A Supplementary Description of *Kalanchoe humifica* (Crassulaceae), with Special Reference to the Floral Characters and Its Chromosome Number

Kazunori MIYATA\(^a\)*, Hiroshi IKEDA\(^b\), Toshiyuki FUJIKI\(^c\) and Hideaki OHBA\(^b\)

\(^a\)Izu Shaboten Park, 1317-13, Futo, Ito, Shizuoka, 413-0231 JAPAN;
\(^b\)The University Museum, The University of Tokyo, 7-3-1, Hongo, Bunkyo-ku, Tokyo, 113-0033 JAPAN;
\(^c\)Department of Applied Science, Faculty of Science, Okayama University of Science, 1-1, Ridai-cho, Kita-ku, Okayama, 700-0005 JAPAN

*Corresponding author: rinoduka@gmail.com

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*Kalanchoe humifica* Desc. (Crassulaceae), described in 2005, was based only on vegetative characters. No report on its floral characters has been published. We cultivated *K. humifica*, and it bloomed in March 2015. Here we provide a supplementary description with special reference to the floral characters. The chromosome number of *K. humifica*, \(2n = 34\), a diploid with the basic chromosome number \(x = 17\), is reported here for the first time.

**Key words:** Chromosome number, Crassulaceae, floral characters, *Kalanchoe humifica*.

*Kalanchoe humifica* Desc. (Crassulaceae) was described in 2005, based on vegetative characters, due to the absence of flowers (Descoings 2005). Since then, there have been no reports on the flowers (see the home page of “International Crassulaceae Network” http://crassulaceae.ch/de/home).

One of the authors, Miyata, purchased a species of *Kalanchoe* from a nursery labelled ‘*Kalanchoe* sp. Tsingy de Bemaraha, W of Madagascar’ in 2009, and grew it in Tokyo. The plant grew vegetative to 1 m tall until the winter of 2014, then produced an elongated scape of flowers, which bloomed in March 2015. From the vegetative characters - large size, thick lanceolate leaves with acuminate apex and obliquely round base - the plant was identified as *K. humifica*. We therefore provide details of the floral features to supplement the description of the gross morphology.

For observation of the pollen, the pollen grains were treated with 10% KOH, Erdtman’s acetolysis method (Erdtman 1934), ethanol series (30%, 60%, and 99.5%) and xylene. The samples were mounted in Eukitt medium. Measurements were made of at least 100 grains. In addition to the description of the flowers and pollen, we also determined the chromosome number of *K. humifica*. Fresh root tips were pretreated with a 2 mM hydroxyquinoline solution at room temperature for 1 hour, kept in a refrigerator (ca. 4 °C) for ca. 15 hours, then fixed with Newcomer’s fluid (see Sharma and Sharma 1980). Root tips were macerated with 1N HCl at 60 °C for 10 minutes, stained with 2% lacto-propionic orcein, then squashed for cytological
Fig. 1. *Kalanchoe humifica* Desc. A. Habit (beside Dr. K. Miyata). B. Bulbils on margin of a leaf. C. Flower. D. Cut open flower, with corolla, stamens and pistils.


**Type:** Cultivated in the Botanischer Garten Heidelberg (Descoings 28314, P–holotype, n.v.).

Herbs, perennial. Roots simple or several branched, stout. Stem erect, terete, glabrous, to 270 cm tall, ca. 4 cm in diameter at base, dark green. Leaves opposite, decussate, fleshy, simple, petiolate, 15–45 cm long, 8–14 cm wide, 0.5–1 mm thick, middle ones larger, upper ones smaller and narrower; petiole terete, with shallowly grooved on upper side, 5–12 cm long, 5–10 mm in diameter, glabrous, light green; leaf blade oblong to lanceolate, 10–33 cm long, base slightly cordate to rounded, often oblique,
margin undulate to crenate, apex acute to acuminate, both surfaces glabrous, light to dark green, often secreting nectar on lower surface; marginal bulbils with several leaves; leaves on bulbils ovate, dark gray, 3–5 mm long, 2–4 mm wide. Inflorescence terminal or lateral from upper cauline leaves, a flat topped cyme, lax, to 90 cm long, 30 cm wide; peduncle glabrous, light green; pedicels 8–13 mm long, glabrous, light green. Flowers pendulous, narrowly campanulate. Calyx narrowly campanulate, with 4 lobes, 15–18 mm long, light green with light brown shading; tube 11–13 mm long, 7–8 mm wide; lobes triangular-ovate, 4–5 mm long, 4.5–5.5 mm wide, apex acute. Corolla narrowly campanulate, 4 lobes, 2.3–2.5 cm long; tube 1.5–1.6 cm long, lower 1/3 light green, upper 2/3 pale light brown; lobes narrowly ovate, 8–9 mm long, 4–5 mm wide, erect, slightly recurved, apex acute, pale light brown. Stamens 8; filaments filiform, glabrous, alternipetalous ones 4, 16–17 mm long, oppositipetalous ones 4, 18–19 mm long, basally pale green, distally light pale brown, adnate to corolla tube in lower 4–5 mm; anthers narrowly ovoid, ca. 2 mm long, ca. 1 mm wide, light reddish brown before dehiscing; pollen grains creamy yellow, tricolporate, prolate in equatorial view, circular in polar view, 30.8 ± 1.5 μm in polar axis, 22.8 ± 1.1 μm in equatorial diameter. Ornamentation rugulate. Pistils 4; ovary lanceolate, glabrous, 5–5.5 mm long, ca. 1.7 mm wide, tapering into styles; style filiform, gradually tapering into stigma, 1.3–1.5 cm long, pale green. Nectary glands 4, ovate, 0.8–1 mm long, ca. 1 mm wide, flat, apex obtuse, greenish yellow. Fruit not seen. Chromosome number: 2n = 34 (determine in present study).


Kalanchoe humifica was described from cultivated plants in the Botanischer Garten Heidelberg, Germany. The origin of the species is unknown, but it may be from Madagascar (Descoings 2005). We obtained the cultivated from a nursery as ‘Kalanchoe sp. Tsingy de Bemaraha, W of Madagascar’, indicating that it came from Tsingy de Bemaraha Strict Nature Reserve, western Madagascar, but the source remains uncertain.

Because the original description was based on immature vegetative material, the sizes of some characters are much smaller than in the mature plant we observed, e.g., height was given as 40–50 cm in the original description, but now to 270 cm at maturity, leaves 10–25 cm long, 6–8 cm wide in the original description, but 15–45 cm long, 8–14 cm at maturity. Kalanchoe humifica appears to be variable in size according to its maturity.

Kalanchoe humifica has a chromosome number of 2n = 34. This is the first chromosome count to be determined for this species. All the somatic metaphase chromosomes were less than 1 μm in length (Fig. 3). Species of Kalanchoe comprise a series of polyploids ranging from 2n = ca. 25, 34, 36, 38(?), 68, 72, 102, 126–135, ca. 140, 155–165, to 170 (Friedmann 1971, Voorst and Arends 1982, Raadts 1983, 1985, 1989, Rabakonandriana and Carr 1987, Morton 1993). Among the numbers, Raadts (1983, 1985, 1989) reported chromosome numbers for 23 species and four varieties from east Africa as 2n = 34, 68, and 102, excluding approximate numbers; they might be diploid, tetraploid, and hexaploid with a basic chromosome number of x = 17. On the other hand, Friedmann (1971) counted chromosome numbers in 23 species from Madagascar, and reported 2n = 34, 36, 38(?), 68, 72, and ca. 140; they were considered to be two polyploid series with basic chromosome numbers of x = 17 and 18. The chromosome number of K. humifica, 2n = 34, may be diploid, with a basic chromosome number of x = 17.
Fig. 2. *Kalanchoe humifica* Desc. A. Leaf. B. Inflorescence. C. Bulbil. D. Inside view of cut open calyx. E. Inside view of cut open corolla, with eight stamens. F. Pistils, with nectary glands at base. G. Juvenile from bulbil. Bar = 3 cm for A, B, 5 mm for C–F, 1 cm for G.
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References

Fig. 3. Pollen and chromosomes of Kalanchoe humifica. A–C. pollen grains. A, B. Equatorial view. C. Ornamentation. D. Somatic metaphase chromosomes (2n = 34). Bar = 10 μm for A, B, 1 μm for C, 5 μm for D.
宮田一範a, 池田 博b, 藤木利之c, 大場秀章b: ベンケイソウ科リュウキュウベンケイ属 Kalanchoe humifica の花形態を含めた追加記載と染色体数

Kalanchoe humifica Desc. は、2005年に記載されたベンケイソウ科リュウキュウベンケイ属の植物であるが、記載時には花が知られていなかったため、栄養体の形質のみで新種として記載された。以来、この種が花をつけたという報告はなかったが、筆者の一人宮田が2009年にこの種の苗を購入し栽培したところ、2015年3月に開花した。そこで、K. humificaについて、花の形態を中心とした追加的記載を行った。また、K. humificaの染色体数は2n = 34であることが初めて明らかにされ、x = 17を染色体基本数とする2倍体であると考えられた。

（a伊豆シャボテン公園,
b東京大学総合研究博物館,
冈山理科大学理学部基礎理学科）