

Clivia miniata ‘Longwood Debutante’, *Clivia miniata* ‘Longwood Fireworks’, and *Clivia miniata* ‘Longwood Sunrise’

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The genus *Clivia* Lindl. (Amaryllidaceae) contains six described species: *C. miniata*, *C. caulescens*, *C. gardenii*, *C. robusta*, *C. nobilis*, and *C. mirabilis* (Zonneveld, 2004). All *Clivia* originate from Southern Africa. Of the six species, *Clivia miniata* is the most popular in cultivation because of its large, upright, attractive flowers borne in an umbel. The other five species have smaller pendent flowers. *Clivia* make excellent house plants because of their attractive foliage, flowers, and tolerance of dry and low light conditions. They are shade-tolerant landscape plants, which are hardy in United States Department of Agriculture Zones 9 and 10 (Koopowitz, 2002).

Longwood Gardens in Kennett Square, PA, began breeding *Clivia* in 1976. The initial goal of the breeding program was to produce a superior yellow-flowered plant for use in the Longwood conservatories. When the breeding program started, yellow-flowered *Clivias* were rare in cultivation, and the flowers needed improvement to increase tepal size and presentation of the flowers. The first breeding cross was made between a yellow-flowered plant of unknown origin and a large orange-flowered plant from Gordon McNeil of South Africa. By crossing these two plants, it was hoped that a plant with superior, large yellow flowers would eventually result. All flowers of the F₁ generation were orange. The F₂ generation yielded a mix of orange and yellow flowers. Other yellow-flowered plants were acquired from Sir John Thouron of Pennsylvania, Dick Ryan of South Africa, and Glasshouse Works, Ohio, and added to the program. In 1984, a seedling from a 1980 cross bloomed with keeled tepals. This was unexpected, and led to new breeding goals of multipetaled flowers and flowers with consistent prominent keeling. The production of a multipetal

flower from keeled tepals proved to be elusive, but consistently keeled tepals were within reach.

The first introduction from the breeding program was released 35 years after the program's inception. The time needed to reach the initial breeding objectives was due to several factors. First, seeds can take 8–10 months to reach maturity after pollination (Merwe et al., 2005). Second, it can take a seedling a minimum of 3–4 years to bloom for the first time (Duncan, 2008). Finally, the only readily available means of clonal propagation of *Civia* has been vegetative division, which is a slow process. Because of the time and effort that goes into *Civia* breeding, superior *Clivia* plants are coveted by collectors who will pay top dollar for a superior plant. At their release, Longwood *Clivia* cultivars sold for \$900 apiece.

The breeding goal of superior yellow flowers was met in the release of *C. miniata* ‘Longwood Debutante’ in 2010 (Fig. 1). ‘Longwood Debutante’ produces slightly fragrant, rich yellow flowers with overlapping tepals, on an umbel above dark green foliage. *Clivia miniata* ‘Longwood Fireworks’ is the second yellow-flowered plant that was released in 2011 (Fig. 1). ‘Longwood Fireworks’ produces large, paler yellow flowers with reflexed tepals and protruding stamens, which are held on a spherical umbel above the foliage. *Clivia miniata* ‘Longwood Sunrise’ is an orange-flowered *C. miniata* with consistently keeled tepals that was released in 2014 (Fig. 1).

Origin

Clivia miniata ‘Longwood Debutante’ resulted from a sibling cross made in 1993 by Dr. Robert Armstrong, former research horticulturist at Longwood Gardens, and given the breeder's number 93 × V7-5. The female parent, with orange flowers, had breeding number 89 × V1-13, and the male parent, with orange flowers, had breeding number 89 × V1-11. Both resulted from a 1989 cross of a yellow-flowered form of *C. miniata* with Longwood Gardens accession number 1981-00239, which was obtained from Glasshouse Works, and Longwood Gardens accession number 1974-0850, which was a tall orange-flowered plant of *C. miniata*. The seedling was selected as a superior plant in 1999, and given the Longwood

Gardens accession number 1999-0264 (Fig. 2). *C. miniata* ‘Longwood Debutante’ was named and registered with *The Clivia Society Clivia Register* in 2011 (Smith, 2011).

Clivia miniata ‘Longwood Fireworks’, accession number 1998-0492, was selected in 1998 as a superior plant. The plant resulted from a cross by Armstrong between Longwood accession 1965-0816, which was a yellow-flowered plant donated to Longwood by Sir John Thouron, and a plant with the breeding number 2 × V2-15 with yellow flowers, which was crossed by Armstrong in 1985. Plant 2 × V2-15 resulted from a cross by Armstrong between 1 × V7-1 with orange flowers and 1 × V6-2 with orange flowers in 1980. Both of these plants resulted from a cross between 1974-0850, a tall orange plant, and Longwood accession number L.103 with yellow flowers (Fig. 3). The plant was named and registered with *The Clivia Society Clivia Register* in 2012 (Smith, 2012).

Clivia miniata ‘Longwood Sunrise’ accession number 1999-0760 resulted from a 1999 Armstrong cross. The breeder's number is 99 × V1-1. The female parent was 93 × V5-3 (Longwood Gardens accession 1999-0064). The female parent was a sibling cross between 89 × V1-10 and 89 × V1-11. Both seedlings resulted from crosses made in 1989 of 1981-0239 yellow-flowered *C. miniata* obtained from Glasshouse Works with 1974-0850 *C. miniata*. The male parent was 89 × V7-7 (Longwood accession 1999-0230), which resulted from a 1989 cross between 3 × V4-5 and 2 × V6-1. *Clivia* 3 × V4-5 resulted from a 1980 cross between 2 × V3-1 with 2 × V2-14. *Clivia* 2 × V3-1 resulted from a 1980 cross between 1 × V7-1 with a yellow-flowered form of *C. miniata* 1964-0291 obtained from Gordon McNeil of South Africa. *Clivia* 1 × V7-1 resulted from a 1976 cross between 1974-0850, and Longwood Gardens accession L.103 from an unknown source. *Clivia* 2 × V2-14 resulted from a 1980 sibling cross between 1 × V6-2 with 1 × V7-1. Parents of both crosses were *Clivia* 1974-0850 and L.103. *Clivia* 2 × V6-1 resulted from a 1980 sibling cross between 1 × V3-1 and 1 × V6-1. Parents of both crosses were 1974-0850 and L.103. Pedigree and flower color of breeding plants is noted in Fig. 4.

Descriptions

Clivia miniata ‘Longwood Debutante’

Clivia miniata ‘Longwood Debutante’ is the first cultivar released from the Longwood Gardens’ breeding program. The plant was named and released in Mar. 2011 at the North American *Clivia Society's* International Symposium and Show held at Longwood Gardens. The slightly fragrant flowers open with a green throat and mature to a rich yellow color with large overlapping tepals that are held in a tight umbel, which rises nicely above the dark green foliage. The plant quickly produces offsets after division.

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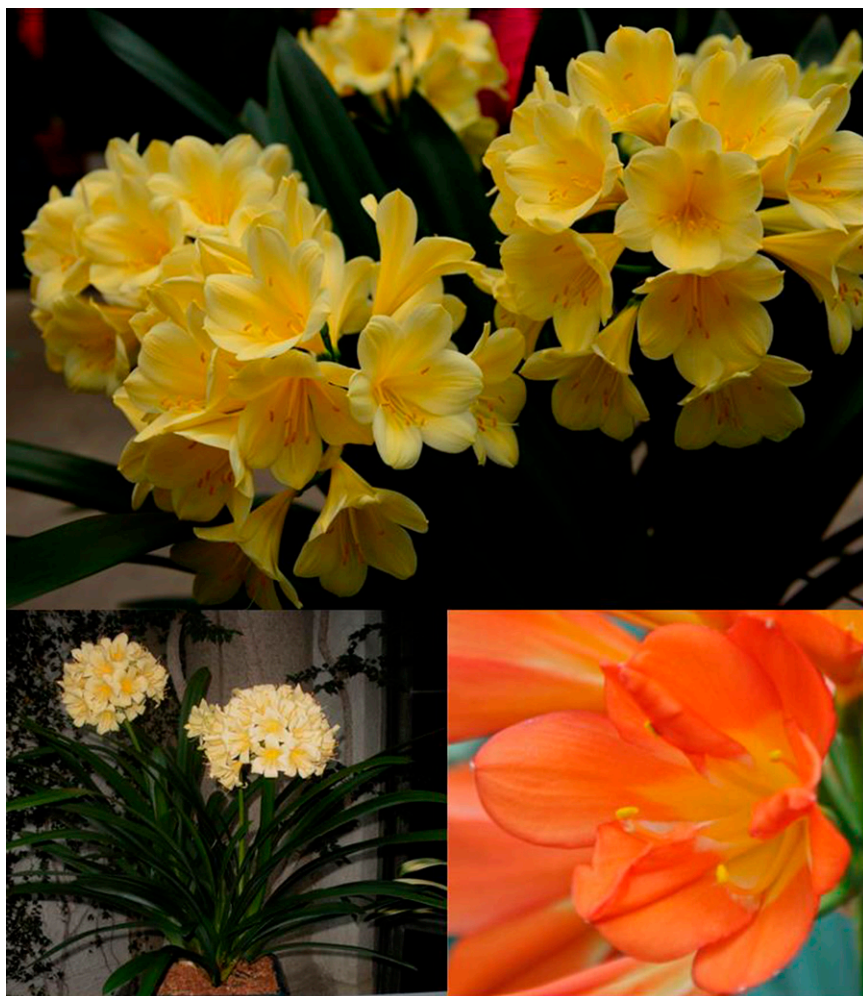


Fig. 1. Clockwise from top: *Clivia miniata* 'Longwood Debutante' with dark green leaves and rich yellow flowers; *C. miniata* 'Longwood Sunrise' the first variety with keeled tepals released by Longwood Gardens; *C. miniata* 'Longwood Fireworks' flowers with reflexed tepals and protruding stamens.

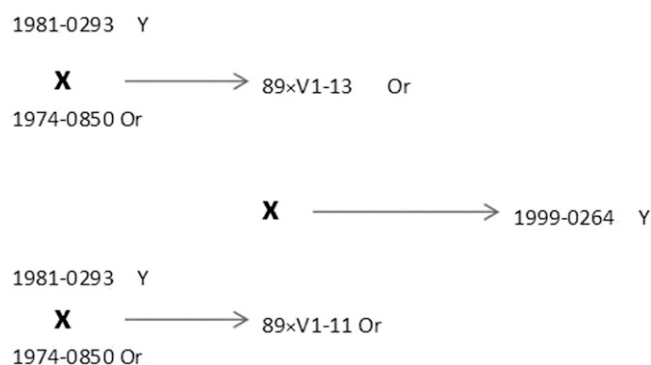


Fig. 2. Pedigree of *Clivia miniata* 'Longwood Debutante'. Female parent appears as the top parent of the cross. "Y" represents a yellow flower. "Or" represents an orange flower.

Since 2012, *C. miniata* 'Longwood Debutante' was awarded six first place ribbons, two second place ribbons, one third place ribbon, three honorable mentions, three Best in Division awards, and two Best in Category awards by the North American *Clivia* Society. It also won the People's Choice award in 2012 and 2013, which was decided by guests of Longwood Gardens.

Description. Plant medium to large 57–77 cm tall; leaves 45–77 cm long and 45–65 mm wide, dull, dark green *RHS Color Chart* Fan 3, Green Group 136B (Royal Horticultural Society, 1995), (*Clivia Color Chart II* Swatch 10/91) (Cape *Clivia* Club, 2008); scapes 37–56 cm long; umbels 21–26 cm wide, with 10–24 flowers; flowers 7–9 cm wide, and 7–9 cm long, flared to nearly open

with tepals diverging at about 45°; pedicels 3 to 6 cm long; tepals overlapping from the base, obovate, slightly revolute, with rounded tips and entire margins; inner tepals 35–45 mm wide; outer tepals 28–30 mm wide; inner and outer surface of tepals yellow; inner surface transitions from *RHS Color Chart* Fan 1, Yellow Group 3C (*Clivia Color Chart II* Swatch 9/88) along the midrib to Yellow Group 1D (*Clivia Color Chart II* Swatch 9/83) along the margin; outer surface transitions from *RHS Color Chart* Fan 1, Yellow Group 8B (*Clivia Color Chart II* Swatch 9/87) along the midrib to Yellow Group 8C (*Clivia Color Chart II* Swatch 9/83) along the margin. The large, slightly fragrant yellow flowers with wide overlapping tepals are held in large umbels on sturdy scapes. Nomenclatural standard, as a dried specimen, deposited in the Longwood Gardens herbarium.

Clivia miniata 'Longwood Fireworks'

Clivia miniata 'Longwood Fireworks' is the second cultivar to be released by Longwood Gardens from their breeding program. The flowers are a pale yellow. The name 'Fireworks' alludes to the shape of the large flowers and the presentation of the rounded umbel with tepals that are reflexed with protruding stamens, resembling fireworks exploding in the sky. The umbel is full and held above the foliage on a sturdy scape. The plant was named and released in 2012 at Longwood Gardens during the North American *Clivia* Show at Longwood. Since 2011, 'Longwood Fireworks' was awarded six first place ribbons, two second place ribbons, two third place ribbons, and three Best in Division Awards by the North American *Clivia* Society.

Description. Plant is medium sized 61–85 cm tall. Leaves 61–86 cm long and 45–58 mm wide, dark olive green *RHS Color Chart* Fan 3, Yellow Green Group 147A (*Clivia Color Chart II* swatch 10/91); scapes 41–54 cm long; umbels 24–27 cm wide, 15–25 flowers; flowers 8.5–10 cm wide, 6–7 cm long, reflexed. Pedicels 3.5–5 cm long; tepals overlapping from the base, obovate; outer tepals have acute tip; inner tepals have a rounded tip; tepal margins are entire, slightly revolute; inner tepals 26–30 mm and outer tepals 22–24 mm; inner surface of tepals transitions from *RHS Color Chart* Fan 1, Yellow Orange Group 16C (*Clivia Color Chart II* swatch 7/65) along midrib to *RHS Color Chart* Fan 1, Yellow Orange Group 16D (*Clivia Color Chart II* swatch 8/74) along the margin; outer surface transitions from *RHS Color Chart* Fan 1, Yellow Group 14D (*Clivia Color Chart II* swatch 7/66) along the midrib to *RHS Color Chart* Fan 1, Yellow Group 13D (*Clivia Color Chart II* swatch 7/62) along the margin. Nomenclatural standard as a dried specimen deposited in the Longwood Gardens herbarium.

Clivia miniata 'Longwood Sunrise'

Clivia miniata 'Longwood Sunrise' is the third cultivar to be released from Longwood

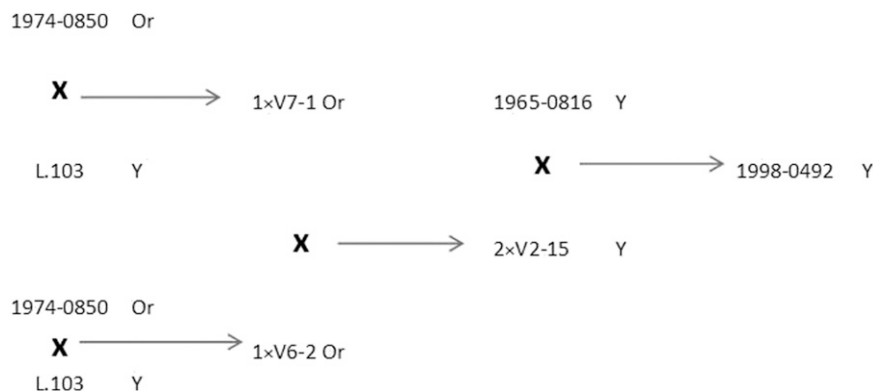


Fig. 3. Pedigree of *Clivia miniata* 'Longwood Fireworks'. Female parent appears as the top parent of the cross. "Y" represents a yellow flower. "Or" represents an orange flower.

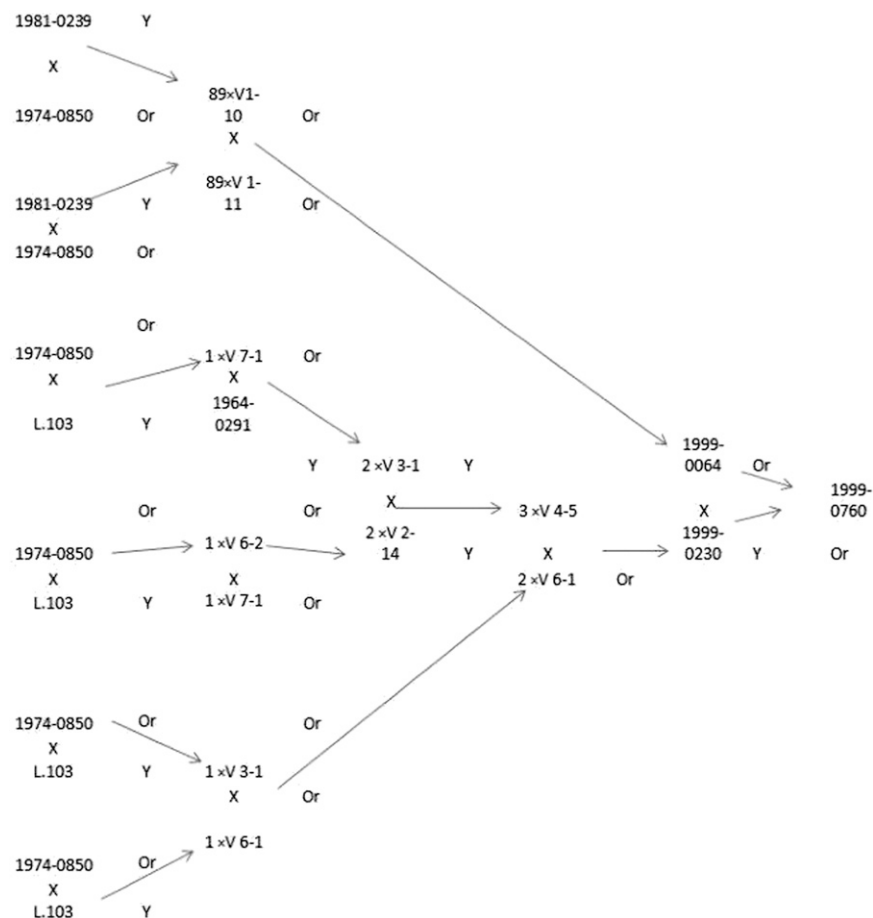


Fig. 4. Pedigree of *Clivia miniata* 'Longwood Sunrise'. Female parent appears as the top parent of the cross. "Y" represents a yellow flower. "Or" represents an orange flower. "U" represents an unknown.

Garden's breeding program and is the first release with keeled tepals. The keel is a raised ridge that runs along the center of the tepals. It was released in 2014 at the North American *Clivia* Society Show at Longwood Gardens. 'Longwood Sunrise' has won two third place awards at North American *Clivia* Shows at Longwood Gardens since 2011.

Description. Plant, height 54–79 cm; leaves are 63–79 cm long by 50–55 mm wide, dark green *RHS Color Chart* Fan 3, Green

Group 139A (*Clivia Color Chart II* swatch 10/91); scapes 35 cm long; umbels 21.1 cm wide with 20 flowers; flowers 84–90 mm long by 53–70 mm wide, not reflexed; pedicels 25–33 mm long, tepals overlapping from base, oblanceolate; tepal margins entire, margins slightly involute; inner tepals rounded, 65–70 mm long by 29 mm wide, *RHS Color Chart* Fan 1, Orange Red Group 32A (*Clivia Color Chart II* swatch 2/16) transitioning to 11B (*Clivia Color Chart II* swatch 9/88) along the midvein; inner tepals keeled, up

to 10 mm wide, beginning to divide into two; outer tepals acute-tipped, 65–70 mm long by 25 mm wide, color same as inner tepals.

Culture

Clivia require a well-drained media. When grown indoors, plants must be given a cool, dry, dormant period that mimics their native environment for proper flowering. During this time, plants should be watered about every 3 weeks. For inducing scape elongation at Longwood, the cool, dry, dormancy treatment begins in November and continues through mid-January. During this time, the greenhouse is set with a heat point of 5.5 °C and a cooling set point of 10 °C. Mori and Yoshihiro (1974) found that 50 d of natural cold temperatures with frost protection promoted good flowering. The number of cumulative hours below 10 °C was 1000 h during this period. Walters (1988) also suggests keeping plants under 10 °C to fulfill the chilling requirements. Once the dormancy requirements are fulfilled, plants should be watered, and temperatures gradually raised to 15.5 °C over a week period to stimulate flowering. Plants will bloom ≈2 months from the time dormancy is broken. About 2 weeks after breaking dormancy, flower buds are visible.

Plants are grown in a media that consists of 25% pine bark, 20% peat moss, 20% compost, 15% vermiculite, 15% perlite, 5% granular montmorillonite clay, and 1.4 kg of lime per cubic yard. At Longwood, plants are fertilized once a week with a fertilizer of 15N–2.19P–12.45K at 250 ppm during the growing season from May through October. Plants are not fertilized during dormancy or flowering. Plants are moved outdoors under protective shade for the summer months from June through early October to avoid the excessive heat in the greenhouses.

Pests and Hazards

At Longwood Gardens, insect pests include mealy bugs, thrips, snails, and slugs. *Clivia* cannot tolerate direct noon day sun, and need protection from intense sunlight; otherwise leaves will quickly scorch. *Clivia* must also be protected from freezing temperatures. If grown out doors for the summer, the plants must be protected from hail, which can damage the leaves.

Availability

All three *Clivia* are available for sale in small quantities at the Longwood Gardens gift shop. Plants can be shipped by mail order within the United States upon request (<http://www.longwoodgardens.org/TheGardens-Shop.htm>).

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