

## 浙江含笑属一新种——尾叶含笑

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**摘要:** 该文报道了采自中国浙江庆元县百山祖国家级自然保护区木兰科含笑属一新种——尾叶含笑 (*Michelia caudata* M. X. Wu, X. H. Wu & G. Y. Li), 该种与野含笑 (*M. skinneriana*) 和紫花含笑 (*M. crassipes*) 相近, 但与野含笑的区别在于叶片倒卵形至倒卵状椭圆形, 叶背面密被黄褐色茸毛, 长 5~7.5 cm, 宽 2.5~3.2 cm, 先端尾尖, 侧脉每边约 6 对, 花被片椭圆形; 与紫花含笑的区别在于花被片淡黄色, 雌蕊群柄长 3~4 mm。根据国际自然及自然资源保护联盟 (IUCN) 红色名录分类标准, 尾叶含笑濒危等级为极度濒危。

**关键词:** 尾叶含笑; 木兰科; 新种; 浙江

**中图分类号:** Q949.747.1 **文献标志码:** A

### A New Species of *Michelia* (Magnoliaceae) from Zhejiang

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**Abstract:** *Michelia caudata* M. X. Wu, X. H. Wu & G. Y. Li (Magnoliaceae), collected from the Baishanzu Nature Reserve in Qingyuan County, Zhejiang Province, China, is described and illustrated. This new species is similar to *M. skinneriana* Dunn and *M. crassipes* Law, but differs from the former in its leaves obovate to obovate-oblong, abaxial with dense fulvous villous, 5–7.5 × 2.5–3.2 cm broad, apex caudate, vein ca. 6 on each side; tepals oblong. It also differs from the later in its flowers pale yellow, gynophore 3–4 mm long. *M. caudata* is classified as Critically Endangered based on the IUCN Red List criteria.

**Key words:** *Michelia caudata*; Magnoliaceae; new species; Zhejiang

The genus *Michelia* L., (Magnoliaceae) is a large genus in the family Magnoliaceae with about 80 species. It occurs in Southeast Asia from India and Sri Lanka eastwards to South Japan and South China and southeastwards to Indonesia<sup>[1-5]</sup>. There are 41 species of *Michelia* recorded from China<sup>[4]</sup>, recently a mass of new species reported<sup>[6-15]</sup>. Up to 2004, there are 70 species in China<sup>[5]</sup>, and this country is considered the centre of modern distribution and diversity of the genus<sup>[1,4,16]</sup>.

Recently, Nooteboom considers the Magnoliaceae to include two monogeneric subfamilies, with Magnolioideae containing the genus *Magnolia* and Liriodendroideae containing the genus *Liriodendron*. The reduction of the former genera of Magnolioideae to a single genus is based on DNA analysis<sup>[17-19]</sup> and morphology<sup>[20]</sup> data. In the present, Nooteboom's new classification of Magnoliaceae is much controversial, so in this article we still follow Law's classification<sup>[1]</sup>.

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During a botanical survey on the Baishanzu Nature Reserve in Qingyuan County, Zhejiang, China in September 2010, a *Michelia* species growing in a valley, ca 460 m a. s. l. caught our attention. At the first glance this species was indeed somewhat similar to *M. skinneriana* Dunn. Upon a closer examination, however, we found that the plant in question differs markedly from *M. skinneriana* Dunn. by having leaves obovate to obovate-oblong, leaves abaxial with dense fulvous villous, apex caudate, vein ca. 6 on each side. After making a botanical expedition in May 2011 to Baishanzu Nature Reserve again, observing the plant in the field, checking specimens of *Michelia* in the ZJFC and HHBG herbarium and consulting relevant floras and other literature<sup>[21-23]</sup>, we are convinced that the plant represents a hitherto undescribed species, which is here described and illustrated.

## 1 *Michelia caudata* M. X. Wu, X. H. Wu & G. Y. Li sp. nov. (Fig. 1, 2)

Haec species *Michelia skinneriana* Dunn similis, sed a hoc suffruticibus vel arboibus, foliis obovatis vel obovati-ellipticis, 5–7.5 × 2.5–3.2 cm, foliis abaxialibus dense flavo-brunneis villosis, apicibus caudatis, lateralibus venis ca. 6 paribus; petiolis haud stipulatis; perianthis ellipticis distinguatur.

TYPE: China. Zhejiang: Qingyuan County, Songyuan Town, Jiaokeng Village, Guanmenao conservation area, 400–600 m a. s. l., grows in evergreen broad-leaved forests, ravines, 460 m a. s. l., 12. iv. 2010, Ye Qingjiao & Wu Xiahua 1096 (holotype, ZJFC).

PARATYPE: China. Zhejiang: Qingyuan County, Songyuan Town, Jiaokeng Village, 460 m a. s. l., 26. ix. 2010, Ma Dandan, Li Genyou & Wu Mingxiang QY20100922 (ZJFC).

Evergreen shrubs or small trees, up to 6.0 m tall. Bark grayish white, old branches dark brown with a little villous, young twigs brown with densely fulvous villus. Leaf blade leathery, obovate to obovate-oblong, 5–7.5 cm long, 2.5–3.2 cm broad, upper surface glabrous, lower surface with

dense fulvous villous, midvein depressed and with fewness villus on upper surface and prominent and with dense fulvous villus (especially at base) on down surfaces, secondary veins ca. 6 on each side of midvein, reticulate veins prominent on both surfaces when dry, base cuneate, apex caudate. Petiole 3–4 mm long, stipular scar almost reaching petiole apex. Peduncle ca. 7–9 mm long, with dense fulvous villous. Flowers erect, fragrant. Tepals 6, pale yellow, elliptic, 1.3–1.7 × 0.6–0.9 cm. Stamens ca. 40, ca. 8 mm long, anther ca. 5 mm long, connective exerted into a ca. 0.2 mm mucro; Filaments yellow, slender, ca. 3 mm long. Gynophore 3–4 mm long, with dense fulvous villus; gynoecium ca. 20, ca. 8 mm long; carpels with dense fulvous villus. Fruit usually curved or shortened due to carpels partly undeveloped; mature carpels globose to ellipsoid, 1–1.5 cm long with beak mucronate, dehiscent. Seeds usually 1 per carpel, fleshy aril orange-red.

## 2 Distribution and habitat

*M. caudata* is endemic to southern Zhejiang, one of the core areas of the National Nature Reserve of the Baishanzu in Eastern China, which is well-known for its very rich flora and high endemism of seed plants. So far, this species is known only from the Baishanzu Nature Reserve, where it grows at 400–600 m a. s. l. in evergreen broad-leaved forests in valley, together with *Castanopsis fargesii*, *C. fordii*, *Machilus velutina*, *Cunninghamia lanceolata*, *Lindera aggregata*, *Phyllostachys edulis*, *M. skinneriana*, *M. foveolata* var. *cinerascens*, *Schima superba*, *Eurya muricata*, *E. loquaiana*, *E. rubiginosa* var. *attenuata*, *Camellia brevistyla*, *C. sinensis*, *Euscaphis japonica*, *Dalbergia hupeana*, *Ilex chinensis*, *I. pubescens*, *Elaeocarpus japonicus*, *Vaccinium mandarinorum*, *Ardisia brevicaulis*, *Rhododendron simsii*, *R. championiae*, *Gardenia jasminoides*, *Loropetalum chinense*, *Symplocos lancifolia*, *Rubus corchorifolius*, *Diplospora dubia*, *Melastoma dodecandrum*, *Miscanthus sinensis*, *Lophatherum gracile*, *Liparis pauliana*, *Pogonatherum crinitum*, *Dicranopteris pedata*, *Woodwardia japonica*, *Spheno-*

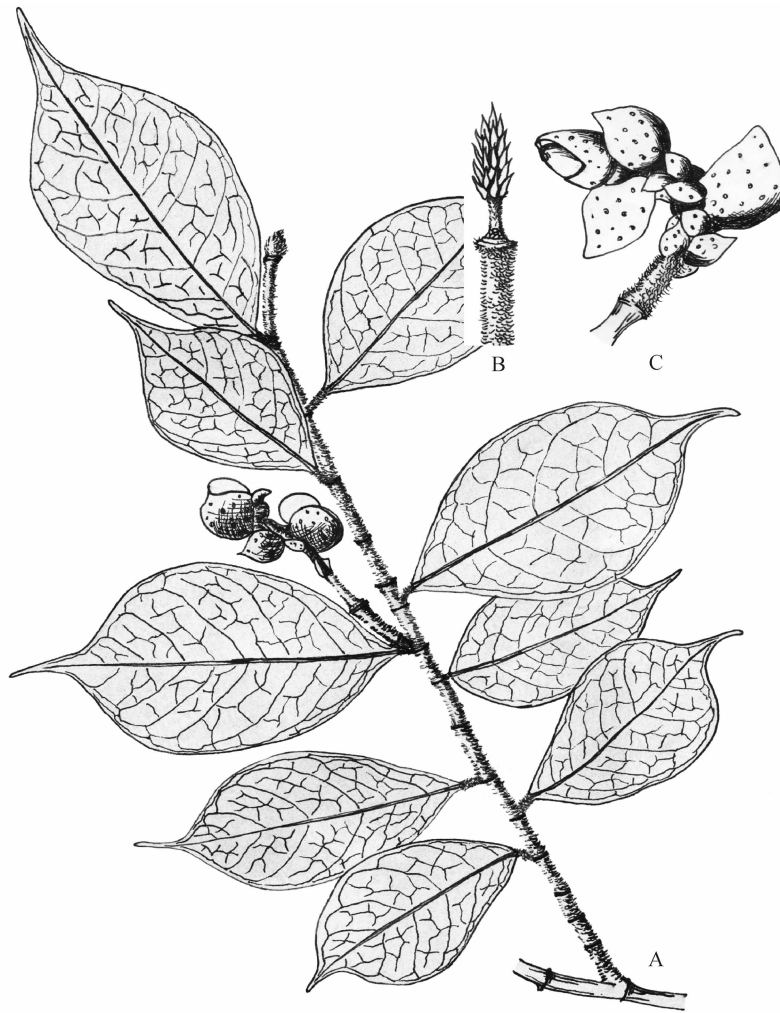


Fig. 1 *M. caudata* M. X. Wu, X. H. Wu & G. Y. Li sp. nov.

A. Fruit branch; B. Peduncle, gynophore and gynoecium; C. Fruit. Drawn by Dan-dan Ma

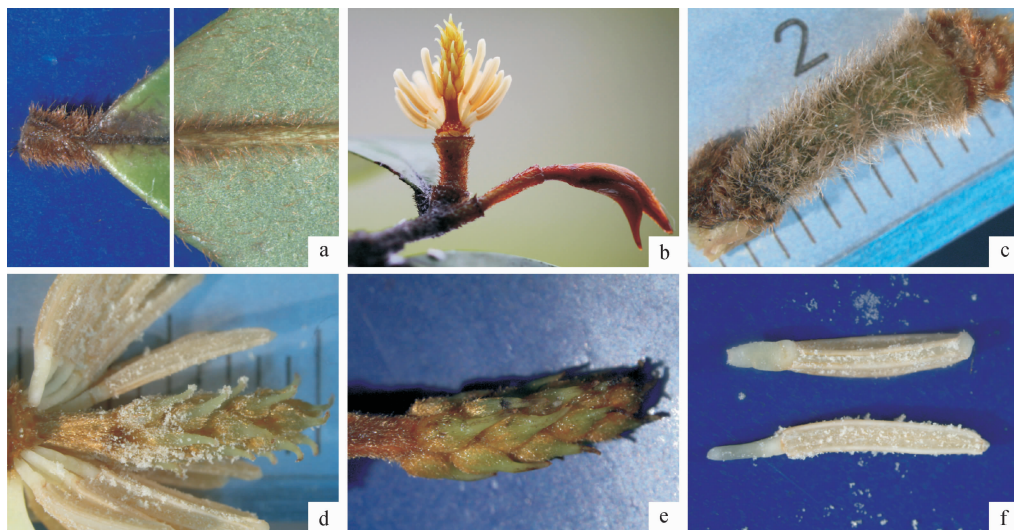


Fig. 2 *M. caudata* M. X. Wu, X. H. Wu & G. Y. Li sp. nov.

a. Villus leaf (details of adaxial and abaxial sides); b. Flower without tepals; c. Pedicel;  
d. Stamens, gynophore and gynoecium; e. Gynoecium; f. Stamens

*meris chinensis*, *Trachelospermum jasminoides*, *Smilax glabra*, et al.

### 3 IUCN Red List category

The populations of *M. caudata* we found covers only an area of about 1 km<sup>2</sup> and has approximately 200 individuals. According to the IUCN red list categories and criteria (IUCN 2001), this species should be categorized as ‘Critically Endangered’ (CR). Fortunately, the type locality is not easily accessible and very sparsely populated because modern transportation means are not yet available from the County of Qingyuan.

### 4 Similar species

*M. caudata* (Table 1) is similar to *M. skinneriana* and *M. figo*, but differs from the former in its leaves obovate to obovate-oblong [vs. narrowly

obovate-elliptic, oblanceolate, or narrowly elliptic), 5–7.5 × 2.5–3.2 cm (vs. 5–11(–14) × 1.5–3.5(–4) cm], abaxially dense fulvous villus (sparsely brown villous), apex caudate (vs. long caudate-acuminate), secondary veins ca. 6 on each side of midvein (vs. 10–13), out tepals glabrous (vs. with brown trichomes at base), connective exerted into a ca. 0.2 mm mucro (vs. 0.5 cm). And *M. figo* is distinguished by its leaves narrowly elliptic to obovate-elliptic, abaxially midvein with brown appressed trichomes but other parts glabrescent, apex obtusely acute, tepals pale yellow but margin sometimes red to purple, gynoeceum glabrous. The new species is also similar to *M. crassipes*, but differs in its leaves lower surface with dense fulvous villous, flowers pale yellow, gynophore 3–4 mm long.

**Table 1 Morphological differences between *M. caudata* sp. nov. and related species**

Character	<i>M. caudata</i>	<i>M. skinneriana</i>	<i>M. figo</i>	<i>M. crassipes</i>
Leaves	Obovate to obovate-oblong, 5–7.5 × 2.5–3.2 cm, abaxially dense fulvous villus, adaxially green and laevis, apex caudate	Narrowly obovate-elliptic, oblanceolate, or narrowly elliptic, 5–11(–14) × 1.5–3.5(–4) cm, abaxially sparsely brown villous, adaxially dark green and glossy, apex long caudate-acuminate	Narrowly elliptic to obovate-elliptic, 4–10 × 1.8–4.5 cm, abaxially midvein with brown appressed trichomes but other parts glabrescent, adaxially glossy and glabrous, apex obtusely acute	Narrowly oblong, obovate to narrowly obovate, 7–13 × 2.5–4 cm, abaxially green and villous along veins, adaxially dark green and glabrous, apex long caudate cuspidate to acute
Secondary veins	ca. 6 on each side of midvein	10–13 on each side of midvein	ca. 6 on each side of midvein	8–10 on each side of midvein
Petiole	3–4 mm long, stipular scar almost reaching petiole apex	2–4 mm, stipular scars as long as petiole	2–4 mm, stipular scar reaching petiole apex	2–4 mm, stipular scars as long as petiole
Flowers	Tepals 6, pale yellow, elliptic, 1.3–1.7 cm long, 0.6–0.9 cm broad, outer tepals glabrous	Tepals 6, pale yellow, obovate, 1.6–2 cm; outer tepals with brown trichomes at base	Tepals 6, pale yellow but margin sometimes red to purple, long elliptic, 1.2–2 × 0.6–1.1 cm	Tepals 6, purplish red to dark purple, long elliptic, 1.8–2 × 0.6–0.8 cm.
Stamens	ca. 8 mm long, connective exerted into a ca. 0.2 mm mucro; anther ca. 5 mm	6–10 mm; connective exerted into a ca. 0.5 mm mucro; anthers 4–5 mm	7–8 mm; connective exerted and forming a sharp tip	ca. 1 cm; connective exerted into a short tip; anthers ca. 6 mm
Gynophore	3–4 mm, with dense fulvous villus	4–7 mm, with dense brown trichomes	ca. 6 mm, with pale yellow tomentose	ca. 2 mm
Gynoeceum	ca. 8 mm; carpels with dense fulvous villus	ca. 6 mm; carpels with dense brown trichomes	ca. 7 mm, exceeding androecium, glabrous	ca. 8 mm, not exceeding androecium, densely pilose

### Key to *Michelia* in Zhejiang

- 1a. Stipules adnate to petiole, leaving stipular scar on petiole.
  - 2a. Petiole longer, often exceeding 5 mm; tepals 9 or more, in 3 or more whorls.
    - 3a. Stipular scar nearly reaching middle of petiole; tepals white ..... **1. *M. alba***
    - 3b. Stipular scar as long as petiole; tepals yellow ..... **2. *M. champaca***
  - 2b. Petiole shorter, usually not exceeding 5 mm; tepals 6, in 2 whorls.
    - 4a. Gynoeceum glabrous ..... **3. *M. figo***
    - 4b. Gynoeceum with trichomes or pilose.
      - 5a. Tepals purplish red to dark purple; gynoeceum not exceeding androecium, densely pilose ..... **4. *M. crassipes***
      - 5b. Tepals pale yellow; gynoeceum exceeding androecium, densely pilose.
        - 6a. Leaf blade apex caudate, secondary veins ca. 6 on each side of midvein; gynophore 3–4 mm, with dense fulvous villus ..... **5. *M. caudata***

- 6b. Leaf blade apex long caudate-acuminate, secondary veins ca. 10–13 on each side of midvein; gynophore 4–7 mm, with dense brown trichomes ..... **6. *M. skinneriana***
- 1b. Stipules free from petiole, no stipular scar on petiole.
- 7a. Young twigs, buds, leaf blade abaxial surfaces glabrous.
- 8a. Leaf blade abaxial surfaces with white powdery; tepals 9, white, ca. 5–7×3.5–4 cm ..... **7. *M. maudiae***
- 8b. Leaf blade abaxial surfaces without powdery; tepals 6, pale yellow, ca. 3×1.5 cm ..... **8. *M. chapensis***
- 7b. Young twigs, buds, leaf blade abaxial surfaces with trichomes.
- 9a. Leaf blade abaxial surfaces with reddish brown or silvery gray tomentose, tepals pale yellowish green, outer 6–7 cm long; gynophore 1.7–2 cm ..... **9. *M. foveolata***
- 9b. Leaf blade abaxial surfaces with densely brown pubescent or golden yellow villous, tepals white, outer ca. 3 cm long; gynophore ca. 8 mm ..... **10. *M. elegans***

### References:

- [1] LAW Y H. A preliminary study on the taxonomy of the family Magnoliaceae[J]. *Acta Phytotaxonomica Sinica*, 1984, **22**(2): 89–109.
- [2] NOOTEBOOM H P. Notes on Magnoliaceae[J]. *Blumea*, 1985, 31: 65–121.
- [3] CHEN B L, NOOTEBOOM H P. Notes on Magnoliaceae III [J]. *The Magnoliaceae of China*. Ann. Miss. Bot. Gard, 1993, 80: 999–1 104.
- [4] LAW Y H. *Michelia* [M]//LAW Y H. *Flora Republicae Popularis Sinicae*. Beijing: Sci. Press, 1996: 151–191.
- [5] LAW Y H. *Magnolias of China* [M]. Beijing: Beijing Sci. & Technol. Press, 2004.
- [6] CHEN B L. Four new species of *Michelia* from Yunnan, China [J]. *Acta Scientiarum Naturalium Universitatis Sunyatseni*, 1987, 3: 86–91.
- [7] LAW Y W, WU Y F. Two new species of *Michelia* [J]. *Bull. Bot. Res.*, 1988, **8**(3): 71–75.
- [8] CHEN B L. A new species of *Michelia* from Jiangxi [J]. *Acta Scientiarum Naturalium Universitatis Sunyatseni*, 1992, **31**(1): 77–78.
- [9] ZHOU S B, ZHANG D C. A new species of the genus *Michelia* L. (Magnoliaceae) from China [J]. *Bulletin of Botanical Research*, 2002, **22**(2): 129–130.
- [10] MA Q X, ZENG Q W, ZHOU R Z, *et al.* *Michelia xinningia* (Magnoliaceae)—a new species from China [J]. *Pak. J. Bot.*, 2005, **36**(4): 37–39.
- [11] WANG F G, ZENG Q W, ZHOU R Z, *et al.* *Michelia rubriflora*, a new species of Magnoliaceae from Hainan Island, China [J]. *Pak. J. Bot.*, 2005, **37**(3): 559–562.
- [12] JIAN S G, ZHOU R Z, CHEN H F. *Michelia multitepala* (Magnoliaceae), a new species from Yunnan, China [J]. *Ann. Bot. Fennici*, 2007, 44: 65–67.
- [13] SIMA Y K, HU H, CHEN W H, *et al.* *Magnolia glaucophylla*, a new species of Magnoliaceae from SE Yunnan, China [J]. *Bulletin of Botanical Research*, 2007, **27**(3): 257–259.
- [14] YI Q F, ZHOU R Z, ZENG Q W, *et al.* *Michelia viridipetala* sp. nov. (Magnoliaceae) from Yunnan, China [J]. *Nordic Journal of Botany*, 2008, 26: 338–343.
- [15] HONG J, LIU E D. *Michelia concinna* (Magnoliaceae), a new species from SE Yunnan, China [J]. *Ann. Bot. Fennici*, 2008, 45: 209–292.
- [16] LAW Y H. Studies on the Systematic Classification of Magnoliaceae [M]//LAW Y H, FAN H M, CHEN Z Y. *Proceedings of the International Symposium on the Family Magnoliaceae*. Beijing: Sci. Press, 2000: 3–13.
- [17] KIM S, PARK C W, KIM Y D, *et al.* Phylogenetic relationships in family Magnoliaceae inferred from ndhF sequences [J]. *American Journal of Botany*, 2001, 88: 717–728.
- [18] AZUMA H, THIEN L B, KAWANO S. Molecular phylogeny of *Magnolia* (Magnoliaceae) inferred from cpDNA sequences and evolutionary divergence of the floral scents [J]. *Journal of Plant Research*, 1999, 112: 291–306.
- [19] AZUMA H, GARCÍA-FRANCO J G, RICO-GRAY J G V, *et al.* Molecular phylogeny of the Magnoliaceae; the biogeography of tropical and temperate disjunctions [J]. *American Journal of Botany*, 2001, 88: 2 275–2 285.
- [20] FIGLAR R B, NOOTEBOOM H P. Notes on Magnoliaceae IV [J]. *Blumea*, 2004, 49: 87–100.
- [21] LIU M C. *Magnoliaceae* [M]//WANG J X. *Flora of Zhejiang Vol. 2*. Hangzhou: Zhejiang Science and Technology Publishing House, 1992.
- [22] ZHENG C Z. *Handbook for Plant Identification in Zhejiang* [M]. Hangzhou: Zhejiang Science and Technology Publishing House, 2005.
- [23] XIA N H, LIU Y H, NOOTEBOOM H P. *Magnoliaceae* [M]//WU Z Y, RAVEN R H. *Flora of China*, Vol. 7. Sci. Press, Beijing & Missouri Bot. Garden Press, St. Louis, 2008: 48–91.