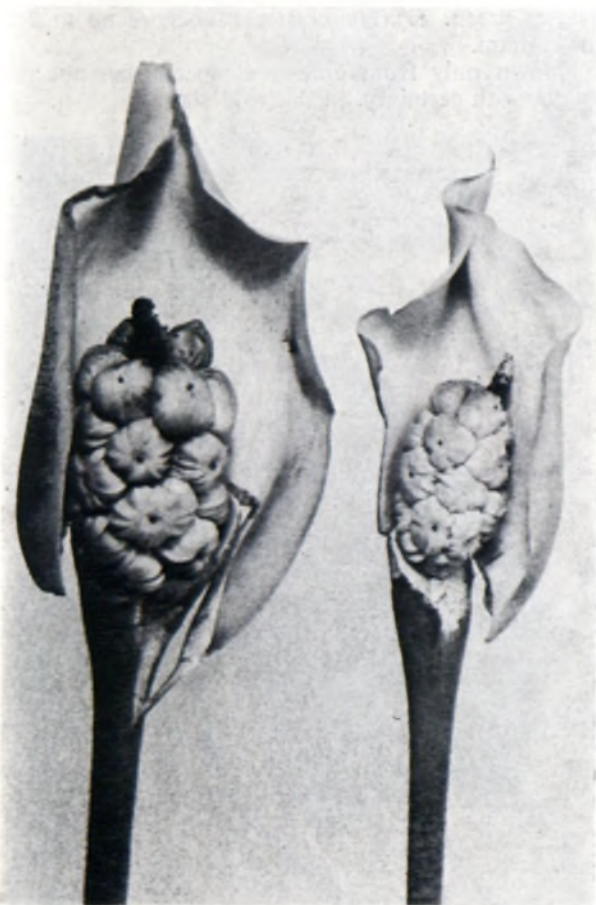


FIG. 9.—Fruit of *Zantedeschia rehmannii* (Codd 6257), grown in Pretoria.

In Berlin there is no Rehmann material of *Z. rehmannii*. In Zurich there are two sheets of Rehmann 80: (a) one sheet with 4 leaves has just "Natal 80" on it; and (b) the other (which may be regarded as the holotype) is annotated "*Zantedeschia rehmannii* Engl." in Engler's writing and has leaves and fruit. The label on this sheet, in Rehmann's writing, reads: "80 Natal auf trockenen, steinigen, begrasten Hügeln 5 engl. M. westlich van (Standarton) New Castle, bei einem Farmer dessen Namen ich nicht herausfinden kan. Vielleicht ist der Name in meinen Reisebüchern enthalten?" The locality Standarton is crossed out and New Castle substituted by Rehmann himself, so the latter locality is probably correct (supported by the former sheet which has just "Natal" on it).

Rehmann spells the name Standarton incorrectly: It is called after a man named Stander.

Z. rehmannii is easily crossed with other species, giving rise to hybrids with lobed leaves, and spathes varied in colour and shape. Abnormalities of leaves and spathes are often found such as: a double spathe, Pretoria garden, Pollock s.n.; Belfast, Galpin 11921; modified leaf with spadix only, Pretoria garden, Jarmer s.n.; modified leaf with spathe, Pretoria garden, Pollock s.n.; leaves with basal lobes, Belfast, Leendertz 9210; Pretoria garden, Gouws s.n.

3. *Zantedeschia jucunda* Letty in Bothalia 7: 455 (1961); Wild Flows. Tvaal. 12, t. 7 (1962). Type: Transvaal, Lydenburg, Barnard & Mogg 991 (PRE, holo.).

Plants glabrous, up to 60 cm tall. *Leaves* deciduous, petiolate, up to 60 cm long; petioles 10–30 cm long; blade triangular-hastate 17–30 cm long, 5–15 cm broad across the base, densely maculate with long white translucent spots, semi-folded along the midrib and upwardly spreading, apex acute with a subulate tip, the length of the blade above the basal lobes usually less than twice the width. *Spathe* about 10–16 cm long, golden-yellow with a purple blotch at the base inside, very slightly rugose within, deep yellow without, folded from below the insertion of the spadix into a cup-shaped funnel; limb spreading, slightly recurved backwards and tapering to a subulate tip. *Spadix* 3–4 cm long; male zone apical about 2–2,5 cm long; female zone basal more or less 2,5 cm long; ovaries subglobose, angled from pressure, sessile, about 24 in number. *Fruits* about 1–3 cm in diam., 3 loculed with 5–8 ovules.

The distribution of this species seems to be restricted to the Magnet Heights region of the Lulu mountains, Sekhukhuniland, where it flowers from November to January.

TRANSVAAL.—2429 (Zebediela): Farm Het Fort, Lulu Mts. (-DB), Barnard & Mogg 991; Geluk's Location (-DB), cult. Pretoria, Native Commissioner s.n.; Schoonoord (-DD), Barnard 180; Du Plessis sub PRE 28835; Magnet Heights (-DD), cult. Haenertsburg, Thompson sub PRE 28836.

Zantedeschia jucunda is most nearly related to *Z. pentlandii* and *Z. albomaculata*. It differs from the former in having triangular-hastate, copiously spotted leaves with upwardly spreading basal lobes and an acute apex, while the spathe is more cup-shaped, a deeper yellow without and within, where it is also slightly rugose, and the limb more spreading and tapering to a subulate tip; whereas *Z. pentlandii* has immaculate (or rarely maculate), oblong-lanceolate leaves with short rounded basal lobes, the spathe regularly funnel-shaped, limb erect,



FIG. 10.—*Zantedeschia jucunda*, grown in Pretoria from plants sent in from the Native Commissioner, Sekukuniland.

lighter in colour, greenish outside, terminating abruptly in a subulate tip. From the form of *Z. albomaculata* subsp. *albomaculata* occurring in the eastern Transvaal, *Z. jucunda* differs in its consistently brilliant yellow spathes, whereas the spathes of *Z. albomaculata* may be white, cream or pale-yellow with an occasional coral-pink variation.

4. *Zantedeschia elliottiana* (Watson) Engl. in Pflanzenr. 4, 23 Dc: 61 (1915); Burt Davy in Kew Bull. 234 (1924), partly, excluding specimen cited; Traub in Plant Life 4: 20 (1948). Neotype: Hort. Kew Gardens 27th April, 1897, type of Bot. Mag. t. 7577 (K!).

Richardia elliottiana Watson in Gard. Chron. 12: 124 (1892); Mottet in Rev. Hort. 67: 38 (1895); De Duren in Rev. Hort. Belg. 23: 13, t. 13 (1897); Hook.f. in Bot. Mag. t. 7577 (1898); N.E. Br. in Fl. Trop. Afr. 8: 167 (1901).

Calla elliottiana Watson in Garden and Forest 5: 330 (1892); Knight in J. Roy. Hort. Soc. 12: Proc. 58 (1890), nom. nud.

Plant robust, up to 60 cm tall. *Leaves* deciduous, glabrous; blade up to 27 cm long and 27 cm broad, sometimes slightly longer than broad, orbicular-ovate, deeply cordate, apiculate, green with many translucent white spots; petiole more or less as long as the blade, occasionally much longer. *Peduncle* about 40 cm long. *Spathe* up to 13 cm long, funnel-shaped above, campanulate below, bright "golden yellow" throughout, immaculate and smooth within, tip caudate. *Spadix* up to 7 cm long, lengths of male and female zones variable, pollen orange yellow; ovaries green. *Fruit* a cluster of berries up to 2.5 cm in diam.

Known only from cultivated specimens; not yet found, with certainty, in the wild state.



FIG. 11.—*Zantedeschia elliottiana*, type of Bot. Mag. t. 7577 (K), cultivated at Kew 1897.

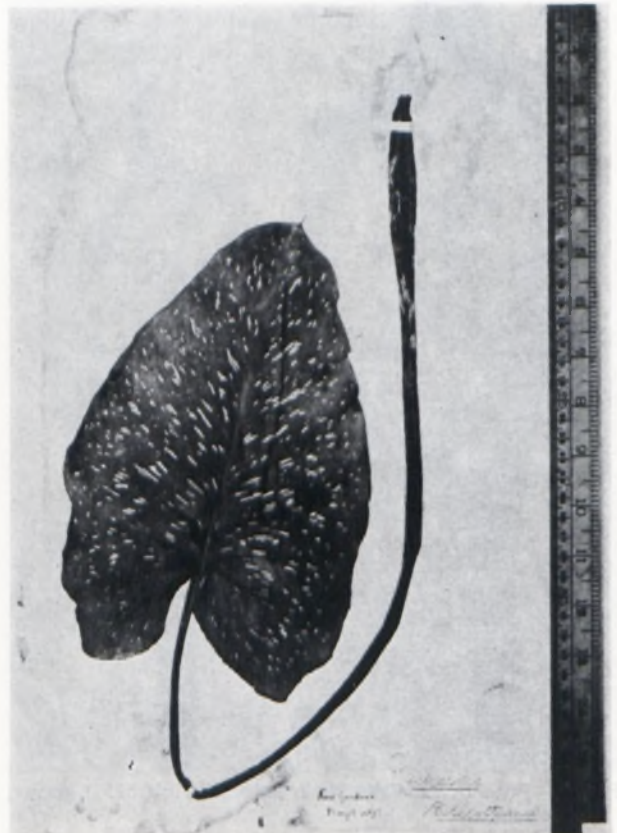


FIG. 12.—Leaf of *Zantedeschia elliottiana*, cultivated at Kew 1895 (K).



PLATE 3.—*Zantedeschia jucunda* Letty. From Wild Flowers of the Transvaal, Pl. 7 (1962).

TRANSVAAL.—Cultivated, "from Transvaal", Marloth 7697. Belfast: Machadodorp, Galpin 11820; Dullstroom (cultivated), O'Connor s.n.

CULTIVATED—Natal, Durban Bot. Garden 15/12/1909 (NH). Hort. Kew Gardens 27 April 1897, type of Bot. Mag. t. 7577 (K).

No specimen was preserved at the time of the original description of this plant; it was grown from seed without locality of origin in the garden of Captain Elliott of Farnboro Park, Hampshire, England, and very inadequately described in the Journal of the Royal Horticultural Society, Vol. 12, Proc. 58 (1890), and later by W. Watson in the Gard. Chron. 12: 124 (1892); de Duren, who published the first illustration of it in Rev. Hort. Belg. 23: t. 13 (1897), was not certain that it was not a variety of *Z. albomaculata*.

The first full description, by J. D. Hooker, accompanies Bot. Mag. t. 7577 (1898), which is supported by a specimen in Kew Herbarium. The above two plates and this specimen must form the basis of the concept for identifying this plant because, up to the present, nothing to match it or to fit into the description has, with certainty, been found in the wild state in South Africa. That no standard was used for the term "yellow" adds to the difficulties.

The specimens cited from the Transvaal come near to the description of the species but all differ slightly. Marloth 7697 has an abnormal double spathe with signs of a purple area at the base inside. Galpin 11820 has the same characteristics and there is no certainty that it is not a cultivated specimen. O'Connor s.n. has a normal spathe which has a definite purple area at the base inside and is a cultivated plant. A plant grown from seed sent as *Z. elliottiana* from California, U.S.A., flowered at the Botanical Research Institute, Pretoria, and proved to be a hybrid, probably with *Z. elliottiana* as a parent, as the shape of the leaves was altogether different from the description, and the spathe was a yellowish cream with a pink margin.

The fact that no plants matching the description have been found under natural conditions in South Africa suggests that the original seeds acquired by Captain Elliott were of hybrid origin.

The species is upheld, provisionally, until more is known about it. Although the spathe is somewhat similar to those of *Z. pentlandii* and *Z. jucunda* in shape and colour, the species can be distinguished from these two by the orbicular-ovate leaves. Some specimens of *Z. albomaculata* subsp. *albomaculata* from the eastern Transvaal have leaves of this shape but, in this species, the spathe is narrowly funnel-shaped, normally cream-coloured (suffused with salmon-orange or coral pink in some abnormal specimens), with a distinct purple blotch at the base.

5. *Zantedeschia pentlandii* (Watson) Wittm. in Gartenfl. 17: t. 1456 (1898); Letty, Wild Flows. Transv. 9, t. 6 (1962). Type: Bot. Mag. t. 7397 (1895).

Calla pentlandii Whyte ex Watson in Gard. Chron. 12: 124 (1892), nomen subnudum.

Richardia pentlandii Watson in Gard. Chron. Ser. 3, 15: 590 (1894); Hook. f. in Bot. Mag. t. 7397 (1895). *R. angustiloba* sensu N.E. Br. in Fl. Cap. 7: 36 (1897); Fl. Trop. Afr. 8: 169 (1901), partly; sensu Phillips in Flow. Pl. S. Afr. 1: t. 10 (1921). *R. sprengeri* Comes in Att. R. Ist. Incorazz. Napoli. Ser. V. Vol. 3. Mem. 7 (1902). Type: Hort. Sprenger, Naples (K).

Zantedeschia macrocarpa sensu Engl. in Pflanzenr. IV, 23 Dc: 67 (1915). *Z. angustiloba* sensu Marloth, Fl. S. Afr. 4: 54, t. 13 (1915); sensu Traub in Plant Life 4: 16 (1948), partly; sensu Batten and Bokelmann, Wild Flows. E. Cape Province 9, t. 4, 2 (1966).

Plants glabrous, up to 60 cm, seldom taller. Leaves deciduous, up to 60 cm long, usually shorter than the peduncles, petiolate, petioles up to 30 cm long, clasping at the base; blade yellowish grass-green, usually immaculate (seldom maculate) oblong-elliptic to oblong-lanceolate, hastate, obtuse to acute, abruptly apiculate, up to 35 cm long and 15 cm wide. Spathe up to 13 cm long, lemon-chrome yellow with a dark purple blotch at the base inside, slightly marked with green outside at the junction with the peduncle, also at the apiculate apex, regularly funnel-shaped; limb loosely folded, seldom recurved backwards, with a 0.5–2 cm long apiculus. Spadix stipitate, usually less than half as long as the spathe; male zone slightly more than two thirds of the length, anthers yellow; female portion less than one third of the length. Ovaries 3-locular, 5–8 ovules in each locule. Fruit green, few in number, with up to 20 seeds.

This species occurs between rocks and beside streamlets on grassy mountains and seems to be restricted to the Mapoch region of the eastern Transvaal, comprising the northern part of the Belfast district and adjoining part of the Lydenburg district. Its flowering time ranges through November and December.



FIG. 13.—*Zantedeschia pentlandii*. Photograph of Bot. Mag. t. 7397.

14.—*Zantedeschia pentlandii*, growing beside a mountain stream in the Steenkampsberg, Transvaal (Letty 334). Photo by Dr. L. E. Codd.



FIG. 15.—*Zantedeschia pentlandii*, in natural habitat in valley of the Steenkampsberg, Belfast District, Transvaal (Letty 333). Photo by Dr. L. E. Codd.



FIG. 16.—Fruit of *Zantedeschia pentlandii* from a plant cultivated in Pretoria. Berries are usually few but seeds numerous.

TRANSVAAL.—2530 (Lydenburg): Willem Botha's farm, Steenkampsberg (-AA), Letty 333; northern slopes of mountains, Saaihoek (-CA), Letty 334, 335 (leaves spotted); 3 km W. of Draaikraal (-CA), Codd 8227; near Draaikraal (-AB), Du Plessis 52.

CULTIVATED.—Cape Town, "plant from Transvaal ex hort.", Marloth 7691; Botanical Research Institute, figured for Flow. Pl. S. Afr. 1: 10 (1921); ex Louis Trichardt in garden of Mrs. Walters; Tsolo: leaves from plant figured in Wild Flowers. E. Cape Province 9, t. 4, 2, 1966 as *Z. angustiloba*, Batten s.n.; Hort. Sprenger, Naples (K).

An illustration agreeing with *Z. pentlandii* appears under the name *Z. angustiloba* in Wild Flowers of the E. Cape Province by Batten and Bokelmann p. 9, t. 4, 2 (1966). The original plant is reported to occur at Tsolo, and similar plants are said to have been seen at Mt. Ayliff in the Eastern Province. Up to the present no specimens of naturally occurring plants from that region have been seen.

Z. pentlandii has immaculate (or very rarely spotted) oblong-lanceolate leaves, slightly constricted above the short, hastate, rounded lobes; the apex is obtuse (or sometimes acute) with a subulate, seldom recurving tip. The spathe is clear lemon-chrome yellow, is funnel-shaped, greenish outside below and rounded at the apex with an abruptly subulate tip.



PLATE 4.—*Zantedeschia pentlandii* (Whyte ex Watson) Wittm. From Wild Flowers of the Transvaal, Pl. 6 (1962).

The description by Watson in the *Gardener's Chronicle* Ser. 3, 15: 590 (1894) is the first that qualifies as a valid description of the species and is indirectly associated with the *Bot. Mag.* Plate 7397 (1895); it appears, therefore, permissible to accept the illustration as typifying the species. As far as is known, no specimen of the figured plant was preserved. The illustrated plant was grown from a tuber taken to Kew by the well-known collector E. E. Galpin, who is reported to have stated that the tubers of a yellow-flowered *Richardia* which he had brought to Kew had been presented to him by a gentleman in the Transvaal who had obtained them from a "Staatsartilleryman" who got them from a native chief while on active service. Later E. E. Galpin verified the precise locality as the Mapoch district, Lydenburg, Transvaal. This information is borne out by the fact that there had been a military engagement in that area a year or two previously.

Richardia sprengeri is reduced to synonymy. There is a specimen at Kew, made by Sprenger in 1902, probably from the same material as described by Comes, which may be regarded as typifying the species. This specimen agrees with *Z. pentlandii* in all characters except the spotted leaves which are occasionally found on naturally occurring plants (our example Letty 335).

6. *Zantedeschia albomaculata* (Hook.) Baill. in *Bull. Soc. Linn. Paris* 1: 254 (1880). Type: Hort. Kew, type of *Bot. Mag.* t. 5140 (1859) (K!, holo.).

Plants 40–75 cm tall. *Leaves* deciduous, up to 75 cm long; petiolate; petiole variable in length and proportion to leaf-blade, green or purple or striped and mottled with purple at the base, sometimes with soft hairs towards the base; blade maculate or immaculate, oblong- or triangular- to orbicular hastate, up to 40 cm long and 25 cm broad; lower lobes variable from short and rounded to long triangular with rounded apex, or strap-shaped with a blunt or acute apex. *Peduncle* up to 75 cm long, green or sometimes stained or mottled with purple, sometimes with soft hairs towards the base. *Spathe* 2.5–17 cm long, seldom without a dark purple area at the base inside, varying in colour from white through ivory, cream, straw-coloured to pale yellow and, seldom, coral pink, the colour outside greenish at the base, intensifying upwards as the spathe matures; tube sometimes open to the base, mostly variably convolute, broadening towards the apex; limb subtruncate to gradually tapering, apiculate, somewhat recurved. *Spadix* sessile or stipitate; ovaries not interspersed with staminodes, 3-locular with 3–4 ovules per locule. *Fruits* few to many, up to 2 cm in diam., green, crowded, 4–8 seeded, upper surface flattened, persistent stigma short and sunk.

The distribution of the aggregate species extends from the eastern Cape Province through Natal, northern Lesotho, north-eastern Orange Free State, Swaziland, south-eastern and eastern Transvaal, and continues northwards into Rhodesia, Malawi, Zambia and Angola, with a recent record from West Tropical Africa which requires further study.



FIG. 17.—*Zantedeschia albomaculata* subsp. *albomaculata*. Photograph of *Bot. Mag.* t. 5140.

Z. albomaculata was the second species in the genus to be described and the description was based on a plant introduced from "Natal", without further information as to its origin. It differs from the first, *Z. aethiopica*, in many important respects: it is deciduous, it has no staminodes among the female organs, its fruit remains a firm berry until germination and does not turn orange-coloured and become pulpy while still on the peduncle.

The present concept of *Z. albomaculata* is a relatively broad one and includes several forms which have in the past been upheld as distinct species. A study of plants in their habitats, together with the more extensive herbarium collections now available, has indicated that the following entities should be included within the broader view of *Z. albomaculata*: *Z. oculata* (1859), *Z. hastata* (1860), *Z. melanoleuca* (1869), *Z. angustiloba* (1879), *Z. macrocarpa* (1883), *Z. melanoleuca* var. *tropicalis* (1901), *Z. chloroleuca* (1903) and *Z. melanoleuca* var. *concolor* (1924).

In this complex there is considerable variation in leaf shape and degree of maculation, as well as in spathe shape and colour. To some extent this variation is linked with geographical distribution and therefore three subspecies are upheld.

For key to subspecies, see species key.

(a) subsp. *albomaculata*

Richardia albomaculata Hook. in Bot. Mag. t. 5140 (1859); Schott, Prodr. 325 (1860); Van Houtte in Fl. des Serr. 13: 97, t. 1343 (1860); 21: 165, t. 2258 (1875); Engl. in DC., Mon. Phan. 2: 327 (1879); N.E. Br. in Fl. Cap. 7: 37 (1897). Type Hort. Kew ex Messrs. Backhouse of York, originally from "Natal", type of Bot. Mag. t. 5140 (K!, holo.). *R. hastata* Hook. in Bot. Mag. t. 5176 (1860); Engl. in DC., Mon. Phan. 2: 328 (1879); Watson in Gard. Chron. ser. 3, 12: 123 (1892); N.E. Br. in Fl. Cap. 7: 38 (1897); Fl. Trop. Afr. 8: 168 (1901). Type: Hort. Kew ex Messrs. Veitch of Exeter, originally from "Natal", type of Bot. Mag. t. 5176 (K!, holo.). *R. angustiloba* Schott in J. Bot. Lond. 3: 35 (1865); Engl. in DC., Mon. Phan. 2: 329 (1879); N.E. Br. in Fl. Cap. 7: 37 (1897); Fl. Trop. Afr. 8: 169 (1901). Type: Angola, Pungo Andongo, between Calamba and Quisonde, on left bank of river Cuanza, Welwitsch 230 (BM!, holo.; K!). *R. melanoleuca* Hook. f. in Bot. Mag. t. 5765 (1869); Engl. in DC., Mon. Phan. 2: 328 (1879); Watson in Gard. Chron. 12: 124 (1892); N.E. Br. in Fl. Cap. 7: 38 (1897); Phill. in Flow. Pl. S. Afr. 4: t. 141 (1924). Type: Hort. Bull. Chelsea, from "Africa", type of Bot. Mag. t. 5765 (K!, holo.). —var. *tropicalis* N.E. Br. in Fl. Trop. Afr. 8: 168 (1901). Lectotype: Malawi, Namasi, Cameron s.n. (K!).

Calla oculata Lindl. in Gard. Chron. 40: 788 (1859). Type: no specimen extant: "Messrs. Veitch received it from Natal".

Zantedeschia albomaculata (Hook.) Baill. in Bull. Soc. Linn. Paris 1: 254 (1880); Engl. in Bot. Jahrb. 4: 64 (1883); Pflanzenr. 4, 23 Dc: 67, t. 30 E-G (1915); Bailey, Cycl. Hort. 3534 t. 4028 (1919); Phill. in Flow. Pl. S. Afr. 19: t. 735 (1939); Traub in Plant Life 4: 14 (1948). —forma *latifolia* Engl. in Bot. Jahrb. 4: 64 (1883). Syntypes: Transvaal, Houtbosch, Rehmann 93, 94 (Z). *Z. hastata* (Hook.) Engl. in Bot. Jahrb. 4: 64 (1883); Dur. & Schinz, Consp. Fl. Afr. 5: 477 (1894); Traub, l.c. 4: 20 (1948). *Z. angustiloba* (Schott) Engl. in Bot. Jahrb. 4: 64 (1883); Dur. & Schinz, l.c. 5: 477 (1895); Engl. in Pflanzenr. 4, 23 Dc: 67 (1915); Traub, l.c. 4: 16 (1948). *Z. melanoleuca* (Hook.f.) Engl. in Bot. Jahrb. 4: 64 (1883); Pflanzenr. 4, 23 Dc: 67 (1915); Bailey, Cycl. Hort. 3536 (1919); Traub, l.c. 4: 22 (1948). —var. *tropicalis* (N.E. Br.) N.E. Br. ex Engl. in Pflanzenr. 4, 23 Dc: 68 (1915); Traub, l.c. 4: 24 (1948). *Z. chloroleuca* Engl. & Gilg in Warburg, Kunene Exp. 180 (1903). Type: Angola, Baum 398. *Z. oculata* (Lindl.) Engl. in Pflanzenr. 4, 23 Dc: 68 (1915). *Z. tropicalis* (N.E. Br.) Letty in Bothalia 7: 456 (1961).

Aroides albomaculatum (Hook.) Kuntze, Rev. Gen. Pl. 2: 740 (1891) (as *Aroides albomaculatum*). *A. hastatum* (Hook.) Kuntze, l.c. (1891) (as *Aroides hastatum*); Rendle, Cat. Afr. Pl. Welw. 2, 1: 90 (1899). *A. angustilobum* (Schott) Kuntze, l.c. 740 (1891) (as *Aroides angustilobum*); Rendle, l.c. 90 (1899).

Leaves conspicuously maculate or immaculate, usually oblong-hastate rarely ovate-hastate (and then white spotted), lower lobes short to triangular-spreading or strap-shaped; spathes white, ivory or cream coloured, rarely pale yellow or coral pink, with limb more or less spreading, usually tapering gradually to the apex; fruit a cluster of medium-sized berries up to 1,8 cm in diam.

Z. albomaculata subsp. *albomaculata* grows in marshy ground beside rivers or streams and in vleis but is also found in pockets among rocks on mountains and grassy hillsides, and in forest margins. It is able to survive, usually in a depauperate state, under fairly dry conditions. It flowers from November to April with a peak in December.

Its distribution, according to the present concept, ranges from the eastern Cape Province, through Natal, northern Lesotho, north-eastern Orange Free State, Swaziland, south-eastern and eastern Transvaal and, northwards, into Rhodesia, Malawi, Zambia and Angola.



FIG. 18.—*Zantedeschia albomaculata* subsp. *albomaculata*, photograph of Bot. Mag. t. 5176, figured as *Z. hastata*.



FIG. 19.—*Zantedeschia albomaculata* subsp. *albomaculata*, photograph of Bot. Mag. t. 5765, figured as *Z. melanoleuca*.



PLATE 5.—*Zantedeschia albomaculata* (Hook.) Engl. subsp. *albomaculata*, showing two forms of leaf.



FIG. 20.—*Zantedeschia albomaculata* subsp. *albomaculata*, Cathedral Peak Forestry Station, Natal (Codd & Dyer 6248). Photo by Dr R. A. Dyer.



FIG. 21.—Fruit of *Zantedeschia albomaculata* subsp. *albomaculata* from Nottingham Road (Codd 8527).



FIG. 22.—*Zantedeschia albomaculata* subsp. *albomaculata* with immaculate leaves from Natal (Codd 8527).

TRANSVAAL.—2228 (Maasstrom): Mhlakeng Plateau, Blouberg (-DB), Codd 9148. 2328 (Baltimore): Pyramid Estate, near Potgietersrust (-DD), Galpin 9100. 2329 (Pietersburg): 6 km N. of Louis Trichardt (-AB), Admiraal s.n.; 8 km N.E. of Louis Trichardt (-AB), Codd 8326; on road to Sibasa, 42 km E. of Louis Trichardt (-AB), Codd 8401; Entabene Forestry Station (-AB), Codd 8410; Dorpsrivier, Louis Trichardt (-AB), Gersner 5.05; Kloofsig near Daviesville (-BD), Markotter s.n. (STE); Forest Station, Woodbush (-DD), Van Dam s.n.; Woodbush (-DD), Swierstra s.n.; 5 km N. of Haenertsburg (-DD), Codd 8415; 1.5 km E. of Haenertsburg (-DD), Reynolds 5806; Mountain Home Farm, Woodbush (-DD), Mogg s.n.; Paardevelei Farm (-DD), Mauve 4289. 2330 (Tzaneen): Elim (-AA), Obermeyer 834; Duiwelskloof (-CA), Haar s.n.; Scheepers 36; Magoebaskloof (-CC), Codd 8407; Prosser 1827; Tzaneen (-CC), Rogers 12501; New Agatha (-CC), McCallum 137. 2430 (Pilgrim's Rest): Wolkberg (-AA), Turner s.n.; The Downs (-AA), Codd 9465, Murray s.n.; Mariepskop (-DB), FitzSimons s.n.; on Blyde-forestry road (-DD), Van der Schijff 6515; Kowyns pass, Graskop (-DD), Plowes 2378. 2431 (Acornhoek): Klaseriebrug, Mariepskop (-AC), Van der Schijff 4797. 2528 (Pretoria): Waterkloof (-CC), Verdoorn 62. 2530 (Lydenburg): Dullstroom (-AC) Galpin 13372; Langverwag (-AC), Louw s.n.; Schagen Hill, Rosehaugh (-BD), Codd 6210. 2531 (Komatipoort): Kaapmuiden (-CB), Mogg s.n.; Louws Creek (-CB), Bradshaw 110; Barberton (-CC), Thornecroft 30; 12 km S.E. of Barberton on road to Havelock (-CC), Codd 8159. 2729 (Volksrust): Volksrust (-BD), Jenkins s.n. 2730 (Vryheid): North Hill, Honey-moonkloof (-AC), Galpin 9882; Laingsnek road, (-AC), Galpin 11792; farm Nauwpoort (-AC), Adendorff 3; farm Oshoek (-AC), Letty 501; farm Tafelberg (-BB), Letty 500.

O.F.S.—“Basutoland”, Cooper 3327 (K). 2828 (Bethlehem): Golden Gate, Hoogland Park (-AB), Liebenberg 7442; Tradou (-CA), Steyn s.n.; Dunnelin Farm (-CA), Potts 3088; Generaal's Nek (-CC), Steyn s.n. 2829 (Harrismith): Sanky 320 (K); 29 km S.E. of Harrismith (-AC), Marais 332.

SWAZILAND.—2631 (Mbabane): Gobolo (-AC), Compton 30347; Little Usutu River (-AC), Compton 28455.



FIG. 23.—*Zantedeschia albomaculata* subsp. *albomaculata* with robust habit from Haenertsberg, Transvaal (Codd 8415).

NATAL.—Without locality: Gerrard 1525 (K); Buchanan s.n. 2731 (Louwsburg); Ngome Forest (-CB), Gerstner 5187 2829 (Harrismith): 38 km N.W. of Ladysmith (-BC), Marais 333; Oliviershoek Pass (-CA), Thode 4295 (STE); Cathedral Peak Forestry Station (-CC), Killick & Marais 2120; Killick 1201; 2178; Codd & Dyer 6248; Cathedral Peak area (-CC), Germishuizen 17. 2830 (Dundee): Culvers (-CC), Rogers 28319; Krantzkop (-DD) Thode 2675. 2831 (Nkandla): Eshowe-Entumeni road (-CD), Gerstner s.n. 2929 (Underberg): Gaints Castle Game Reserve (-AB), Trauseld 303; Oribi Ridge area, Giants Castle (-AB), Trauseld 492; Thabamhlope Research Station (-AB), West 635; Champagne Castle (-AB), Bayer 1209; Sweetwaters (-BA), Dyer 3130; west of Estcourt (-BB), Munro s.n.; Harris Hill, Glenbella (-BB), Plowes 2398; Fairleigh (-BB), Plowes 2388; 2390; 16 km W. of Underberg (-CD), Dyer 3210; 16 km S.W. of Underberg (-CD), Dyer 3294; 3295; 3296; 3297; Loteni Nature Reserve (-DB), Killick 3887; 3.5 km from Donnybrook (-DD), Killick & Marais 2091; 2093; 2094. 2930 (Pietermaritzburg): Balgowan (-AC), Mogg 3537; Nottingham Road (-AC), Dyer & Verdoorn 2374; 2375; Codd 8527; Everdon farm, 5 km from Howick (-AC), Hilliard 4049; Lions River district (-AC), Smuts 1410; 18 km from Greytown on Rietvlei Road (-BA), Marais 352; 43 km S. of Nottingham Road (-BA), Smuts 1106; 36 km S. of Nottingham Road (-BA), Smuts 1408; 1409; Dargle (-CA), Hill 2; 3; Griffins Dargle (-CA), Moll 2669; Table Mountain, Pietermaritzburg (-CB), Ward 644; Huntley s.n.; Little Noodberg (-DB), Strey 6256; Kloof (-DD), Letty 449. 3029 (Kokstad): 38 km from Ottersburg to Harding (-DB), Admiraal 318; Weza, Ingeli slopes (-DB), Strey 6288. 3030 (Port Shepstone) Ixopo (-AA), Mogg s.n.; 1.5 km from Ixopo (-AA), Strey 6129; Drakensberg, Upper Umkomaas (-AB) Oberdieck & Weidemann 1383; Dumisa (-AD), Rudatis 1237 (K); near Friedenau (-BC), Strey 6222; 7038; Port Shepstone-Bizana road (-CB), Admiraal 305.

LESOTHO.—2828 (Bethlehem): Leribe (-CC), Dieterlich 306; Moreng, Butha-Buthe (-CC), Jacot-Guillarmod, 1829, 1830. 2927 (Maseru): Mamathes, Cannibal's Cave, (-BB), Jacot-Guillarmod 4645; Mamathes (-BB), Jacot-Guillarmod 1818; Collett 470.

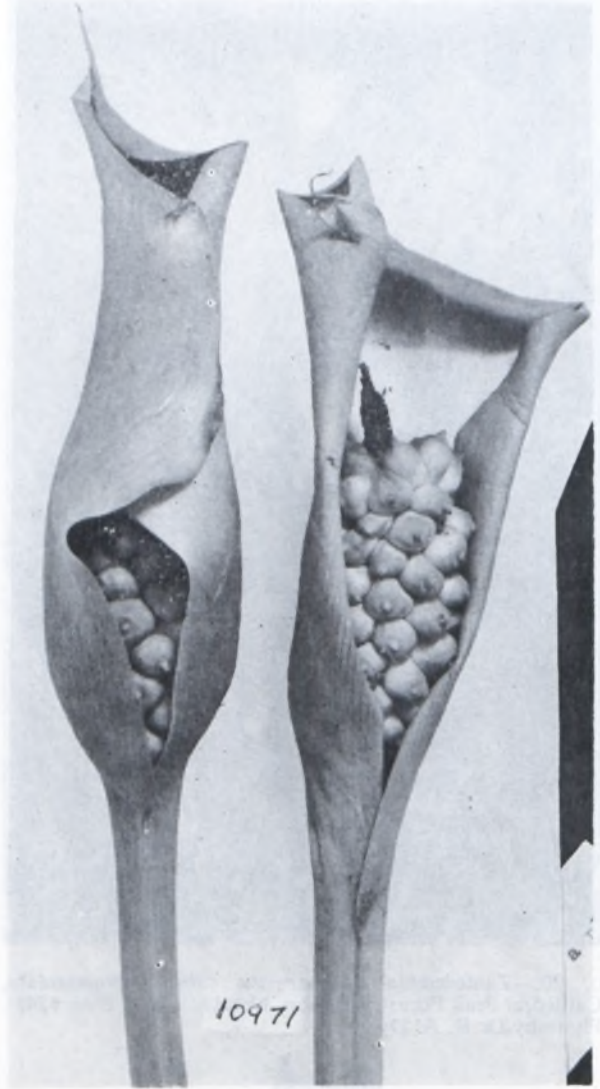


FIG. 24.—*Zantedeschia albomaculata* subsp. *albomaculata*, fruit of a plant with robust habit from Magoebaskloof (Codd 8407).

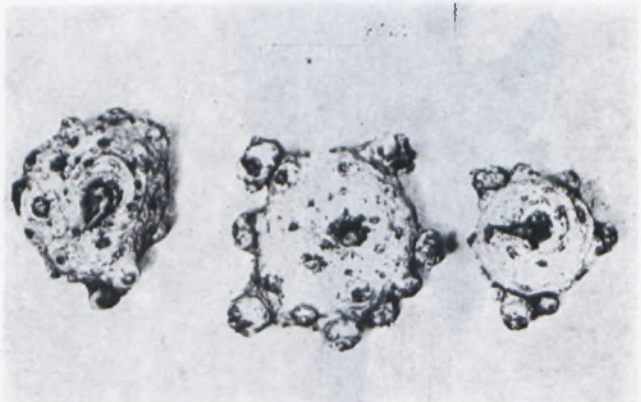


FIG. 25.—Tubers of *Zantedeschia albomaculata* subsp. *albomaculata* from Maclear, Cape Province (C. Giddy), $\times \frac{1}{2}$.



PLATE 6.—*Zantedeschia albomaculata* (Hook.) Engl. subsp. *albomaculata*, variations. From Wild Flowers of Transvaal, Pl. 5 (1962).



FIG. 26.—*Zantedeschia albomaculata* subsp. *albomaculata*, type specimen of *Z. angustiloba* showing leaf variation. (Welwitsch 230 in BM).



FIG. 27.—*Zantedeschia albomaculata* subsp. *albomaculata* from Angola (Codd 7687), with cream coloured spathe.

CAPE.—3025 (Colesburg): Top of Katberg Pass (-CB), Dyer 2311. 3027 (Lady Grey): Witte Bergen (-CA), Drège 3527 (K). 3028 (Matatiele): Halcyons Drift, (-CD), Marais 867. 3029 (Kokstad): Kingscote (-AB), Marais 344; Mount Currie (-CD), Comins 308; near Kokstad (-CD), Marais 346; Tyson 1590 (K); 24 km S.E. of Bizana (-DD), Codd 10694. 3126 (Queenstown): Queenstown (-DD), Galpin 1946. 3128 (Umtata): Bazeia (-CB), Baur 433 (K). 3129 (Port St. Johns): 3 km W. of Holy Cross Mission (-BA), Codd 9327; 18 km S.W. of Lusikisiki (-BC), Codd 10693; 21 km E. of Libode (-CA), Codd 10690; 16 km E. of Umtata (-CC), Codd 10688. 3227 (Stutterheim): Dohne (-CB), Sim 20119; near Komgha (-DB), Flanagan, 1091.

RHODESIA.—Abercorn: Nkali Dambo, Richards 342 (K). Inyanga: Mare River; Wild 4928; Rhenan Wattle Estate, Plowes 2289. Melsetter: Crook s.n.; farm Gungunyama, Mt. Silinda, Obermeyer s.n.

MALAWI.—Nivera Hill, Benson 81. Namasi, Cameron s.n. (K).

ZAMBIA.—Mwinilunga: R. Muzhila, Milne-Redhead 3823.

ANGOLA.—Cubango: near St. Cruz Mission on Cuando River, Codd 7687 (cult. in Pretoria). Huilla: near Lopollo, Welwitsch 232; Tchivinguiro, Barbosa & Morena 10062. Kituvico-Kela: Baixo de Cassange, near River Lui, Gossweiler 9570 (K). Libolo: on Longa River, Dawe 352 (K). Moxico: R. Masanu, Milne-Redhead 4153 (K). Pungo Andongo: between islands of Calamba and Quisonde, Welwitsch 230 (BM; K).

CULTIVATED.—“From Natal”, from Messrs. Backhouse of York, type of *Z. albomaculata* in Bot. Mag. t. 5140 (K). “From Natal”, ex Messrs. Veitch, Exeter, type of *Z. hastata* in Bot. Mag. t. 5176 (K). “From Africa”, ex Hort. Bull, Chelsea, type of *Z. melanoleuca* in Bot. Mag. t. 5765 (K). Cult. Hort. Breslau, Engler 230 (K). “From F. Sander, April 17th 1899” (K).

As will be seen from the extensive synonymy, a good deal of variation is included in subsp. *albomaculata*. Characters on which species or even varieties were previously separated, for example, degree of spotting of the leaf, the presence of bristles on petioles and peduncles and, to some extent, leaf shape, have been found to be unreliable when a wide range of material is examined.

The type of *Z. albomaculata*, on which the illustration in Bot. Mag. t. 5140 (1859) is based, is a plant cultivated at Kew which was obtained from Messrs Backhouse of York and a specimen is preserved in Kew Herbarium. It is said to have been introduced from Natal. The leaf is oblong-hastate, maculate, and the spathe is ivory-white with the limb tapering gradually to the apex. Corresponding plants are known from the eastern Cape Province to the Natal Midlands, with isolated specimens from the Harrismith (Orange Free State) and Wakkerstroom (Transvaal) areas.

Calla oculata Lindl. was described in the Gardener's Chronicle 40: 788 (1859) on the same day (1st October 1859) as *Richardia albomaculata* Hook. in Bot. Mag. t. 5140 (1859). No type specimen has been traced and, from its description, it cannot be separated from *Z. albomaculata* subsp. *albomaculata* as interpreted in the present publication. Although it has been equated with *Richardia hastata* Hook. by most authors, it has not previously been linked with

Z. albomaculata. A clue to its identity is the statement that it came from Messrs Veitch's nursery, as did the type of *Z. hastata*.

When describing *Richardia hastata* in Bot. Mag. t. 5176 (1860), Hooker mentioned that it was very closely allied to *R. albomaculata*, differing mainly in the absence of pellucid spots on the leaves. Field studies have shown that this character has no taxonomic significance within subsp. *albomaculata* although it is interesting to note that in this subspecies the leaves are either immaculate or conspicuously spotted, even on adjacent plants, but rarely sparsely spotted as in subsp. *macrocarpa*. The type of *R. hastata* is a plant cultivated at Kew, said to be from "Natal", supplied by Messrs Veitch of Exeter. A specimen of a single spathe is preserved in the Kew herbarium. The leaves are depicted as immaculate. The spathe, which is a little broader than typical *R. albomaculata*, is described as "rather dirty yellow-green". According to the plate it is light yellow-green (Ridgway 6. 31. d). Specimens matching the plate and description of *R. hastata* grow together with plants matching the plate of *R. albomaculata* in Natal and have also been found as far afield as Angola (Welwitsch 232, Codd 7687).

Among the specimens on the sheets bearing the type number of *R. angustiloba* Schott (Welwitsch 230) at the British Museum, only one differs in having an exceptionally long upper leaf lobe with prolonged strap-shaped side-lobes, from which, no doubt, the epithet *angustiloba* was derived. The variation within one gathering, added to certain marked similarities with *Z. hastata*, has prompted the present inclusion of *R. angustiloba* in the *albomaculata* group.

In the original description Schott does not mention the colour of the spathe of *R. angustiloba*, nor is it indicated on the type specimen, Welwitsch 230. However, on two sheets of Welwitsch 232 in BM (included by subsequent authors in this species) and annotated, respectively, "*R. angolensis*" and "*R. hastata*", are the words: "spathe . . . intense sulphurea" and "spatha sulphurea". Although sulphur is a pale greenish-yellow, authors have apparently interpreted the colour as a bright yellow, with the result that *Z. pentlandii* was placed as a synonym of *Z. angustiloba* (see N.E. Brown in Fl. Trop. Afr. 8: 169, 1902).

Later, a plant collected by Baum in Angola was separated as *Z. chloroleuca* Engl. & Gilg; it was described as being related to *Z. hastata* and was later placed by Engler as a synonym of *Z. angustiloba* (Pflanzenr. 4, 23 Dc: 65, 1915).

The variation in the leaf-shape in specimens from Angola, often on the same sheet, is not fully understood, and more extensive collection in Angola and Zambia is necessary in order to reach a satisfactory decision on the status of plants in these territories.

In this connection it is of considerable interest to note that *Z. angustiloba* has recently been recorded in northern Nigeria by Hepper in Kew Bull. 21: 493 (1968) and Fl. W. Trop. Afr. ed 2, 3: 121 (1968). The spathe is stated to be a striking yellow colour. This specimen has not been seen and further material is desired.

Richardia melanoleuca Hook.f. in Bot. Mag. t. 5765, (1869), called the "black-throated" *Richardia* by its author, has not only the white pellucid spots on the leaves in common with the *albomaculata* group but also the distinctive dark blotch at the base of the spathe inside. The type of the plate in the Botanical Magazine is in the Kew Herbarium with "Hort. Bull, Chelsea, from Africa" written on the sheet. Obviously a small plant, it has ovate, hastate leaves with width almost equal to the length and copiously maculate. The spathe, described as "straw-coloured" is also small, wide-open to the base exposing the whole spadix and the blackish-purple patch inside. It is felt that the type of *R. melanoleuca* is an abnormal specimen because it is not exactly matched by any specimens from the wild state. Certain gatherings from Natal (Inanda: Wood 431 in K and NH, and Wood 1370 in NH) approach it in appearance but the spathes, although small, are not open to the base. Individual plants with spathes matching the type are sometimes found but with immaculate leaves (Comins 708 from Mount Currie). Odd spathes of this type also occur among normal spathes on adjacent plants. As far as leaf shape is concerned, oblong-hastate to orbicular-cordate leaves are occasionally found on the same plant.

Two specimens also from Inanda, Strey 4874 and 4876 are difficult to allocate. No. 4874 has the small truncate spathe of subsp. *macrocarpa* but with leaf-shape and maculation nearer to subsp. *albomaculata*; No. 4876, with spathe- and leaf-shape more nearly matching *macrocarpa*, is immaculate. In addition, in Kew Herbarium, mounted on the same sheet as Gerrard 1525 (July 1865), is a specimen of Sanderson 209 from "Port Natal" which is intermediate between subsp. *albomaculata* and subsp. *macrocarpa*, having the leaves of the former and spathe of the latter.

R. melanoleuca var. *tropicalis* N.E. Br., based on two specimens, Cameron s.n. and Evelyn Cecil 149 from Malawi and Rhodesia respectively, comes nearer to the type of *Z. albomaculata* than to that of *Z. melanoleuca*. It is characterized by long-triangular-hastate leaves which are copiously translucent-spotted and up to 30 cm or more long; and by the spathes being folded into a cylindrical tube and varying in colour from cream to pale yellow (with an aberrant form with handsome, coral pink spathes from north-eastern Transvaal known as "Helen O'Connor").

When dealing with the genus, prior to the publication of The Wild Flowers of the Transvaal (Letty, 1962), var. *tropicalis* was given specific status (Bot. halia 7: 456, 1961) but, after examining a wider range of material, the differences have not proved sufficient to exclude it from *Z. albomaculata* subsp. *albomaculata*, though it is almost distinct enough to be regarded as a variety. Its habitat is mostly at forest margins or bush in partial shade and its flowering reaches its peak in November. It is distributed mainly in the Transvaal and northwards into Rhodesia, but there are several specimens from the Natal coastal areas which grade into this form.



PLATE 7.—*Zantedeschia albomaculata* (Hook.) Engl. subsp. *macrocarpa* (Engl.) Letty. From Wild Flowers of Transvaal, Pl. 4 (1962).

Certain specimens collected in the Barberton area (*Thorncroft* 30 and *Codd* 8159), although agreeing with *Z. albomaculata* subsp. *albomaculata* in habit of plant and colour and shape of spathe, have leaves which match those of *Z. elliottiana*, being broadly orbicular-cordate and densely maculate. More material and further study may justify separate status for this form.



FIG. 28.—*Zantedeschia albomaculata* subsp. *macrocarpa* growing in Lydenburg District (*Codd* 8201). Photo by Dr L. E. Codd.

(b) subsp. *macrocarpa* (Engl.) Letty, stat. nov.

Z. macrocarpa Engl. in Bot. Jahrb. 4: 64 (1883); Dur. & Schinz, Consp. Fl. Afr. 5: 477 (1895); Engl. in Pflanzenr. 4, 23: 67 (1915). Type: Trigardsfontein, *Rehmann* 82 (B!, holo.; Z!; PRE, photo). *Z. melanoleuca* var. *concolor* Burt. Davy in Kew. Bull. 1924: 233 (1924). Type: Hort. Sander & Co. (K!). *Z. oculata* sensu Burt. Davy, l.c. 234 (1924), partly; sensu Letty, Wild Flows. Transv. 8, t. 4 (1962). *Z. angustiloba* sensu Traub in Plant Life 4: 16 (1948), partly.

Richardia macrocarpa (Engl.) Watson in Gard. Chron. 12¹ 124 (1892). *R. angustiloba* sensu N.E. Br. in Fl. Cap. 7: 37 (1897), partly; Fl. Trop. Afr. 8: 169 (1901), partly.

This subspecies is characterized by having the leaves sparsely maculate or sometimes immaculate, triangular hastate, lower lobes bluntly triangular; spathes cream or straw-coloured with limb more or less truncate and terminating abruptly in a subulate tip; fruits usually large, up to 2 cm in diameter, 3 locular, 2–3 ovuled.

Occurs on marshy ground beside streams and in grassy vleis. The flowering period is from October to February with a peak in November. Its distribution ranges over the higher regions of the Transvaal, Swaziland, Natal, Lesotho and eastern Orange Free State.

TRANSVAAL.—2430 (Pilgrim's Rest): Mac-Mac Falls (-DD), *Codd* 6751. 2528 (Pretoria): Debbes Ravine (-CA), *Mogg* 14842. 2529 (Witbank): Middelburg (-CC), *Jenkins s.n.*; *Van der Schijff* 4323. 2530 (Lydenburg): Steenkampsberg (-AA), *Letty* 336; 51 km beyond Belfast on Machadodorp road, (-AA), *Letty* 338; Draaikraal (-AA), *Du Plessis s.n.*; 27 km N. of Lydenburg on road to Steenkampsberg (-AA), *Codd* 8201; W. of Lydenburg (-AB), *Letty* 330; Horseshoe Cataract (-AB), *Letty* 322; near The Bonnet (-AB), *Letty* 323; Boshoeck, W. of Steenkampsberg (-AA), *Young* A373; Wemmershoeck (-AB), *Strey* 3154; Lydenburg (-AB), *Wilms* 1574; *Wilms s.n.*; Dullstroom (-AC) *Van der Merwe s.n.*; *Galpin* 11922; 11923; 12 km N. of Dullstroom (-AC), *Codd* 6656; Western end of Schoemansklouf (-AC), *Young* A317; near Belfast turn-off to Lydenburg (-CA), *Letty* 321; Belfast (-CA), *Leendertz s.n.*; Machadodorp (-CB), *Galpin* 13110; *Letty* 327; 337; 4 km beyond Belfast to Machadodorp (-CB), *Letty* 328; between Belfast and Machadodorp (-CB), *Van der Schijff s.n.*; *Reynolds* 2697; 2564; N.E. of Machadodorp on Lydenburg Road (-CB), *Codd* and *de Winter* 3362; 1.5 km E. of Dalmanutha (-CC), *Codd* 8088; Slaaihoek (-DA), *Bruce* 503; Nelshoogte (-DD), *Codd* 8127. 2531 (Komatipoort): Umkomati Valley (-CC), *Galpin* 1360. 2627 (Potchefstroom): Vereeniging (-DB), *Leendertz* 3913. 2628 (Johannesburg): Linden-Emmerentia road (-AA), *Gilliland s.n.*; Witpoortjie valley (-AA), *Marloth* 7770; Wilgepoort (-AD), *Leendertz s.n.* 2629 (Bethal): 6 km beyond Oshoek (-DA), *Letty* 332; Trichardsfontein (-DB), *Rehmann* 82 (B); *Adendorff* 1; 9 km beyond Ermelo on Bethal road (-DB), *Letty* 339; Ermelo (-DB), *Letty* 340; banks of Vaal River on farm Leeuwenberg (-DB) *Robertson* 23. 2630 (Carolina): 32 km S.E. of Machadodorp on Slaaihoek road (-AA), *Letty* 469; Carolina (-AA), *Rademacher s.n.*; Mockford's farm, Blairmore (-BC), *Gunn s.n.*; Mavriestad (-CA) *Pott* 5148; 24 km S.E. of Ermelo (-DA) *Codd* 4771. 2729 (Volksrust): Maquabi (-BB), *Burt-Davy* 4095; Rolfontein (-BB), *Burt-Davy* 4123; Amersfoort (-BB), *Adendorff* 2; Laingsnek (-BD), *Letty* 494. 2730 (Vryheid): farm Oshoek (-AC), *Letty* 489; *Devenish* 1086; Piet Retief (-BB), *Collins s.n.*

O.F.S.—2828 (Bethlehem): Golden Gate National Park (-CA), *Roberts* 3146. 2829 (Harrismith): 4 km S.E. of Swinburne (-AD), *Codd* 10724; Van Reenens Pass (-AD), *Letty* 472.

SWAZILAND.—2631 (Mbabane): Forbes Reef road (-AA), *Compton* 29551; Hlatikulu (-CD), *Collins s.n.*

NATAL.—ex Natal, *Wood s.n.* (left-half of sheet, K); 2729 (Volksrust); Majuba (-BD), *Schweickerdt* 974. 2730 (Vryheid): Paulpietersburg (-BD), *Galpin* 9691; Utrecht (-CB), *Codd* 6259. 2829 (Harrismith) Mlambojiva valley, Bergville (-CB), *Killick & Marais* 2133; 2134. 2830 (Dundee): Glencoe (-AA), *Shepherd* 63 (NH); Nqutu (-BA), *Codd* 9405. 2929 (Underberg): Major Stewart's farm, Underberg (-CD), *Dyer* 3228. 2930 (Pietermaritzburg): (-CB), *Wilms* 2335 (K).

CULTIVATED.—Hort. F. Stander & Co. (K); Hort. C. G. van Tubergen (K); "from Natal" (K).

Zantedeschia albomaculata subsp. *macrocarpa* is characterised by, and differs from subsp. *albomaculata*, in having triangular-hastate, sparsely speckled leaves, and medium-sized spathes which are straw-coloured and truncate at the apex. Its epithet is derived from the, generally, few and large-sized berries which develop in the withering spathe; these weigh the flaccid peduncle down until it lies on the ground and the seeds germinate.



FIG. 29.—*Zantedeschia albomaculata* subsp. *macrocarpa* on the marshy banks of a Transvaal stream, Lydenburg District (Codd 8201). Photo by Dr L. E. Codd.



FIG. 30.—Behaviour of maturing fruit of *Zantedeschia albomaculata* subsp. *macrocarpa* (Codd 8201).



FIG. 31.—Fruit of *Zantedeschia albomaculata* subsp. *macrocarpa*, Bergville District, Natal (Killick & Marais 2134).



PLATE 8.—*Zantedeschia albomaculata* (Hook.) Engl. subsp. *valida* Letty.

For purposes of typification, the specimen of *Rehmann* 82 in Berlin-Dahlem Herbarium may be accepted as being the holotype. It consists of one leaf and a capsule containing large berries and bears labels with "*Zantedeschia macrocarpa*" in Engler's handwriting and "Transvaal, Trigardsfontein, *Rehmann* No. 82" in Rehmann's handwriting.

In Zurich there are several Rehmann specimens called *Z. macrocarpa*, including a specimen of *Rehmann* 82 annotated in Engler's handwriting. In addition there is *Rehmann* 72, consisting of three leaves, from "Natal, Drakensberg, Laingsnek" (in Rehmann's writing) with "*Z. macrocarpa* Engl.?". For notes on *Rehmann* 83 and 7096 see subsp. *valida* (below).

(c) subsp. *valida* Letty, subsp. nov., subsp. *macrocarpa* (Engl.) Letty affinis, planta robustiore foliis crassioribus ovato-vel ovato-orbiculato-cordatis differt.

Planta robusta ca 70 cm alta. *Folia* petiolata; lamina 30 cm longa, 20 cm lata, crassa, ovato-vel ovato-orbiculato-cordata, immaculata; petiola 30 cm longa. *Spatha* variabilis grandis ca 15 cm longa, 12 cm lata in fundo purpureae. *Baccae* 1 cm diam., numerosae.

TYPE: Natal, farm Blanerne, 29 km N. of Ladysmith, Letty 492 (PRE, holo.).

Plant robust up to 70 cm tall. *Leaves* petiolate, petiole up to 30 cm long; blades thickish textured up to 30 cm long, up to 20 cm broad, ovate-cordate to ovate-orbicular-cordate with apiculate apex, immaculate. *Spathes* vary in size up to 15 cm long, 12 cm broad, ivory to cream coloured with purple area at base inside. *Berries* medium sized about 1 cm diam., numerous, 3 locular, 2 to 3 ovuled.

Found in rock-clefts on the mountains and foothills as well as on the banks of streams and in vleis, it flowers from October to March with the peak in November. Its distribution seems to be restricted to the region bounded by the Biggarsberg, Giants Castle and Collings Pass, in Natal.

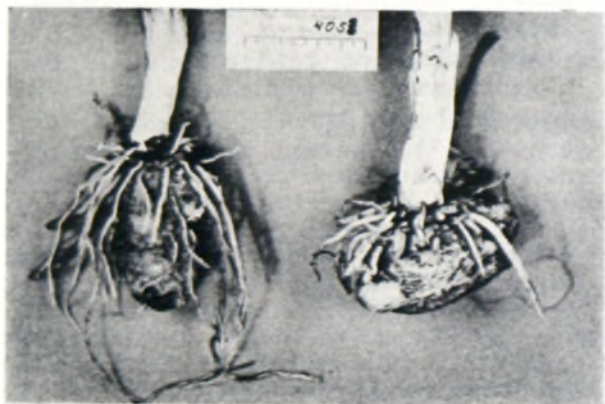


FIG. 32.—Tubers of *Zantedeschia albomaculata* subsp. *valida* from Klip River District, Natal (Letty 492 and 493) $\times \frac{1}{2}$.

NATAL.—2829 (Harrismith); Biggarsberg (cult. Pretoria), Marais 360; 29 km N. of Ladysmith on farm Blanerne (—BD), Letty 492; 10 km from Biggarsberg store on road to Collings Pass (—BD), Letty 493; on farm Blanerne, Elandslaagte, Biggarsberg (—BD), Mitchell-Innes s.n. 2929 (Underberg); Giant's Castle (—AD), Trauseld 302.

Without the flowering spathes, plants of *Zantedeschia albomaculata* subsp. *valida* could easily be mistaken for *Z. aethiopica* by the robust habit and the shape and texture of the leaves. Apart from this



FIG. 33.—*Zantedeschia albomaculata* subsp. *valida*, habit of plant figured on Plate 8, from Biggarsberg, Natal (Marais 360).

resemblance, they differ in all other respects except, perhaps, the colour of the spathes. The nearest affinity of subsp. *valida* is subsp. *macrocarpa* with which it agrees in being deciduous, and also in the shape and the colouring of the spathe, but differs in the shape and texture of the leaves.

Among specimens examined by Dr Codd in Zurich, one labelled "*Rehmann* 83, Transvaal, Trigardsfontein" and annotated as *Z. macrocarpa* by Engler has leaves somewhat larger and broader than *Rehmann* 82 (the type of *Z. macrocarpa*), and is practically identical with another specimen which bears a rubber stamp with the words "7096, Drakensberge, Biggarsberge". As these two specimens *Rehmann* 83 and 7096 are considered to represent *Z. albomaculata* subsp. *valida*, the locality given for No. 7096 appears to be correct.

Z. lutwychei N.E. Br., described in Gardener's Chronicle 13: 568 (1893), was grown from specimens said to have been imported from the neighbourhood of Lake Nyanza and called "Pride of the Congo". It was illustrated in Rev. Hort. Paris, p. 60 (1896). Although the *Zantedeschia* specimens in several European herbaria have been seen, no specimens from the Congo have been encountered. The existing material of *Z. lutwychei*, which has been examined, consists of a single leaf in Kew Herbarium of the plant described in the Gardener's Chronicle (1893), and the illustration in Rev. Horticole (1896). From this evidence it seems that *Z. lutwychei* resembles *Z. albomaculata* subsp. *valida* but, until matching specimens from the supposed area of origin of *Z. lutwychei* are forthcoming, its status is doubtful. It is, therefore, treated as a *nomen dubium*.

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