

## The identity of *Magnolia odoratissima* (Magnoliaceae) from China

Shugang CHEN<sup>1,2,\*</sup>, Qingwen ZENG<sup>1</sup>

<sup>1</sup>Key Laboratory of Plant Resources Conservation and Sustainable Utilization, South China Botanical Garden, Chinese Academy of Sciences, Guangzhou, PR China

<sup>2</sup>University of Chinese Academy of Sciences, Beijing, PR China

Received: 17.09.2012 • Accepted: 22.01.2013 • Published Online: 02.07.2013 • Printed: 02.08.2013

**Abstract:** The type specimen of *Magnolia odoratissima* Y.W.Law & R.Z.Zhou (Magnoliaceae) conflicts with the protologue and belongs to the genus *Parakmeria* Hu & W.C.Cheng. A new name, *Magnolia kwangnanensis* S.G.Chen & Q.W.Zeng sp. nov., and a new type are designated to accommodate the original description. Here we provide new data and a detailed morphological description for this species. Notes are also presented on its habitat, pollen morphology, and conservation status.

**Key words:** *Magnolia*, Magnoliaceae, taxonomy, new species, China

### 1. Introduction

The name *Magnolia odoratissima* Y.W.Law & R.Z.Zhou (Law & Zhou, 1986; Law, 1996, 2004; Zhang, 2004; Law & Xia, 2006; Cicuzza et al., 2007) is currently in use for a species of Magnoliaceae distributed in Guangnan County, in southeastern Yunnan Province, China. It is endemic to China and has been listed in the Grade II protected plants in the *National Key Protected Wild Plants List* (approved by the State Council of China, 1999). Chen and Nooteboom (1993) treated it as a synonym of *Magnolia championii* Benth. In contrast, Xia and Deng (2002) recognised this species in a revision of Magnoliaceae, and excluded the specimen C.F.Weï & D.Chen 123226 (shown to be *Magnolia championii*), which was collected from Guangdong Province and cited in the protologue. Recently, one study (Nie et al., 2008) suggested that it was closely related to *M. coco* (Lour.) DC. based on nuclear data sets (PHYA, LFY, and GAI1). However, the type specimen cited in the protologue (China, Yunnan Province, Guangnan County, alt. 1100 m, 10.05.1984, R.Z.Zhou 54 [IBSC]) (Figure 1) clearly conflicts with the protologue and the illustration. It is obviously referable to *Parakmeria yunnanensis* Hu. The locality and date of the holotype in the original paper do not agree with those of the gathering record on the sheet, which states "China, Yunnan Province, Xichou County, Fadou Township, alt. 1400 m, 14.10.1984". Furthermore, its determination slip reads "*Parakmeria yunnanensis* Hu", written by Law. After examining all specimens of *Magnolia odoratissima* in IBSC, we found another 3

gatherings: Z.Q.Liu 8405, R.Z.Zhou 58, and L.W.Chen 2, which were collected before April 1986 when Law and Zhou published the name, and which agree perfectly with Law and Zhou's protologue and illustration. In particular, the specimen R.Z.Zhou 58 (China, Yunnan Province, Guangnan County) collected by the same collector was marked with the word "type" on the determination slip of one sheet by Y.W.Law and Y.F.Wu. This suggests that Law and Zhou (1986) were clearly describing a species of *Magnolia* L. based on R.Z.Zhou 58, but they had mistakenly cited an incorrect collection number (R.Z.Zhou 54), which belongs to the genus *Parakmeria* Hu & W.C.Cheng. In fact, the collection information of these 2 gatherings is nearly the same except for the collection number and the date. According to Art. 9.1, Note 1 in the *International Code of Botanical Nomenclature* (McNeill et al., 2006), "any designation made by the original author, if definitely expressed at the time of original publication of the name of the taxon, is final"; we have no choice but to accept the type designation in the protologue. Thus, *Magnolia odoratissima* will now become a taxonomic synonym of *Parakmeria yunnanensis*. The species hitherto known as *M. odoratissima* requires a new name and a new type and is described herein as a new species, *Magnolia kwangnanensis* S.G.Chen & Q.W.Zeng.

### 2. Materials and methods

A detailed morphological study of wild living plants of *Magnolia kwangnanensis* as well as herbarium specimens

\* Correspondence: chensg@scbg.ac.cn



Figure 1. *Magnolia odoratissima* Y.W.Law & R.Z.Zhou (holotype).



Figure 2. *Magnolia kwangnanensis* (holotype).

was undertaken. Morphological studies included both qualitative and quantitative features of leaves, flowers, fruits, and seeds, as have been described in detail for other related groups in the Magnoliaceae by Law (2004). Herbarium specimens were checked in the following herbaria: HAST, HIB, HITBC, HNWP, IBK, IBSC, IFP, KUN, LBG, NAS, PE, TAI, TAIF, and WUK. For scanning electron microscopy (SEM) observation, fresh pollen was dispersed on stubs directly after being collected, gold-coated in a JFC-1600 Auto Fine Coater, and observed under a JEOL JSM-6360LV Scanning Electron Microscope at 25 kV in South China Botanical Garden, Chinese Academy of Sciences. The descriptive terminology of Punt et al. (2007) was followed. Authors of cited taxa follow Brummitt and Powell (1992).

### 3. Results and discussion

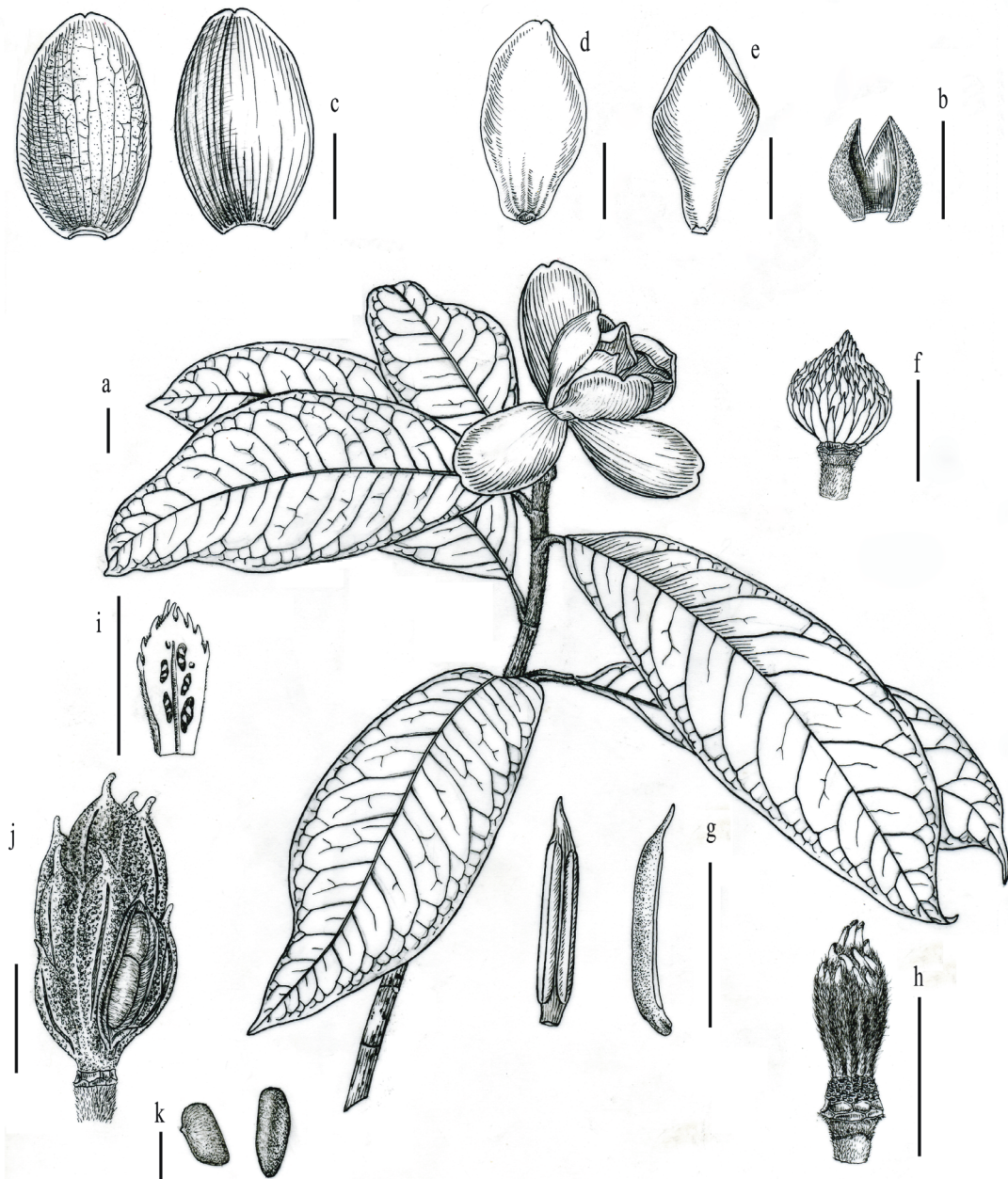
***Magnolia kwangnanensis* S.G.Chen & Q.W.Zeng sp. nov.** (Figures 2–3)

**Type:** China. Yunnan Province: Guangan County, Zhuanjiao Township (Chongtian District), in limestone mountains, alt. 1100 m, 23.10.1984, R.Z.Zhou 58 (holotype: IBSC; isotype: IBSC, K, KUN).

**Diagnosis:** *Magnolia kwangnanensis* is closely related to *M. coco*. It mainly differs from *M. coco* in that it has buds,

twigs, petioles, and pedicels densely yellowish pubescent (vs. glabrous); flower buds ovoid, 3–5 × 2–3 cm (vs. globose, 1.5–2 × 1.5–2 cm); pedicels erect, 1–3 × 0.5–0.75 cm, with 2 bract scars (vs. pendulous, 1.5–2.5 × 0.3–0.5 cm, with 3–4 bract scars); outer tepals creamy white, abaxially yellowish holosericeous near base (vs. greenish, glabrous); stamens 1.4–1.8 cm long (vs. 0.4–0.6 cm long); gynoecia ellipsoid, 2–2.5 × 0.8–1 cm, densely yellowish sericeous (vs. ovoid, 1.5–2 × 0.7–1 cm, green, densely papillose); carpels 21–26 (vs. 8–12) (Table).

**Description:** Evergreen trees or small trees, to 10 m tall; trunk to 30 cm dbh; bark dim grey, conspicuously lenticellate; young twigs green, old ones brown; buds, twigs, petioles, and pedicels densely yellowish pubescent. Leaves alternate; petioles 1.5–3.5 cm long, stipular scars almost reaching the apex of the petioles; leaf blade elliptic, oval or oblong, 10–33 × 4–11.5 cm, leathery, apex acuminate or short-acute, base cuneate or broadly cuneate, adaxially dark green and glabrous, abaxially pale green and white tomentulose, later glabrescent; midribs and lateral veins slightly impressed adaxially and elevated abaxially, reticulate veins elevated on both surfaces, lateral



**Figure 3.** *Magnolia kwangnanensis*. a- flowering twig, b- bract, c- outer tepals, d- mid tepal, e- inner tepal, f- androecium and gynoecium, g- stamens, h- gynoecium, i- longitudinal section of gynoecium, j- fruit, k- seeds. Scale bars: a-f, h-i = 2 cm; g and k = 1 cm.

veins 15–27 on each side, joining near leaf margin. Flowers bisexual, very fragrant, solitary, and terminal; flower buds ovoid, green, 3–5 × 2–3 cm; pedicels 1–3 × 0.5–0.75 cm, with 2 annular bract scars; tepals 9(–10), creamy white, fleshy, concave, outer 3 thinner, oval or oblong, often retuse at apex, 5–6(–7) × 2.5–3.6 cm, with ca. 7 longitudinal veins, abaxially yellowish holosericeous near base, mid 3 obovate, often retuse at apex, 4.5–6(–7) × 2.5–3.6(–4) cm, inner 3(–4) obovate-spathulate, 4.5–5.5(–6.5) × 2–3(–3.6)

cm; stamens (85–)130–240, creamy white, 1.4–1.8 cm long, anthers 1–1.2 cm long, introrsely dehiscent, filaments very short, ca. 0.2 cm long, connectives produced into triangular short appendages; gynoecia ellipsoid, 2–2.5 × 0.8–1 cm, densely yellowish sericeous; carpels 21–26, ovules 2 per carpel. Aggregate fruits green, ellipsoid, 5–6 × 2.5–3 cm; follicles dehiscent along dorsal sutures, with a reflexed beak at apex; seeds red, 0.9–1.7 × 0.6–0.8 cm.

Fl. 5–6 & 9–10; Fr. 9–10.

**Table.** Comparisons of morphological and pollen characters of *Magnolia kwangnanensis* and *M. coco*.

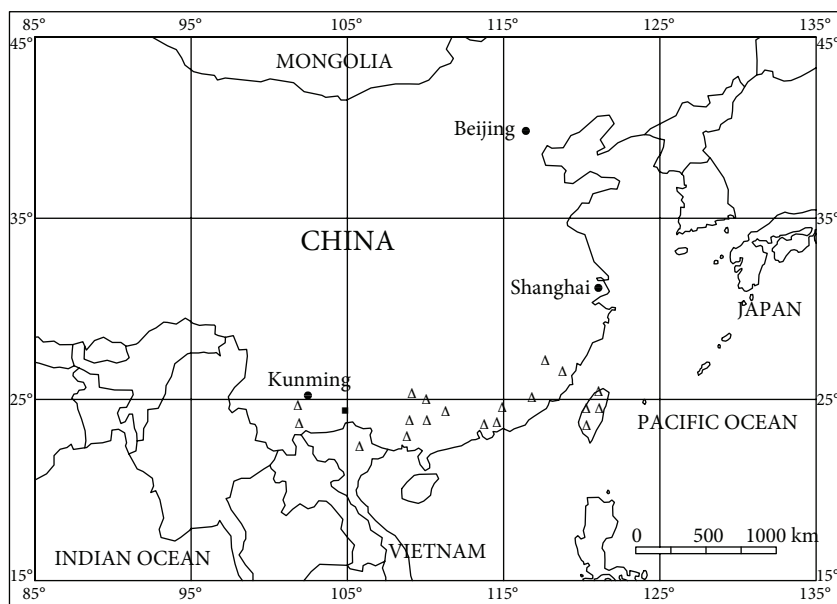
Characters	<i>Magnolia kwangnanensis</i>	<i>Magnolia coco</i>
Buds	densely yellowish pannose	glabrous
Twigs	densely yellowish pannose	glabrous
Leaves	elliptic, oval or oblong, 10–33 × 4–11.5 cm, adaxially glabrous, abaxially white tomentulose, later glabrescent	elliptic, narrowly elliptic or obovate-elliptic, 7–14 × 2–4.5 cm, glabrous on both surfaces
Petioles	densely yellowish pannose, 1.5–3.5 cm long	glabrous, 0.5–1 cm long
Flower buds	ovoid, 3–5 × 2–3 cm	globose, 1.5–2 × 1.5–2 cm
Pedicels	densely yellowish pannose, erect, 1–3 × 0.5–0.75 cm	glabrous, pendulous, 1.5–2.5 × 0.3–0.5 cm
Tepals	9(–10), outer 3 creamy white, abaxially yellowish holosericeous near base	9, outer 3 greenish, glabrous
Stamens	1.4–1.8 cm long	0.4–0.6 cm long
Gynoecia	ellipsoid, 2–2.5 × 0.8–1 cm, densely yellowish sericeous	ovoid, 1.5–2 × 0.7–1 cm, green, densely papillose
Carpels	21–26	8–12
Fruits	ellipsoid, 5–6 × 2.5–3 cm	ellipsoid, ca. 3 × 1.5 cm
Pollen shape	peroblate	oblate
Polar axis (μm)	35.82 ± 4.05	42.9
Equatorial axis (μm)	86.81 ± 5.94	64.4
P/E ratio	0.42 ± 0.06	0.67
Exine sculpture	densely foveolate, with a few granula	densely perforate-foveolate

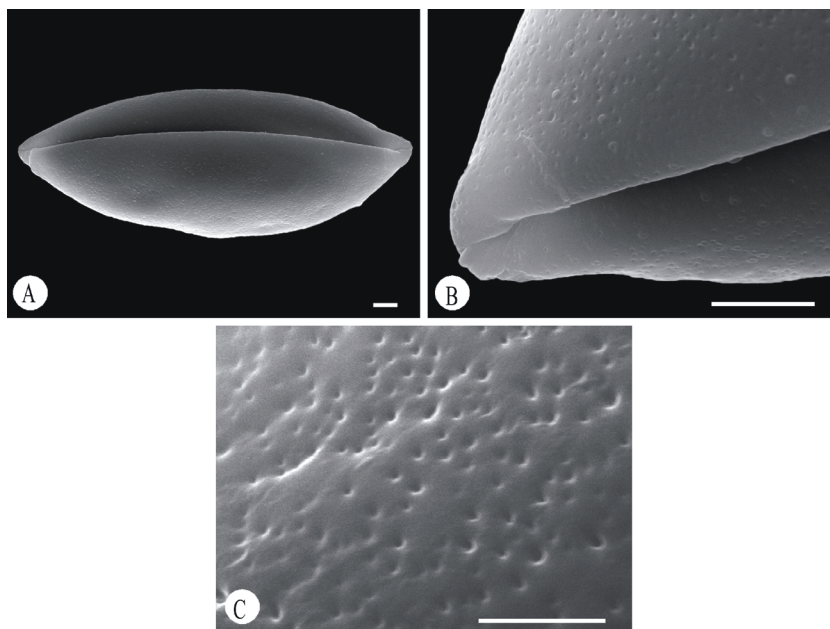
**Distribution and habitat:** *Magnolia kwangnanensis* is endemic to Guangan County, SE Yunnan Province, China (Figure 4). It grows in the limestone montane evergreen broad-leaved forests at alt. 1100–1500 m with other characteristic plants such as *Cyclobalanopsis glauca* (Thunb.) Oerst., *Litsea honghoensis* H.Liu, *Turpinia montana* (Blume) Kurz, *Symplocos sumuntia* Buch.-Ham. ex D.Don, *Rhamnus lamprophylla* C.K.Schneid., *Itea yunnanensis* Franch., *Symplocos paniculata* Miq.,

*Ternstroemia gymnanthera* (Wight & Arn.) Bedd., *Camellia kissii* Wall., *Eurya kweichowensis* P.T.Li, *Myrsine africana* L., and *Zanthoxylum calcicola* C.C.Huang.

**Etymology:** The specific epithet is derived from the type locality, Guangan County.

**Pollen morphology:** Pollen grains of *Magnolia kwangnanensis* are peroblate, bilaterally symmetrical, heteropolar, and monocolpate (Figure 5). The polar axis is 35.82 ± 4.05 μm, equatorial axis is 86.81 ± 5.94 μm, P/E

**Figure 4.** Known distribution of *Magnolia kwangnanensis* (■), and *M. coco* (Δ).



**Figure 5.** Scanning electron micrographs of pollen grains of *Magnolia kwangnanensis*. A: General view, B: Partial enlarged view, C: Exine sculpture. Scale bars: A and B = 5  $\mu$ m, C = 2  $\mu$ m.

ratio is  $0.42 \pm 0.06$ , exine sculpture is densely foveolate with a few granula; while in *M. coco* the polar axis is 42.9  $\mu$ m, equatorial axis is 64.4  $\mu$ m, P/E ratio is 0.67, exine sculpture is densely perforate-foveolate (Chen, 1985) (Table).

**Conservation status:** The assessment of conservation status of plant species is one of the most significant tools in establishing conservation strategies for the species involved (Işık, 2011; Kahraman et al., 2012). As *Magnolia kwangnanensis* is known only from a single location, with an estimated extent of occurrence of less than 100 km<sup>2</sup>, and the population is very small, it should be included in the IUCN category Critically Endangered (CR: B1ab [ii, v]) according to IUCN threat criteria (2001). Reproductive biology studies are very important to the further conservation of endangered plants (Melia et al., 2012), and *M. kwangnanensis* has been introduced to the Magnolia Garden of South China Botanical Garden to carry out the ex situ conservation of this species. In addition, it is an excellent landscape plant because of its handsome tree-shape, dense twigs and leaves, and large fragrant flowers.

## References

- Brummitt RK & Powell CE (eds.) (1992). *Authors of Plant Names*. Kew: Royal Botanic Gardens.
- Chen BL & Nooteboom HP (1993). Notes on Magnoliaceae III: The Magnoliaceae of China. *Annals of the Missouri Botanical Garden* 80: 999–1104.
- Chen BL (1985). Studies on *Magnolia coco* (Lour.) DC. *Acta Scientiarum Naturalium Universitatis Sunyatseni* 24: 84–90.

**Other representative specimens examined:** China. Yunnan Province: Guangan County, Zhuanjiao Township (Chongtian District), 04.05.1984, Z.Q.Liu 8405 (IBSC); without locality, Oct.1985, L.W.Chen 2 (IBSC); Guangan County, Heizhiguo Township, Sep.1986, Z.Q.Liu s.n. (IBSC); Guangan County, Zhuanjiao Township, Amiao Village, in the evergreen broad-leaved forests, 23°36'28"N, 104°55'24"E, alt. 1202 m, 14.09.2010, Q.W.Zeng & X.M.Hu 218 (IBSC).

## Acknowledgements

This work was supported by the National Natural Science Foundation of China (Grant No. 31070305 and 30871960), and the Science and Technology Project of Guangdong Province (Grant No. 2011B020302002). We thank Prof Yang Qiner for his advice on the taxonomic treatment. Liu Yunxiao is also thanked for her help with the drawings of the species.

- Cicuzza D, Newton A & Oldfield S (2007). *The Red List of Magnoliaceae*. Cambridge: Fauna & Flora International.
- Işık K (2011). Rare and endemic species: why are they prone to extinction? *Turkish Journal of Botany* 35: 411–417.
- IUCN (2001). *IUCN Red List Categories and Criteria: Version 3.1*. Gland and Cambridge: IUCN Species Survival Commission.

- Law YH & Xia NH (2006). Magnoliaceae. In: Chen SK & Wang H (eds.) *Flora Yunnanica*, Vol. 16, pp. 19. Beijing: Science Press.
- Law YH & Zhou RZ (1986). A new species of Magnoliaceae from Guangtung and Yunnan, China. *Bulletin of Botanical Research* 6: 139–142.
- Law YH (1996). Magnoliaceae. In: Law YH (ed.) *Flora Reipublicae Popularis Sinicae*, Vol. 30, pp. 115. Beijing: Science Press.
- Law YH (2004). *Magnolias of China*. Beijing: Beijing Science & Technology Press.
- McNeill J, Barrie FR, Burdet HM, Demoulin V, Hawksworth DL, Marhold K, Nicolson DH, Prado J, Silva PC, Skog JE, Wiersema JH & Turland NJ (eds.) (2006). *International Code of Botanical Nomenclature (Vienna Code)*. Ruggell: Gantner Verlag.
- Melia N, Gabedava L, Barblishvili T & Jgenti L (2012). Reproductive biology studies towards the conservation of two rare species of Colchic flora, *Arbutus andrachne* and *Osmanthus decorus*. *Turkish Journal of Botany* 36: 55–62.
- Nie ZL, Wen J, Azuma H, Qiu YL, Sun H, Meng Y, Sun WB & Zimmer EA (2008). Phylogenetic and biogeographic complexity of Magnoliaceae in the Northern Hemisphere inferred from three nuclear data sets. *Molecular Phylogenetics and Evolution* 48: 1027–1040.
- Kahraman A, Bagherpour S, Karabacak E, Doğan M, Doğan HM, Uysal İ & Celep F (2012). Reassessment of conservation status of the genus *Salvia* (Lamiaceae) in Turkey II. *Turkish Journal of Botany* 36: 103–124.
- Punt W, Hoen PP, Blackmore S, Nilsson S & Le Thomas A (2007). Glossary of pollen and spore terminology. *Review of Palaeobotany and Palynology* 143: 1–81.
- Xia NH & Deng YF (2002). Notes on Magnoliaceae. *Journal of Tropical and Subtropical Botany* 10:128–132.
- Zhang DX (2004). *Magnolia lawiana* Sima & H. Yu is a superfluous renaming of *M. odoratissima* Y. W. Law & R. Z. Zhou (Magnoliaceae). *Taxon* 53: 1063–1064.