

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/301620521>

# A New System for the Family Magnoliaceae

Chapter · January 2012

---

CITATION

1

READS

917

2 authors, including:



**Yong-Kang Sima**

Yunnan Academy of Forestry & Grassland Science (formerly Yunnan Academy of Forestry), Kunming, Yunnan, China

18 PUBLICATIONS 21 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



2) Taxonomical revision of the genera *Michelia* and *Manglietia* [View project](#)



A taxonomic revision of the genus *Lirianthe* Spach s.l. from China [View project](#)

# A New System for the Family Magnoliaceae

SIMA Yong-Kang<sup>1,2</sup>, and LU Shu-Gang<sup>1\*</sup>

1. Institute of Ecology and Geobotany, Yunnan University, Kunming 650091, China; 2. Yunnan Academy of Forestry; Yunnan Laboratory for Conservation of Rare, Endangered & Endemic Forest Plants, State Forestry Administration; Yunnan Provincial Key Laboratory for Cultivation And Exploitation of Forest Plants, Kunming 650204, China.

(\*Author for correspondence. E-mail: shuganglu@163.com)

**Abstract:** A new system for the family Magnoliaceae is proposed on the basis of the latest data on DNA and the observations of morphological characters especially in living plants. In the new system, a total of 2 subfamilies, 2 tribes and 15 genera are recognized, of which two genera are described as new. A key to the subdivision of the family and 52 new combinations are presented.

Key words: Magnoliaceae; *Paramagnolia*; *Metamagnolia*; New genus; New combination

## 1 Introduction

As it is well known, the family Magnoliaceae is one of the most primitive taxa in angiosperms (Wu *et al.* 2003). Southeastern Asia is very rich in species, but the greatest concentration of species and highest diversity occur in southern and southwestern China (Law 1984; Liu *et al.* 1995; Sima *et al.* 2001). Magnoliaceous plants are of great values in botanical studies; theoretically, they as the classic representative of primitive taxa are the key materials for the research of the origin and evolution of angiosperms, and for the reconstruction of the natural system of angiosperms; practically, they are the main components of evergreen broad-leaved forests and deciduous broad-leaved forests from tropical to temperate zones as well as famous trees for ornamental, timber, medicinal and perfume (Sima *et al.* 2001).

The taxonomic studies on the family Magnoliaceae (*sensu stricto*) has a long history; since the early part of 18th century many systems of the family have been published, of which, Dandy's system was followed by most later authors for about half a century and Law's system is very popular in China, but none of the systems at generic level were generally accepted. Not only the genus number but also the conception of the genera are quite different in different systems (de Candolle, 1817; Benth & Hooker, 1862; Baillon, 1866; Engler & Gilg, 1924; Dandy, 1927, 1964; Law, 1984; Nooteboom, 1985, 1993, 2000; Liu, 2000; Figlar & Nooteboom, 2004; Sima, 2005; Xia *et al.*, 2008; Sima & Lu, 2009). All present studies reveal that the generic delimitation and classification of the family Magnoliaceae are controversial, and further researches to reconstruct a more objective and natural system and solve evolutionary and phylogenetic problems in Magnoliaceae are necessary.

Based on the data on DNA (Chase *et al.* 1993; Jin *et al.* 1999; Azuma *et al.* 1999, 2001, 2004; Shi *et al.* 2000; Kim *et al.* 2001; Wang *et al.* 2006; Nie *et al.* 2008) and the observations of morphological characters especially in living plants (Fig. 1–2) (Tiffney 1977; Zhang *et al.* 1996; Li 1997; Figlar 2000; Xu *et al.* 2000; Sima *et al.* 2001; Xu & Wu 2002; Gong *et al.* 2003; Li & Conran 2003), the present authors proposed a new system for the family Magnoliaceae. In the new system, a total of 2

subfamilies, 2 tribes and 15 genera are recognized, of which two genera are described as new. Of course, it is a start to table a hypothesis on Magnoliaceae system. In the future, this system will be tested to determine whether the hypothesis is correct or incorrect with refining the knowledge of phylogenetic relationships in Magnoliaceae. It is believed that the day to solve the evolutionary and phylogenetic problems in Magnoliaceae is coming soon.

## 2 Taxonomical System

### 2.1 Morphological charaters

On the basis of taxonomic theories and evolutionary principles, the following morphological charaters are selected for taxonomy and their evolutionary tendency is presented.

1. Plants pubescent → glabrous;
2. Branching sympodial → monopodial;
3. Branches produced by syllepsis → by prolepsis;
4. Leaves evergreen → deciduous;
5. Young leaf blades in bud conduplicate → open;
6. Young leaves in bud erect → pendant;
7. Leaves on the branch arranged spirally → distichously;
8. Leaves at the base cuneate to rounded → cordate to auriculate;
9. Leaf blades unlobed → lobed;
10. Leaf margin thin and not sclerophyllous → thick and sclerophyllous;
11. Stipules adnate to → free from the petiole;
12. The type of leaf stomatal apparatus paracytic → anomocytic;
13. Mixed bud scales or bracts foliaceous → spathaceous;
14. Axillary buds in the mixed bud sprouted → never sprouted;
15. Floral branches by mixed bud after flowering or fruiting shed partly → completely;
16. Flowers bisexual → androdioecious → unisexual monoecious → unisexual dioecious;
17. Pseudophyllaries foliaceous → spathaceous;
18. Tepals less than 9 → 9 to more;
19. Big parasepals present → absent;
20. Tepals coloured only on the abaxial surface → on both surfaces;
21. Stamens caducous → persistent;
22. Anthers dehiscent introrsely (→ sublatrorsely to latrorsely) →extrorsely
23. Anther connective appendages shorter → longer than the anther cells;
24. Gynoecium sessile → stipitate;
25. Gynoecium in diameter 8 mm to more → less than 8 mm;
26. Mature carpels not samarioid →samarioid;
27. Fruits not spicate → spicate;
28. Mature carpels on torus sparse → dense → concrescent;
29. Mature carpels not follicular →follicular;
30. Mature carpels with a dorsal suture groove → without a dorsal suture groove;

31. Mature carpels without a dorsal suture ridge → with a dorsal suture ridge;
32. Mature carpels dehiscent along the dorsal and/or ventral suture → circumscissile → indehiscent;
33. Mature carpels not falling → falling off from fruit axis;
34. Mature fruit axes not split → split;
35. Placentation marginal → apical;
36. Ovules 2 to more → 2 in each carpel;
37. Testae free from → adnate to the endocarp;
38. The morphological character of chalazal region on endotesta of seed belongs to the pore type → the tube type.

## 2.2 Taxonomical system

### I. *Magnoliaceae* subfam. *Magnolioideae*

#### i. Tribe *Magnolieae*

1. *Manglietia* Blume
2. *Lirianthe* Spach
3. *Magnolia* L.
4. *Dugandiodendron* Lozano-Contreras
5. *Talauma* Juss.
6. *Houpoëa* N. H. Xia et C. Y. Wu
7. *Oyama* (Nakai) N. H. Xia et C. Y. Wu
8. *Kmeria* (Pierre) Dandy
9. *Pachylarnax* Dandy
10. *Paramagnolia* Sima et S. G. Lu
11. *Metamagnolia* Sima et S. G. Lu

#### ii. Tribe *Michelieae* Y. W. Law

12. *Aromadendron* Blume
13. *Yulania* Spach
14. *Michelia* L.

### II. *Magnoliaceae* subfam. *Liriodendroideae* (Nurk.) Y. W. Law

15. *Liriodendron* L.

## 2.3 Key to the subfamilies, tribes and genera of *Magnoliaceae*

- 1 (28) Leaf blades unlobed or rarely 2-lobed at the apex; anthers dehiscent introrsely or sublatrorsely to latrorsely; placentation marginal; mature carpels not samaroid, dehiscent; testae fleshy, free from the endocarp (I. Subfam. **Magnolioideae**).
- 2 (23) Fruits ovoid, ellipsoid or globose; mature carpels with a dorsal suture groove or ridge, not follicular even if not concrescent; branches produced only by syllepsis or rarely by prolepsis; stamens caducous or rarely persistent (i. Tribe **Magnolieae**).
- 3 (20) Leaves cuneate to rounded or rarely subcordate at the base, and arranged spirally or distichously on the branch, evergreen or deciduous.
- 4 (19) Plants with more or less trichomes; young leaf blades conduplicate in bud.
- 5 (18) Plants with bisexual flowers or rarely with bisexual and unisexual flowers; tepals 9 or 9 to more, the flowers with less than

- 9 tepals can be never seen.
- 6 (9) Ovules unconstant, 2 to more in each carpel.
- 7 (8) Pseudophyllaries foliaceous or rarely spathaceous and caducous; all mixed buds with spathaceous scales and foliaceous scales (normal leaves); leaf margin thin and not sclerophyllous ..... 1. *Manglietia*
- 8 (7) Pseudophyllaries spathaceous and caducous or rarely foliaceous; most mixed buds only with spathaceous scales or without foliaceous scales (normal leaves); leaf margin thick and sclerophyllous ..... 2. *Lirianthe*
- 9 (6) Ovules constant, 2 in each carpel.
- 10 (15) Plants evergreen.
- 11 (14) All mixed buds with spathaceous scales and foliaceous scales (normal leaves); pseudophyllaries foliaceous, persistent.
- 12 (13) Anther connective appendages not elongated, triangular or semicircular ..... 3. *Magnolia*
- 13 (12) Anther connective appendages elongated, bristlelike ..... 4. *Dugandiodendron*
- 14 (11) Most mixed buds only with spathaceous scales or without foliaceous scales (normal leaves); pseudophyllaries spathaceous, caducous ..... 5. *Talauma*
- 15 (10) Plants deciduous.
- 16 (17) Branches produced only by syllepsis; leaves arranged spirally on the branch; peduncles and pedicles robust, erect; stamens caducous ..... 6. *Houpoëa*
- 17 (16) Branches produced by prolepsis or rarely by prolepsis and syllepsis; leaves arranged distichously on the branch; peduncles and pedicles slender, pendent; stamens persistent ..... 7. *Oyama*
- 18 (5) Plants only with unisexual flowers; tepals 2 to 13, the flowers with less than 9 tepals can be seen ..... 8. *Kmeria*
- 19 (4) Plants entirely glabrous; young leaf blades open in bud ..... 9. *Pachylarnax*
- 20 (3) Leaves cordate to auriculate at the base, and arranged spirally on the branch, deciduous.
- 21 (22) Plants entirely glabrous; tepals coloured only on the abaxial surface, not blotched at the base of adaxial surface ..... 10. *Paramagnolia*
- 22 (21) Plants with more or less trichomes; tepals coloured on both surfaces, blotched at the base of adaxial surface ..... 11. *Metamagnolia*
- 23 (2) Fruits cylindrical, ovoid or globose; mature carpels without a dorsal suture groove or ridge, follicular when not concrescent; branches produced only by prolepsis or rarely by prolepsis and syllepsis; stamens persistent (ii. Tribe **Micheliaceae** Y. W. Law).
- 24 (27) All axillary buds or some upper axillary buds in mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting; branching sympodial and monopodial.
- 25 (26) Plants evergreen; peduncles slender, more than 2.5 cm long; Anthers dehiscent introrsely ..... 12. *Aromadendron*
- 26 (25) Plants deciduous; peduncles shorter, less than 2.0 cm long; Anthers dehiscent sublatrorsely to latrorsely ..... 13. *Yulania*
- 27 (24) All axillary buds in mixed bud undeveloped and not sprouted, or the basal axillary bud in mixed bud developed, sprouted and formed into a scorpioid cyme of 2 to 4 floral branches; all of the floral branches into which mixed buds formed shed after flowering or fruiting; branching only monopodial ..... 14. *Michelia*
- 28 (1) Leaf blades 4- to 10-lobed; anthers dehiscent extrorsely; placentation apical; mature carpels samaroid, indehiscent; testae thin and dry, adnate to the endocarp (II. subfam. **Liriodendroideae** (Nurk.) Y. W. Law) ..... 15. *Liriodendron*



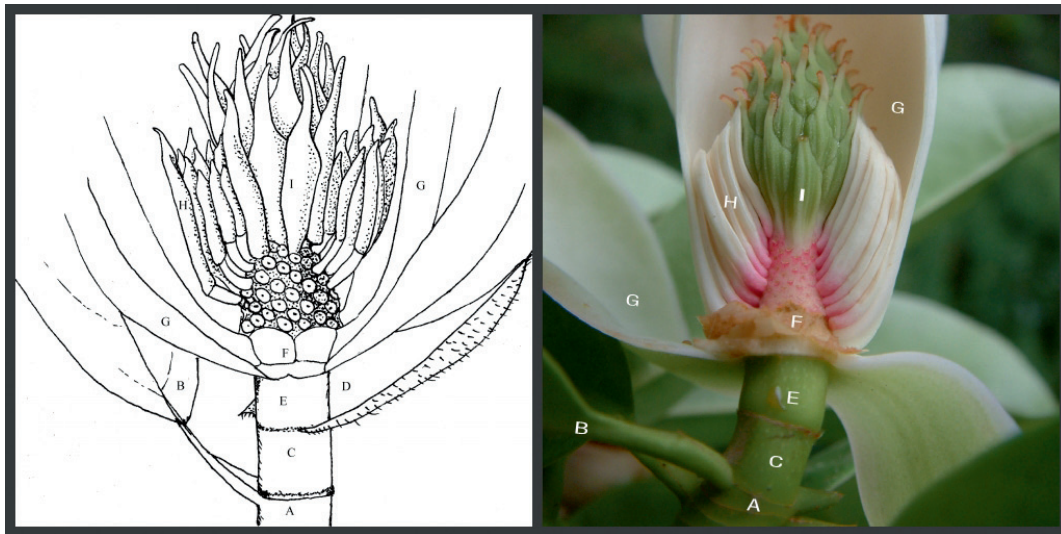


Fig. 1 A flower of Magnoliaceae: A. Internode; B. pseudophyllary (foliaceous scale or leaf); C. peduncle; D. bract (spathaceous); E. pedicel; F. receptacle; G. tepals; H. stamens; I. carpels.

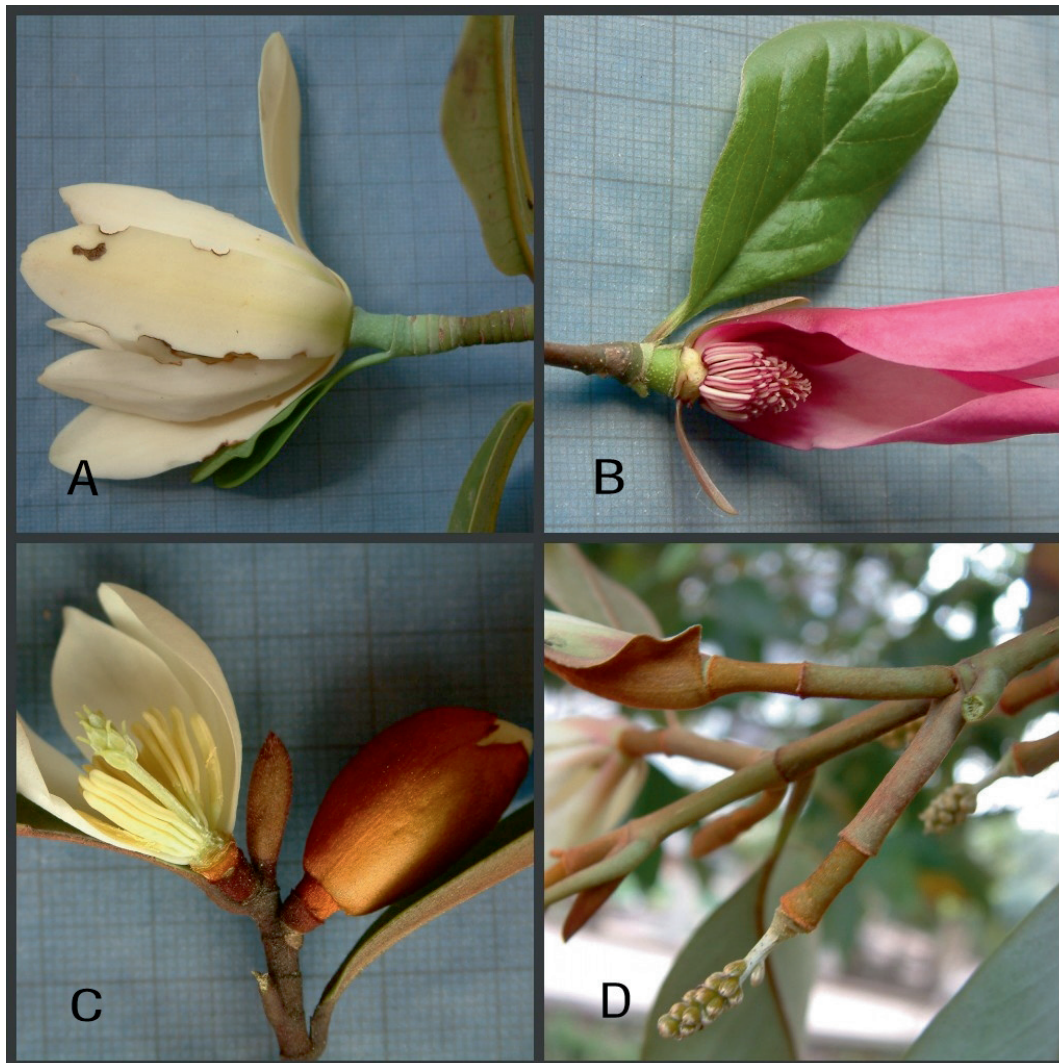


Fig. 2 The positions of floral branches of Magnoliaceae: A. *Michelia lacei* W. W. Smith (terminal); B. *Yulania liliiflora* (Desr.) D. L. Fu (terminal); C. *Michelia yunnanensis* Franch. ex Finet et Gagnep. (axillary); D. *Michelia macclurei* Dandy (axillary, 2-branched).

### 3 Taxonomic Treatment

#### I. Magnoliaceae subfam. Magnolioideae

##### i. Tribe Magnolieae

1. *Manglietia* Blume, Verh. Batav. Genootsch. Kunsten 9: 149. 1823. = *Magnolia* sect. *Manglietia* (Blume) Baill., *Adansonia* 7: 66. 1866. – Type: *Manglietia glauca* Blume

– *Paramanglietia* Hu et W. C. Cheng, Acta Phytotax. Sin. 1 (3–4): 255. 1951. – Type: *Paramanglietia aromatica* (Dandy) Hu et W. C. Cheng = *Manglietia aromatica* Dandy

– *Sinomanglietia* Z. X. Yu, Acta Agric. Univ. Jiangxiensis 16 (2): 202. 1994. – Type: *Sinomanglietia glauca* Z. X. Yu et Q. Y. Zheng = *Manglietia decidua* Q. Y. Zheng

**Description.** Trees, evergreen, or rarely semievergreen or deciduous, hairy or glabrescent. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally, rarely fascicled and pseudowhorled on the shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent or rarely spathaceous, caducous. Bracts solitary, spathaceous, caducous. Peduncles robust or slender. Pedicels present or absent, visible or invisible. Tepals 9 to 18, 3-merous or 4-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous to syncarpous; mature carpels with or rarely without a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 to more in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type.

About 40 species distributed in tropical and subtropical Asia.

2. *Lirianthe* Spach, Hist. Nat. Vég., Phan. 7: 485. 1839. = *Magnolia* sect. *Lirianthe* (Spach) Dandy in Roy. Hort. Soc., Camellias and Magnolias, Conf. Rep.: 68. 1950. – Type: *Lirianthe grandiflora* (Roxb.) Spach – *Lirianthe pterocarpa* (Roxb.) Sima et S. G. Lu

– *Magnolia* sect. *Gwillimia* DC., Syst. Nat. 1: 455, 548. 1817. – Type: *Magnolia pumila* Andr. – *Lirianthe coco* (Lour.) N. H. Xia et C. Y. Wu

– *Blumia* Nees ex Blume, Verh. Batav. Genootsch. Kunst. 9: 147. 1823, nom. rejec., non *Blumea* DC. (1833), nom. cons. = *Magnolia* sect. *Blumia* (Nees ex Blume) Baill., *Adansonia* 7: 2. 1866. – Type: *Blumia candollei* (Blume) Nees – *Lirianthe liliifera* (L.) Sima et S. G. Lu

– *Talauma* sect. *Blumiana* Blume, Fl. Javae 19–20: 32. 1829. = *Magnolia* subsect. *Blumiana* (Blume) Figlar et Noot., *Blumea* 49 (1): 90. 2004. – Type: *Talauma candollei* Blume – *Lirianthe liliifera* (L.) Sima et S. G. Lu

**Description.** Trees or shrubs, evergreen, hairy or glabrescent. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally on the shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to leaves or the first developed axillary buds, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, spathaceous,

caducous or rarely foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust or slender. Pedicles absent or present, invisible or rarely visible. Tepals 9 or 9 to 10, 3-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous or syncarpous; mature carpels not samaroid, with or without a dorsal suture groove, dehiscing circumscissile, or along the dorsal and/or ventral suture. Placentation marginal; ovules 2 or 2 to more in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type.

About 20 species distributed in tropic and subtropical SE Asia.

**Taxonomic combinations:**

*Lirianthe clemensiorum* (Dandy) Sima et S. G. Lu, **comb. nov.** = *Magnolia clemensiorum* Dandy, J. Bot. 68: 207. 1930.

*Lirianthe gigantifolia* (Miq.) Sima et S. G. Lu, **comb. nov.** = *Talauma gigantifolia* Miq., Fl. Ned. Ind. 1 (2): 15. 1858.

*Lirianthe lasia* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia lasia* Noot., Blumea 32 (2): 377. 1987.

*Lirianthe liliifera* var. *angatensis* (Blanco) Sima et S. G. Lu, **comb. nov.** = *Magnolia angatensis* Blanco, Fl. Filip.: 859. 1837. = *Magnolia liliifera* var. *angatensis* (Blanco) Govaerts, World Checklist Bibliogr. Magnoliaceae: 71. 1996.

*Lirianthe liliifera* var. *beccarii* (Ridl.) Sima et S. G. Lu, **comb. nov.** = *Talauma beccarii* Ridl., Bull. Misc. Inform. Kew 1912: 381. 1912. = *Magnolia liliifera* var. *beccarii* (Ridl.) Govaerts, World Checklist Bibliogr. Magnoliaceae: 71. 1996.

*Lirianthe liliifera* var. *obovata* (Korth.) Sima et S. G. Lu, **comb. nov.** = *Talauma obovata* Korth., Ned. Kruidk. Arch. 2 (2): 89. 1851. = *Magnolia liliifera* var. *obovata* (Korth.) Govaerts, World Checklist Bibliogr. Magnoliaceae: 71. 1996.

*Lirianthe liliifera* var. *singaporensis* (Ridl.) Sima et S. G. Lu, **comb. nov.** = *Talauma singaporensis* Ridl., Bull. Misc. Inform. Kew 1914: 323. 1914. = *Magnolia liliifera* var. *singaporensis* (Ridl.) Govaerts, World Checklist Bibliogr. Magnoliaceae: 71. 1996

*Lirianthe mariusjacobsia* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia mariusjacobsia* Noot., Blumea 32 (2): 381. 1987.

*Lirianthe nana* (Dandy) Sima et S. G. Lu, **comb. nov.** = *Magnolia nana* Dandy, J. Bot. 68: 207. 1930.

*Lirianthe persuaveolens* (Dandy) Sima et S. G. Lu, **comb. nov.** = *Magnolia persuaveolens* Dandy, Bull. Misc. Inform. Kew 1928: 186. 1928.

*Lirianthe persuaveolens* var. *pubescens* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia persuaveolens* var. *pubescens* Noot., Blumea 32 (2): 379. 1987.

*Lirianthe persuaveolens* subsp. *rigida* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia persuaveolens* subsp. *rigida* Noot., Blumea 32 (2): 379. 1987.

*Lirianthe poilanei* (Dandy ex Gagnep.) Sima et S. G. Lu, **comb. nov.** = *Magnolia poilanei* Dandy ex Gagnep. in P. H. Lecomte, Fl. Indo-Chine, Suppl. 1: 40. 1938.

*Lirianthe pulgarensis* (Elmer) Sima et S. G. Lu, **comb. nov.** = *Talauma pulgarensis* Elmer, Leafl. Philipp. Bot. 5: 1809. 1913.

*Lirianthe sarawakensis* (A. Agostini) Sima et S. G. Lu, **comb. nov.** = *Talauma sarawakensis* A. Agostini, Atti Reale Accad. Fisiocrit. Siena, X, 1: 190. 1926.

*Lirianthe villosa* (Miq.) Sima et S. G. Lu, **comb. nov.** = *Talauma villosa* Miq., Fl. Ned. Ind. Eerste Bijv.: 366. 1861.

3. *Magnolia* L., Sp. Pl.: 535. 1753. – Type: *Magnolia virginiana* L.

**Description.** Trees, evergreen or semievergreen, hairy. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally on the shoot, or spirally on the terminal shoot and distichously on the axillary shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules adnate to or free from the



petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust. Pedicels present or absent, visible or invisible. Tepals 9 to 12, 3-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous; mature carpels with a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type.

Sixteen species distributed in southeast North America and Central America.

4. ***Dugandiodendron*** Lozano-Contreras, *Caldasia* 11 (53): 33. 1975. = *Magnolia* subsect. *Dugandiodendron* (Lozano-Contreras) Figlar et Noot., *Blumea* 49 (1): 90. 2004. – Type: *Dugandiodendron mahechae* Lozano-Contreras  
– *Magnolia* subsect. *Cubenses* Imkhan., *Novosti Sist. Vyssh. Rast.* 28: 60. 1991. – Type: *Magnolia cubensis* Urb. = *Dugandiodendron cubense* (Urb.) Sima et S. G. Lu  
– *Magnolia* sect. *Splendentes* Dandy ex A. Vázquez, *Brittonia* 46: 4. 1994. = *Magnolia* subsect. *Splendentes* (Dandy ex A. Vázquez) Figlar et Noot., *Blumea* 49 (1): 91. 2004. – Type: *Magnolia splendens* Urb. = *Dugandiodendron splendens* (Urb.) Sima et S. G. Lu

**Description.** Trees, evergreen, hairy. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally on the shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules free from the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust or slender. Pedicels present or absent, visible or invisible. Tepals 9 to 15, 3-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages longer than the anther cells, embedded to the gynoecium. Gynoecium sessile. Fruits apocarpous to synocarpous; mature carpels with or without a dorsal suture groove, dehiscing circumscissile, or along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type.

About 25 species distributed in tropic Central and South America.

**Taxonomic combinations:**

***Dugandiodendron cacuminoides*** (Bisse) Sima et S. G. Lu, **comb. nov.** = *Magnolia cacuminoides* Bisse, *Repert. Spec. Nov. Regni Veg.* 85 (9-10): 587. 1974.

***Dugandiodendron cristalense*** (Bisse) Sima et S. G. Lu, **comb. nov.** = *Magnolia cristalensis* Bisse, *Repert. Spec. Nov. Regni Veg.* 85 (9-10): 588. 1974.

***Dugandiodendron cubense*** (Urb.) Sima et S. G. Lu, **comb. nov.** = *Magnolia cubensis* Urb., *Symb. Antill.* 1 (2): 307. 1899.

***Dugandiodendron cubense*** subsp. ***cacuminicolum*** (Bisse) Sima et S. G. Lu, **comb. nov.** = *Magnolia cacuminicola* Bisse, *Repert. Spec. Nov. Regni Veg.* 85 (9-10): 587. 1974. = *Magnolia cubensis* subsp. *cacuminicola* (Bisse) G. Klotz, *Wiss. Zeitschr. Friedrich-Schiller-Univ. Jena, Math.-Naturwiss. Reihe* 29 (4): 464. 1980.

***Dugandiodendron domingense*** (Urb.) Sima et S. G. Lu, **comb. nov.** = *Magnolia domingensis* Urb., *Repert. Spec. Nov. Regni Veg.* 13: 447. 1914.

***Dugandiodendron ekmanii*** (Urb.) Sima et S. G. Lu, **comb. nov.** = *Magnolia ekmanii* Urb., *Ark. Bot.* 23A (11): 12. 1931.

*Dugandiodendron emarginatum* (Urb. et Ekman) Sima et S. G. Lu, **comb. nov.** = *Magnolia emarginata* Urb. et Ekman, Ark. Bot. 23A (11): 11. 1931.

*Dugandiodendron hamori* (R. A. Howard) Sima et S. G. Lu, **comb. nov.** = *Magnolia hamori* R. A. Howard, Bull. Torrey Bot. Club 75: 351. 1948.

*Dugandiodendron pallescens* (Urb. et Ekman) Sima et S. G. Lu, **comb. nov.** = *Magnolia pallescens* Urb. et Ekman, Ark. Bot. 23A (11): 10. 1931.

*Dugandiodendron portoricense* (Bello) Sima et S. G. Lu, **comb. nov.** = *Magnolia portoricensis* Bello, Anales Soc. Esp. Hist. Nat. 10: 233. 1880.

*Dugandiodendron splendens* (Urb.) Sima et S. G. Lu, **comb. nov.** = *Magnolia splendens* Urb., Symb. Antill. 1 (2): 306. 1899.

5. *Talauma* Juss., Gen. Pl.: 281. 1789. = *Magnolia* sect. *Talauma* Baill., Adansonia 7: 3, 66. 1866. = *Magnolia* subgen. *Talauma* (Juss.) Pierre, Fl. Forest. Cochinch.: sub. t. 1. 1880. – Type: *Talauma plumieri* (Sw.) DC. – *Talauma dodecapetala* (Lam.) Urb.

– *Svenhedinia* Urb., Repert. Spec. Nov. Regni Veg. 24: 3. 1927. = *Talauma* sect. *Svenhedinia* (Urb.) Imkhan., Novosti Sist. Vyssh. Rast. 29: 74. 1993. – Type: *Svenhedinia minor* (Urb.) Urb. = *Talauma minor* Urb.

**Description.** Trees, evergreen, hairy. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally on the shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to leaves or the first developed axillary buds, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, spathaceous, caducous or rarely foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust or slender. Pedicels present or absent, visible or invisible. Tepals 9 to 15, 3-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits syncarpous; mature carpels with or without a dorsal suture groove, dehiscing circumscissile. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type.

About 30 species distributed in tropic southeast-central North America and Central and South America.

6. *Houpoëa* N. H. Xia et C. Y. Wu, Fl. China 7: 64. 2008. = *Magnolia* sect. *Rytidospermum* Spach, Hist. Nat. Vég. Phan. 7: 474. 1839. – Type: *Magnolia umbrella* Desr. – *Houpoëa tripetala* (L.) Sima et S. G. Lu

**Description.** Trees, deciduous, hairy. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally, often fascicled and pseudowhorled on the shoot; leaf blades unlobed or rarely 2-lobed at the apex, cuneate to rounded or rarely subcordate at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust. Pedicels present, visible. Tepals 9 to 17, 3- to 5-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous; mature carpels with a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type.

Four species distributed in temperate eastern North America and temperate E and SE Asia.

**Taxonomic combinations:**

*Houpoëa tripetala* (L.) Sima et S. G. Lu, **comb. nov.** = *Magnolia virginiana* L. var. *tripetala* L., Sp. Pl.: 536. 1753.  
= *Magnolia tripetala* (L.) L., Syst. Nat., ed. 10: 1082. 1759.

7. *Oyama* (Nakai) N. H. Xia et C. Y. Wu, Fl. China 7: 66. 2008. = *Magnolia* sect. *Oyama* Nakai, Fl. Sylv. Koreana 20: 117. 1933. – Type: *Magnolia parviflora* Siebold et Zucc. – *Oyama sieboldii* (K. Koch) N. H. Xia et C. Y. Wu  
= *Magnolia* sect. *Cophantera* Dandy, Curtis's Bot. Mag. 159: sub. t. 9467. 1936. – Type: *Magnolia sieboldii* K. Koch = *Oyama sieboldii* (K. Koch) N. H. Xia et C. Y. Wu

**Description.** Trees or shrubs, deciduous, hairy. Branching sympodial and monopodial; branches produced by prolepsis. Leaves conduplicate, erect in the bud when young, arranged distichously on the shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles slender. Pedicels present or rarely absent, visible or invisible. Tepals 9 to 10, 3-merous, subequal, coloured only on the abaxial surface. Stamens persistent; anthers dehiscent introrsely, anther connective appendages absent or shorter than the anther cells. Gynoecium sessile or rarely stipitate. Fruits apocarpous; mature carpels without a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type.

Three species distributed in E and SE Asia.

8. *Kmeria* (Pierre) Dandy, Bull. Misc. Inform. Kew 1927: 262. 1927. = *Magnolia* subgen. *Kmeria* Pierre, Fl. Forest. Cochinch.: sub. t. 1. 1880. = *Magnolia* sect. *Kmeria* (Pierre) Figlar et Noot., Blumea 49 (1): 91. 2004. – Type: *Magnolia duperreana* Pierre = *Kmeria duperreana* (Pierre) Dandy  
– *Woonyoungia* Y. W. Law, Bull. Bot. Res., Harbin 17 (4): 354. 1997. – Type: *Woonyoungia septentrionalis* (Dandy) Y. W. Law  
= *Kmeria septentrionalis* Dandy

**Description.** Trees, evergreen, hairy or glabrescent. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally on the shoot, or spirally on the terminal shoot and distichously on the axillary shoot; leaf blades unlobed, cuneate at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, unisexual monoecious or dioecious. Pseudophyllaries solitary, foliaceous, persistent or rarely spathaceous, caducous. Bracts solitary, spathaceous, caducous. Peduncles slender. Pedicels present or absent, invisible. Tepals 2 to 17, 2- to 5-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely or sublatrorsely to latrorsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous or synocarpous; mature carpels without a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type.

Three species distributed in subtropical SE Asia.

9. *Pachylarnax* Dandy, Bull. Misc. Inform. Kew 1927: 260. 1927. – Type: *Pachylarnax praecalva* Dandy  
– *Magnolia* sect. *Gynopodium* Dandy, Curtis's Bot. Mag. 165: t. 16. 1948. = *Magnolia* subgen. *Gynopodium* (Dandy) Figlar et

Noot., Blumea 49 (1): 94. 2004. – Type: *Magnolia nitida* W. W. Sm. = *Pachylarnax nitida* (W. W. Sm.) Sima et S. G. Lu  
 – *Parakmeria* Hu et W. C. Cheng, Acta Phytotax. Sin. 1 (1): 1. 1951. – Type: *Parakmeria omeiensis* W. C. Cheng = *Pachylarnax omeiensis* (W. C. Cheng) Sima et S. G. Lu  
 – *Micheliopsis* H. Keng, Quart. J. Taiwan Mus. 8: 207. 1955. – Type: *Micheliopsis kachirachirai* (Kaneh. et Yamam.) H. Keng = *Pachylarnax kachirachirai* (Kaneh. et Yamam.) Sima et S. G. Lu  
 – *Manglietiastrum* Y. W. Law, Acta Phytotax. Sin. 17 (4): 72. 1979. = *Magnolia* sect. *Manglietiastrum* (Y. W. Law) Noot., Blumea 31 (1): 91. 1985. = *Manglietia* sect. *Manglietiastrum* (Y. W. Law) Noot., Ann. Missouri Bot. Gard. 80 (4): 1051. 1993. – Type: *Manglietiastrum sinicum* Y. W. Law = *Pachylarnax sinica* (Y. W. Law) N. H. Xia et C. Y. Wu

**Description.** Trees, evergreen, glabrous. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves open, erect in the bud when young, arranged spirally on the shoot, or spirally on the terminal shoot and distichously on the axillary shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules free from the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual or androdioecious. Pseudophyllaries solitary, spathaceous, caducous. Bracts solitary, spathaceous, caducous. Peduncles robust. Pedicels present or absent, visible or invisible. Tepals 9 to 11, 3-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium stipitate or sessile. Fruits apocarpous to synocarpous; mature carpels with or without a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 or 2 to 8 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type or rarely to the pore type.

Seven species distributed in tropical and subtropical SE Asia.

10. ***Paramagnolia*** Sima et S. G. Lu, **gen. nov.** – Type: *Paramagnolia fraseri* (Walter) Sima et S. G. Lu = *Magnolia* sect. *Auriculatae* Figlar et Noot., Blumea 49 (1): 92. 2004 [*'Auriculata'*]. – Type: *Magnolia fraseri* Walter = *Paramagnolia fraseri* (Walter) Sima et S. G. Lu

**Diagnosis.** Folia decidua, glabra, pseudovercillata, basi auriculata. Tepala non nisi subtus colorata.

**Description.** Trees, deciduous, glabrous. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally, often fascicled and pseudowhorled on the shoot; leaf blades unlobed, auriculate at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust. Pedicels present, visible. Tepals 9, 3-merous, subequal, coloured only on the abaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous; mature carpels with a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type.

One species and one variety distributed in SE North America.

**Taxonomic combinations:**

***Paramagnolia fraseri*** (Walter) Sima et S. G. Lu, **comb. nov.** = *Magnolia fraseri* Walter, Fl. Carol.: 159. 1788.

***Paramagnolia fraseri*** var. ***pyramidata*** (Bartram) Sima et S. G. Lu, **comb. nov.** = *Magnolia pyramidata* Bartram, Travels Carolina: 408. 1791. = *Magnolia fraseri* var. *pyramidata* (Bartram) Torr. et A. Gray, Fl. N. Amer. 1: 43. 1838.

11. **Metamagnolia** Sima et S. G. Lu, **gen. nov.** – Type: *Metamagnolia macrophylla* (Michx.) Sima et S. G. Lu  
= *Magnolia* sect. *Macrophyllae* Figlar et Noot., *Blumea* 49 (1): 92. 2004 [*Macrophylla*']. – Type: *Magnolia macrophylla* Michx.  
= *Metamagnolia macrophylla* (Michx.) Sima et S. G. Lu

**Diagnosis.** Folia decidua, pubescentia, pseudoverticillata, basi auriculata vel cordata. Tepala utrinque colorata.

**Description.** Trees, deciduous, pubescent. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, erect in the bud when young, arranged spirally, often fascicled and pseudowhorled on the shoot; leaf blades unlobed, deeply cordate to auriculate at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles robust. Pedicels present, visible. Tepals 9, 3-merous, subequal, coloured on both surfaces, blotched at the base of adaxial surface. Stamens caducous; anthers dehiscent introrsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous; mature carpels with a dorsal suture groove, dehiscing along the dorsal and/or ventral suture. Placentation marginal; ovules 2 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type.

Two species and one subspecies distributed in SE North America.

**Taxonomic combinations:**

**Metamagnolia macrophylla** (Michx.) Sima et S. G. Lu, **comb. nov.** = *Magnolia macrophylla* Michx., *Fl. Bor.-Amer.* 1: 327. 1803.

**Metamagnolia macrophylla** subsp. **ashei** (Weath.) Sima et S. G. Lu, **comb. nov.** = *Magnolia ashei* Weath., *Rhodora* 28: 35. 1926. = *Magnolia macrophylla* subsp. **ashei** (Weath.) Spongberg, *J. Arnold Arbor.* 57: 268. 1976.

**Metamagnolia dealbata** (Zucc.) Sima et S. G. Lu, **comb. nov.** = *Magnolia dealbata* Zucc., *Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss.* 2: 373. 1836.

ii. Tribe **Michelieae** Y. W. Law

12. **Aromadendron** Blume, *Bijdr.*: 10. 1825. = *Talauma* sect. *Aromadendron* Miq., *Ann. Mus. Bot. Lugduno-Batavi* 4: 70. 1868. = *Magnolia* sect. *Aromadendron* (Blume) Noot., *Blumea* 31 (1): 89. 1985. = *Magnolia* subsect. *Aromadendron* (Blume) Figlar et Noot., *Blumea* 49 (1): 94. 2004. – Type: *Aromadendron elegans* Blume

– *Alcimandra* Dandy, *Bull. Misc. Inform. Kew* 1927: 260. 1927. = *Magnolia* sect. *Alcimandra* (Dandy) Noot., *Blumea* 31 (1): 88. 1985. – Type: *Alcimandra cathcartii* (J. D. Hook. et Thomson) Dandy = *Aromadendron cathcartii* (J. D. Hook. et Thomson) Sima et S. G. Lu

– *Magnolia* sect. *Maingola* Dandy, *Curtis's Bot. Mag.* 165: t. 16. 1948. = *Magnolia* subsect. *Maingola* (Dandy) Figlar et Noot., *Blumea* 49 (1): 93. 2004. – Type: *Magnolia maingayi* King = *Aromadendron maingayi* (King) Sima et S. G. Lu

**Description.** Trees, evergreen, hairy or glabrescent. Branching sympodial and monopodial; branches produced by prolepsis, or rarely by prolepsis and syllepsis. Leaves conduplicate, erect in the bud when young, arranged distichously on the shoot, or spirally on the terminal shoot and distichously on the axillary shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules free from the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles short or slender. Pedicels absent or rarely present, invisible or visible. Tepals 9 or 9 to 45, 3- to 5-merous, subequal, coloured only on the abaxial surface. Stamens persistent; anthers dehiscent introrsely, anther connective appendages absent,



or shorter to longer than the anther cells, not embedded to the gynoecium. Gynoecium sessile or stipitate. Fruits apocarpous to syncarpous; mature carpels without a dorsal suture groove, dehiscent along the dorsal and/or ventral suture, or circumscissile. Placentation marginal; ovules 2 or 2 to 9 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type or the tube type.

Thirteen species distributed in tropical and subtropical SE Asia.

**Taxonomic combinations:**

*Aromadendron annamense* (Dandy) Sima et S. G. Lu, **comb. nov.** = *Magnolia annamensis* Dandy, J. Bot. 68: 209. 1930.

*Aromadendron ashtonii* (Dandy ex Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia ashtonii* Dandy ex Noot., Blumea 32 (2): 363. 1987.

*Aromadendron bintuluense* (A. Agostini) Sima et S. G. Lu, **comb. nov.** = *Talauma bintuluensis* A. Agostini, Atti Reale Accad. Fisiocrit. Siena, X, 1: 187. 1926.

*Aromadendron borneense* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia borneensis* Noot., Blumea 32 (2): 366. 1987.

*Aromadendron carsonii* (Dandy ex Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia carsonii* Dandy ex Noot., Blumea 32 (2): 348. 1987.

*Aromadendron carsonii* var. *drymifolium* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia carsonii* var. *drymifolia* Noot., Blumea 32 (2): 351. 1987.

*Aromadendron carsonii* var. *phaulantum* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia phaulanta* Dandy ex Noot., Blumea 32 (2): 359. 1987. = *Magnolia carsonii* var. *phaulanta* (Dandy ex Noot.) S. Kim et Noot., Blumea 47 (2): 332. 2002.

*Aromadendron griffithii* (J. D. Hook. et Thomson) Sima et S. G. Lu, **comb. nov.** = *Michelia griffithii* J. D. Hook. et Thomson in J. D. Hooker, Fl. Brit. Ind. 1: 41. 1872.

*Aromadendron gustavii* (King) Sima et S. G. Lu, **comb. nov.** = *Magnolia gustavii* King, Ann. Roy. Bot. Gard. (Calcutta) 3 (2): 209. 1891.

*Aromadendron macklottii* (Korth.) Sima et S. G. Lu, **comb. nov.** = *Manglietia macklottii* Korth., Ned. Kruidk. Arch. 2 (2): 97. 1851.

*Aromadendron macklottii* var. *beccarianum* (A. Agostini) Sima et S. G. Lu, **comb. nov.** = *Michelia beccariana* A. Agostini, Atti Reale Accad. Fisiocrit. Siena, X, 1: 184. 1926. = *Magnolia macklottii* var. *beccariana* (A. Agostini) Noot., Blumea 32 (2): 348. 1987.

*Aromadendron pahangense* (Noot.) Sima et S. G. Lu, **comb. nov.** = *Magnolia pahangensis* Noot., Blumea 32 (2): 367. 1987.

*Aromadendron pealianum* (King) Sima et S. G. Lu, **comb. nov.** = *Magnolia pealiana* King, Ann. Roy. Bot. Gard. (Calcutta) 3 (2): 210. 1891.

13. *Yulania* Spach, Hist. Nat. Vég., Phan. 7: 462. 1839, nom. cons. propos. = *Magnolia* subgen. *Yulania* (Spach) Reichenbach, Der Deutsch. Bot. 1: 192. 1841. – Type: *Yulania conspicua* (Salisb.) Spach – *Yulania denudata* (Desr.) D. L. Fu = *Lassonia* Buc'hoz, Pl. Nouv. Découv.: t. 19. 1779, nom. rejec. propos. Type: *Lassonia heptapeta* Buc'hoz, nom. rejec. – *Yulania denudata* (Desr.) D. L. Fu

– *Tulipastrum* Spach, Hist. Nat. Vég., Phan. 7: 461. 1839. = *Magnolia* sect. *Tulipastrum* (Spach) Dandy in Roy. Hort. Soc., Camellias and Magnolias, Conf. Rep.: 74. 1950. = *Yulania* sect. *Tulipastrum* (Spach) D. L. Fu, J. Wuhan Bot. Res. 19 (3): 198. 2001. = *Magnolia* subsect. *Tulipastrum* (Spach) Figlar et Noot., Blumea 49 (1): 92. 2004. – Type: *Tulipastrum americanum* Spach – *Yulania acuminata* (L.) D. L. Fu

– *Buergeria* Siebold et Zucc., Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4: 186. 1845. = *Magnolia* sect. *Buergeria* (Siebold

et Zucc.) Dandy in Roy. Hort. Soc., Camellias and Magnolias, Conf. Rep.: 73. 1950. = *Yulania* sect. *Buergeria* (Siebold et Zucc.) D. L. Fu, J. Wuhan Bot. Res. 19 (3): 198. 2001. – Type: *Buergeria stellata* Siebold et Zucc. = *Yulania stellata* (Siebold et Zucc.) Sima et S. G. Lu

– *Magnolia* subgen. *Pleurochasma* Dandy, J. Roy. Hort. Soc. 75: 161. 1950. – Type: *Magnolia campbellii* J. D. Hook. et Thomson = *Yulania campbellii* (J. D. Hook. et Thomson) D. L. Fu

– *Magnolia* sect. *Axilliflora* B. C. Ding et T. B. Chao, Acta Agric. Univ. Henan. 19 (4): 360. 1985. = *Yulania* sect. *Axilliflora* (B. C. Ding et T. B. Chao) D. L. Fu, J. Wuhan Bot. Res. 19 (3): 198. 2001. – Type: *Magnolia axilliflora* (T. B. Chao, T. X. Zhang et J. T. Gao) T. B. Chao – *Yulania biondii* (Pamp.) D. L. Fu

– *Magnolia* sect. *Trimorphaflora* B. C. Ding et T. B. Chao, Acta Agric. Univ. Henan. 19 (4): 359. 1985. – Type: *Magnolia henanensis* B. C. Ding et T. B. Chao – *Yulania biondii* (Pamp.) D. L. Fu

– *Magnolia* sect. × *Zhushayulania* W. B. Sun et T. B. Chao, J. Centr. South Forest. Univ. 19 (2): 27. 1999. = *Yulania* sect. × *Zhushayulania* (W. B. Sun et T. B. Chao) D. L. Fu, J. Wuhan Bot. Res. 19 (3): 198. 2001. – Type: *Magnolia* × *soulangeana* Soul.-Bod. = *Yulania* × *soulangeana* (Soul.-Bod.) D. L. Fu

**Description.** Trees or shrubs, deciduous, hairy. Branching sympodial and monopodial; branches produced by prolepsis. Leaves conduplicate, erect in the bud when young, arranged distichously on the shoot; leaf blades unlobed or rarely 2-lobed at the apex, cuneate to rounded or rarely subcordate at the base. Stipules adnate to the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, spathaceous or foliaceous, caducous or rarely persistent. Bracts solitary, spathaceous, caducous. Peduncles short. Pedicels absent or rarely present, invisible or visible. Tepals 9 to 38, 3- to 5-merous, subequal, or unequal, ones in outmost whorl smaller than 1/2 of ones in other inner whorls, coloured only on the abaxial surface. Stamens persistent; anthers dehiscent sublateral to lateral, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous to synocarpous; mature carpels without a dorsal suture groove, dehiscing along the dorsal and/or ventral suture, or circumscissile. Placentation marginal; ovules 2 or 2 to 3 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type.

Eleven species distributed in temperate E Asia and eastern North America.

**Taxonomic combinations:**

*Yulania stellata* (Siebold et Zucc.) Sima et S. G. Lu, **comb. nov.** = *Buergeria stellata* Siebold et Zucc., Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4 (2): 186. 1845.

14. *Michelia* L., Sp. Pl.: 536. 1753. = *Magnolia* sect. *Michelia* (L.) Baill., Adansonia 7: 66. 1866. – Type: *Michelia champaca* L.

= *Champaca* Adans., Fam. Pl. 2: 365. 1763. – Type: *Champaca michelia* Noronha – *Michelia champaca* L.

– *Liriopsis* Spach, Hist. Nat. Vég., Phan. 7: 460. 1839. – Type: *Liriopsis fuscata* (Andr.) Spach – *Michelia figo* (Lour.) Spreng.

– *Magnolia* sect. *Micheliopsis* Baill., Adansonia 7: 4, 66. 1866. = *Michelia* sect. *Micheliopsis* (Baill.) Dandy in J. Praglowski, World Pollen Spore Fl. 3: 5. 1974. – Type: *Magnolia figo* (Lour.) DC. = *Michelia figo* (Lour.) Spreng.

= *Sampaca* Kuntze, Revis. Gen. Pl.: 6. 1891. – Type: *Sampaca euonymoides* Kuntze = *Michelia champaca* L.

– *Elmerrillia* Dandy, Bull. Misc. Inform. Kew 1927: 261. 1927. = *Magnolia* subsect. *Elmerrillia* (Dandy) Figlar et Noot., Blumea 49 (1): 93. 2004. – Type: *Elmerrillia papuana* (Schltr.) Dandy – *Michelia tsiampacca* L.

– *Paramichelia* Hu, Sunyatsenia 4: 142. 1940. = *Michelia* sect. *Paramichelia* (Hu) Noot. et B. L. Chen, Ann. Missouri Bot. Gard. 80 (4): 1087. 1993. – Type: *Paramichelia baillonii* (Pierre) Hu = *Michelia baillonii* (Pierre) Finet et Gagnep.

– *Tsoongiodendron* Chun, Acta Phytotax. Sin. 8 (4): 281. 1963. = *Michelia* sect. *Tsoongiodendron* (Chun) Noot. et B.L.Chen, Ann. Missouri Bot. Gard. 80 (4): 1086. 1993. – Type: *Tsoongiodendron odorum* Chun = *Michelia odora* (Chun) Noot. et B. L. Chen

**Description.** Trees or shrubs, deciduous, hairy. Branching only monopodial; branches produced by prolepsis, or rarely by prolepsis and syllepsis. Leaves conduplicate, erect in the bud when young, arranged distichously on the shoot, or spirally on the terminal shoot and distichously on the axillary shoot; leaf blades unlobed, cuneate to rounded at the base. Stipules adnate to or free from the petiole. All axillary buds in mixed bud undeveloped and not sprouted, or the basal axillary bud in mixed bud developed, sprouted and formed into a scorpioid cyme of 2 to 4 floral branches; all of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, spathaceous or rarely foliaceous, caducous. Bracts solitary, spathaceous, caducous. Peduncles short. Pedicels absent or rarely present, invisible or visible. Tepals 4 to 23, 3- to 5-merous, subequal, or rarely unequal, ones in outmost whorl smaller than 1/2 of ones in other inner whorls, coloured only on the abaxial surface. Stamens persistent; anthers dehiscent sublaterally to laterally, anther connective appendages shorter than the anther cells. Gynoecium stipitate or sessile. Fruits apocarpous to syncarpous; mature carpels without a dorsal suture groove, dehiscing along the dorsal and/or ventral suture, or circumscissile. Placentation marginal; ovules 2 to 36 in each carpel. Testae free from the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the tube type or the pore type.

About 60 species distributed in tropical and subtropical Asia.

**Taxonomic combinations:**

*Michelia ovalis* (Miq.) Sima et S. G. Lu, **comb. nov.** = *Talauma ovalis* Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 69. 1868.

*Michelia pubescens* (Merr.) Sima et S. G. Lu, **comb. nov.** = *Talauma pubescens* Merr., Philipp. J. Sci. 3: 133. 1908.

*Michelia tsiampacca* var. *glaberrima* (Dandy) Sima et S. G. Lu, **comb. nov.** = *Elmerrillia papuana* var. *glaberrima* Dandy, Bull. Misc. Inform. Kew 1928: 185. 1928.

*Michelia tsiampacca* subsp. *mollis* (Dandy) Sima et S. G. Lu, **comb. nov.** = *Elmerrillia mollis* Dandy, Bull. Misc. Inform. Kew 1928: 184. 1928. = *Elmerrillia tsiampacca* subsp. *mollis* (Dandy) Noot., Blumea 31(1): 108. 1985.

II. **Magnoliaceae** subfam. **Liriodendroideae** (Nurk.) Y. W. Law

15. *Liriodendron* L., Sp. Pl.: 535. 1753. – Type: *Liriodendron tulipifera* L.  
= *Tulipifera* Mill., Gard. Dict. Abr., ed. 4. 1754. – Type: *Tulipifera liriodendrum* Mill. = *Liriodendron tulipifera* L.

**Description.** Trees, deciduous, hairy and glabrescent or glabrous. Branching sympodial and monopodial; branches produced by only syllepsis. Leaves conduplicate, pendant in the bud when young, arranged spirally on the shoot; leaf blades 4- to 10-lobed, rounded, truncate or slightly cordate at the base. Stipules free from the petiole. All axillary buds or some upper axillary buds in the mixed bud developed and sprouted; only the parts, from flowers or fruits to pseudophyllaries, of the floral branches into which mixed buds formed shed after flowering or fruiting. Flowers terminal, solitary, bisexual. Pseudophyllaries solitary, foliaceous, persistent. Bracts solitary, spathaceous, caducous. Peduncles short or slender. Pedicels present or absent, invisible or visible. Tepals 9 to 12, 3-merous, subequal, coloured on both surfaces. Stamens persistent; anthers dehiscent extrorsely, anther connective appendages shorter than the anther cells. Gynoecium sessile. Fruits apocarpous; mature carpels samaroid, without a dorsal suture groove, indehiscent. Placentation apical; ovules 2 in each carpel. Testae adnate to the endocarp. The morphological character of chalazal region on endotesta of seed belonging to the pore type.

Two species distributed in SE Asia and SE North America.

## Acknowledgements

The work was supported by the National Natural Science Foundation of China (30660154, 31060096), the Foundation of The Magnolia Society International and the Foundation of Yunnan Provincial Key Laboratory for Cultivation and Exploitation of Forest Plants, China.

## References

- Azuma H, Thien L B, and Kawano S. 1999. Molecular phylogeny of *Magnolia* (Magnoliaceae) inferred from cpDNA sequences and floral scents. *Journal of Plant Research* 112: 291–306.
- Azuma H, Garcia-Franco J G, Rico-Gray V, and Thien L B. 2001. Molecular phylogeny of the Magnoliaceae: The biogeography of tropical and temperate disjunctions. *American Journal of Botany* 88 (12): 2275–2285.
- Azuma H, Rico-Gray V, Garcia-Franco J G, Toyota M, Asakawa Y, and Thien L B. 2004. Close relationship between Mexican and Chinese *Magnolia* (subtropical disjunct of Magnoliaceae) inferred from molecular and floral scent analyses. *Acta Phytotaxonomica et Geobotanica* 55 (3): 167–180.
- Baillon H E. 1866. Mémoire sur la famille des Magnoliacées. *Adansonia* 7: 1–16, 65–69.
- Bentham G, and Hooker J D. 1862. *Genera plantarum* 1. Reeve & Co., London.
- Chase M W, Soltis D E, Olmstead R G, Morgan D, Les D H, Mishler B D, Duvall M R, Price R A, Hills H G, Qiu Y L, Kron K A, Rettig J H, Conti E, Palmer J D, Manhart J R, Sytsma K J, Michaels H J, Kress W J, Karol K G, Clark W D, Hedren M, Gaut B S, Jansen R K, Kim K J, Wimpee C F, Smith J F, Furnier G R, Strauss S H, Xiang Q Y, Plunkett G M, Soltis P S, Swensen S, Williams S E, Gadek P A, Quinn C J, Eguiarte L E, Golenberg E, Learn G H Jr., Graham S W, Barrett S C H, Dayanandan S, and Albbert V A. 1993. Phylogenetics of seed plants: An analysis of nucleotide sequences from the plastid gene *rbcL*. *Annals of the Missouri Botanical garden* 80: 528–580.
- Dandy J E. 1927. The genera of Magnolieae. *Bulletin of Miscellaneous Information* (Royal Botanic Gardens, Kew) 1927 (7): 257–264.
- Dandy J E. 1964. Magnoliaceae. In: J Hutchinson. *The Genera of Flowering Plants, Angiospermae* I. Clarendon Press, Oxford. pp.50–57.
- De Candolle A P. 1817. *Regni vegetabilis systema naturale* 1. Treuttel & Würtz, Paris. pp. 449–560.
- Engler A, and Gilg E. 1924. *Syllabus der Pflanzenfamilien*. 2nd ed. Berlin.
- Figlar R B. 2000. Proleptic branch initiation in *Michelia* and *Magnolia* subgenus *Yulania* provides basis for combinations in subfamily Magnolioideae. In: Liu Y H, Fan H M, Chen Z Y, Wu Q G, and Zeng Q W (eds). *Proceeding of the international symposium on the family Magnoliaceae*. Science Press, Beijing. pp. 14–25.
- Figlar R B, and Nooteboom H P. 2004. Notes on Magnoliaceae IV. *Blumea* 49 (1): 87–100.
- Gong X, Shi S H, Pan Y Z, Huang Y L, and Yin Q. 2003. An observation on the main taxonomic characters of subfamily Magnolioideae in China. *Acta Botanica Yunnanica* 25 (4): 447–456.
- Law Y W. 1984. A preliminary study on the taxonomy of the family Magnoliaceae. *Acta Phytotaxonomica Sinica* 22 (2): 89–109.
- Li J. 1997. A cladistic analysis of Magnoliaceae. *Acta Botanica Yunnanica* 19 (4): 342–356.
- Li J, and Conran J G. 2003. Phylogenetic relationships in Magnoliaceae subfam. Magnolioideae: a morphological cladistic analysis. *Plant Systematics and Evolution* 242: 33–44.
- Liu Y H. 2000. Studies on the phylogeny of Magnoliaceae In: Liu Y H, Fan H M, Chen Z Y, Wu Q G, and Zeng Q W (eds). *Proceedings of the International Symposium on the Family Magnoliaceae*. Science Press, Beijing. pp. 3–13.
- Liu Y H, Xia N H, and Yang H Q. 1995. The origin, evolution and phytogeography of Magnoliaceae. *Journal of Tropical and*

*Subtropical Botany* 3 (4): 1–12.

- Nie Z L, Wen J, Azuma H, Qiu Y L, Sun H, Meng Y, and Sun W B. 2008. Phylogenetic and biographic complexity of Magnoliaceae in the Northern Hemisphere inferred from three nuclear data sets. *Molecular Phylogenetics and Evolution* 48: 1027–1040.
- Noteboom H P. 1985. Notes on Magnoliaceae with a revision of *Pachylarnax* and *Elmerrillia* and the Malesian species of *Manglietia* and *Michelia*. *Blumea* 31 (1): 65–121.
- Noteboom H P. 1993. Magnoliaceae. In: Kubitzki K (ed). *The Families and Genera of Vascular Plants* 2. Springer-Verlag, Berlin. pp. 391–401.
- Noteboom H P. 2000. Different looks at the classification of the Magnoliaceae. In: Liu Y H, Fan H M, Chen Z Y, Wu Q G, and Zeng Q W (eds). *Proceedings of the International Symposium on the Family Magnoliaceae*. Science Press, Beijing. pp. 26–37.
- Jin H, Shi S H, Pan H C, Huang Y L, and Zhang H D. 1999. Phylogenetic relationships between *Michelia* (Magnoliaceae) and its related genera based on the *matK* gene sequence. *Acta Scientiarum Naturalium Universitatis Sunyatseni* 38 (1): 93–97.
- Kim S, Park C W, Kim Y D, and Suh Y. 2001. Phylogenetic relationship in family Magnoliaceae inferred from *ndhF* sequences. *American Journal of Botany* 88 (4): 717–728.
- Shi S, Jin H, Zhong Y, He X, Huang Y, Tan F, and Boufford D E. 2000. Phylogenetic relationships of the Magnoliaceae inferred from cpDNA *matK* sequences. *Theoretical and Applied Genetics* 101: 925–930.
- Sima Y K. 2005. Magnoliaceae. In: Li Y Y (ed). *National Protected Wild Plants in Yunnan Province, China*. Yunnan Science and Technology Press, Kunming. pp. 199–244.
- Sima Y K, and Lu S G. 2009. Magnoliaceae. In: Shui Y M, Sima Y K, Wen J, Chen W H (eds). *Vouchered Flora of Southeast Yunnan*, 1. Yunnan Publishing Group Corporation: Yunnan Science and Technology Press, Kunming. pp. 16–67.
- Sima Y K, Wang Q, Cao L M, Wang B Y, and Wang Y H. 2001. Prefoliation features of the Magnoliaceae and their systematic significance. *Journal of Yunnan University* (Natural Sciences Edition) 23 (Suppl.): 71–78.
- Tiffney B H. 1977. Fruits and seeds of the Brandon Lignite: Magnoliaceae. *Botanical Journal of the Linnean Society* 75: 299–323.
- Wang Y L, Li Y, Zhang S Z, and Yu X S. 2006. The utility of *matK* gene in the phylogenetic analysis of the genus *Magnolia*. *Acta Phytotaxonomica Sinica* 44 (2): 135–147.
- Wu Z Y, Lu A M, Tang Y C, Chen Z D, and Li D Z. 2003. *The Families and Genera of Angiosperms in China: A Comprehensive Analysis*. Science Press, Beijing. pp. 57–68.
- Xia N H, Liu Y H (Law Y W), and H P Noteboom. 2008. Magnoliaceae. In: Wu Z Y, Raven P H, and Hong D Y (eds). *Flora of China* 7. Science Press, Beijing; Missouri Botanical Garden Press, St. Louis. pp. 48–91.
- Xu F X, Chen Z Y, and Zhang D X. 2000. A Cladistic Analysis of Magnoliaceae. *Journal of Tropical and Subtropical Botany* 8 (3): 207–214.
- Xu F X, and Wu Q G. 2002. Chalazal region morphology on the endotesta of Magnoliaceous seeds and its systematic significance. *Acta Phytotaxonomica Sinica* 40 (3): 260–270.
- Zhang B, Huang Y H, Su Y J, and Wang T. 1996. Observation on the morphology of seed endotesta at chalazal region of Magnoliaceae. *Ecologic Science* 1996 (1): 30–34.