



DISCOVERY OF THE CRITICALLY ENDANGERED BULBOUS HERB *Crinum woodrowii* (AMARYLLIDACEAE) & ITS NEOTYPIFICATION

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Abstract

A single population of a critically endangered species, *Crinum woodrowii*, was discovered from Katraj Ghat, Pune District, Maharashtra, at a location other than its type location. A neotype of the species is designated here and its detailed description, distribution, habitat, IUCN threat status, and nomenclatural notes are provided.

Key words: habitat, Katraj Ghat, Maharashtra, neotype, new locality, taxonomy

Introduction

The genus *Crinum* L. (Amaryllidaceae J. St.-Hil.) is represented by ca. 120 species in tropical and subtropical regions of the world with 12 species, three varieties and one forma found in India, of which three species and the forma, *Crinum brachynema* Herb., *C. eleonora* Blatt. & McC. f. *purpurea* Blatt. & McC., and *C. woodrowii* Baker ex W. Watson are endemic to Mahabaleshwar and adjoining areas of Satara District, Maharashtra (Ahmedullah & Nayar, 1986; Bachulkar, 1993; Cooke, 1907; Deshpande *et al.*, 1995; Gaikwad & Yadav, 2004; Karthikeyan *et al.*, 1989; Lakshminarasimhan, 1996; Mishra & Singh, 2001; Punekar *et al.*, 2004 & 2006; Raghavan & Singh, 1983 & 1984; Singh & Raghavan, 1986; Yadav, 1997). Presumed to have become extinct

the bulbous perennial herb, *C. woodrowii*, noted for its enormous beautiful flowers, became a subject of immense botanical interest due to its habitat preference for hilly slopes and on the margins of moist deciduous forests between 700–1250 m altitudes in northern Western Ghats. Copious bulbs of this species were first collected by George Marshall Woodrow (1846–1911) in January of 1897 from Mahabaleshwar and sent to Kew, under an assumption that the species was *C. brachynema*, but when it flowered in July, 1897, the plant proved to be a new species described by Kew's assistant curator, William Watson (1858–1925), in 1897, and subsequently by Keeper John Gilbert Baker in 1898 as *C. woodrowii*.

Until recently *Crinum woodrowii* was represented by only two herbarium specimens, one collection made in 1899 by Woodrow (CAL) and another gathered by S.A. Punekar and S.P. Kavade in 2001 (BSI); in reporting this latter gathering, Punekar *et al.* (2004) assigned the status as 'critically endangered' to this plant. Here we report a second location.

During an assessment of endemic and threatened angiosperms of northern Western Ghats in Goa, Karnataka and Maharashtra from 2007 to 2012, an intensive search was made to rediscover *Crinum woodrowii*. While the existence of the species was confirmed in the type locality from 2010 to 2012, it was also discovered from Katraj Ghat (18°27'15"N, 73°51'45"E), Pune District, Maharashtra, with an extant population of approximately 12 individuals in 2010. Hence, *C. woodrowii* is strictly endemic to Pune and Satara districts of Maharashtra in India and alarmingly, in less than a decade, the population at the type locality has collapsed drastically from 150 individuals in 2004 to only 60 in 2010 and then to a mere 55 in 2011. Its present area of occupancy in the two extant locations is confined to some eight sq. km, the type locality of about five sq. km, and the Katraj Ghat population of approximately three sq. km. Our present studies uphold the Critically Endangered status of *C. woodrowii* in accordance with the IUCN 2013.

Field observations revealed that moth caterpillars feed on most of the reproductive organs such as flowers and fruits along with the scapes and leaves. Punekar *et al.* (2004), too, also found that caterpillars of the moth genus *Polytela* Guenée (Notuidae Latreille) feed on the flowers and fruits. This diminishes significantly the chances of regular sexual reproduction and normal seed set. Further the fruits which are able to mature are also consumed at times and this hampers seed dispersal. Additionally, the massive bulbs, weighing 150-600 gm, are dug and fed upon by unknown nocturnal herbivores minimizing the chances of even asexual propagation, which perhaps is the only means of survival and population sustenance. Under these circumstances the minimal successful pollination achieved by honeybees, beetles, and the stingless bees become futile as the flowers are devoured by the caterpillars even before they mature to produce fruits.

Population augmentation is essential for the species sustenance in wild. Under the present scenario this can best be achieved asexually through vegetative propagation by bulbs under *ex situ* conditions and their reintroduction into their natural habitat. Such efforts proved successful when ten plantlets were raised in the experimental garden at the Botanical Survey of India, Western Regional Centre, Pune, Maharashtra, from two bulbs brought from the Katraj Ghat population. Of these, six plantlets were successfully reintroduced to Katraj Ghat in 2011, bringing the population strength to 16 individuals. It was further found that out of the ten plants raised *ex situ*, only two produced seeds which, when sown under *ex situ* as well as in the natural habitat, failed to germinate. It is suggested here that vegetative propagation methods, if adopted properly, can gradually increase the number of individuals in years to come. Furthermore, the above information clearly calls for careful and detailed studies as to how best to improve the natural reproductive biology of *Crinum woodrowii* with the aim of species expansion in the wild through a combination of control of predation and improved techniques to promote viable seed production and germination.

Crinum woodrowii Baker ex W. Watson,
Garden & Forest 10: 324. 18 Aug 1897, as
"Woodrowii". (Figs. 1, 2)

Neotype (here designated): India, Maharashtra, Bombay Presidency, May 1899, *G.M. Woodrow s.n.* (CAL, neotype). Additional specimens: Kates Point, Mahabaleshwar, Satara District, 9 Jun 2001, *S.A. Punekar, S.P. Kavade & M.N. Datar 178344* (BSI); Katraj Ghat, Pune District, 15 Jun 2010, *R. Kr. Singh & P.G. Diwakar 184900* (BSI).

Herbs, bulbous, 50–115 cm high, scapose; bulbs 8–18 cm in diameter, globose-spherical, with a brown outer tunic. **Leaves** 30–85 × 5–15.5 cm, 10–20 arising from the bulb contemporarily with flowering or sometimes after flowering, ensiform, bright green, glabrous, acute apically, sheathing basally, scabrous marginally; leaf sheaths forming a pseudostem. **Scapes** 50–115 × 2–5 cm, 1(–2), arising from the bulb outside the tuft of leaves, stout, compressed. **Flowers** 10–18 in a terminal umbel, fragrant, white; pedicels 2–3.5 cm long, green, with or without a light

purplish tinge; involucre bracts 2, 7–10 × 2.5–4 cm, opposite, green with a light purplish tinged, deltoid, acute apically, inflexed marginally; bracteoles many, 3–8 cm long, filiform, pale yellowish-green. **Perianth** hypocrateriform; tube 6.5–12 cm long, cylindric, curved, pale yellowish-green with light purplish tinge; lobes 7–11.5 × 1–2.5 cm, white, light purplish tinged on dorsal median line, lanceolate, acute at apex. **Stamens** 6; filaments 6–8 cm long, filiform, dark purplish in upper half, white in lower half; anther 1.2–1.5 cm long, versatile, linear, crescent, yellow. **Ovary** 0.7–1 × 0.3–0.5 cm, oblong; ovules sessile; style 16–18 cm long, filiform, overtopping the stamens, dark purplish in upper half, white in lower half; stigma lobed. **Fruits** 4–7 cm across, subglobose; stalk 3–4 cm long. **Seeds** 0.9–1.2 cm across, rounded, blackish brown, with a thick testa and copious albumen.

Flowering and fruiting: May–July.

Illustration: Baker, Botanical Magazine 124: t. 7597. 1 Jul 1898.

Distribution: Endemic to Kates Point, Mahabaleshwar, Satara District and to Katraj Ghat, Pune District, Maharashtra State, India.

Habitat: Infrequent to rare on hilly slopes and along the margins of moist deciduous forests between 700–1250 m in association with *Adelocaryum coelestinum* Brand, *A. malabaricum* Brand, *Arisaema murrayi* (J. Graham) Hook., *Ceropegia panchganiensis* Blatt. & McCann, *Crinum brachynema* Herb., *Curculigo orchioides* Gaertn., *Euphorbia fusiformis* Buch.-Ham. ex D. Don, *E. nana* Royle, *E. pycnostegia* Boiss., *E. rothiana* Spreng., *Habenaria grandifloriformis* Blatt. & McCann, *Hitchenia caulina* (J. Graham) Baker, *Indigofera dalzellii* T. Cooke, *Iphigenia stellata* Blatt., *Lepidagathis cuspidata* Nees, *Pimpinella heyneana* (DC.) Benth., *Pinda concanensis* (Dalzell) P.K. Mukh. & Constance, *Scilla hyacinthina* (Roth) J.F. Macbr., *Strobilanthes callosa* Nees, *S. reticulata* Stapf, *Themeda tremula* (Nees ex Steud.) Hack., and *Zingiber diwakarianum* R.Kr. Singh.

Threat factors: (1) harvesting of bulbs for medicinal and ornamental purposes. (2) Selling bulbs by locals to treat respiratory diseases

(especially in asthma). (3) Digging and eating raw bulbs by males to increase physical strength. (4) Damage caused by natural pests, such as moth caterpillars and nocturnal herbivores. (5) Repeated forest fires in dry seasons. (6) Habitat degradation due to anthropogenic pressures.

Uses: *Crinum woodrowii* has promising potential of utilizing wild genes in breeding experiments and cultivar development as its beautiful and unique flowers are surely responsible for considering this species the world's most beautiful crinum lily. It can be grown as a garden ornamental and the fragrant flowers and medicinal bulbs can also be used commercially in the perfume and pharmaceutical industries.

IUCN threat status: Based on assessment and field observations from year 2007 to 2012, *Crinum woodrowii* is currently and properly, categorised as Critically Endangered [B2b (ii,v) c (ii,iv); C2b].

Nomenclatural notes: The neotype selected here is required because *Crinum woodrowii* was first described by W. Watson on the basis of plants which flowered in July, 1897, at Kew, from bulbs that were collected from Mahabaleshwar by G. M. Woodrow and sent to Kew under an assumption that the species was *C. brachynema*. However, if a herbarium specimen was prepared by Watson, it is no longer extant. Since no original material has been found, the 1899 G. M. Woodrow specimen at Central National Herbarium (CAL), Botanical Survey of India, Howrah, India, is designated here as the neotype.

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PLATE 1



Figure 1: *Crinum woodrowii* Baker ex W. Watson., (A) habit, (B) grown and (C) flowering in experimental garden from bulb.

PLATE 2



Figure 2: *Crinum woodrowii* Baker ex W. Watson., (A) bulb and (B) fruits.