

# The Revision of *Euonymus* (Celastraceae)



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[www.bbg.org](http://www.bbg.org)

[www.metasequoia.org](http://www.metasequoia.org)



## Outline from 1994 to 2000

- 6 months in Institute of Botany, CAS, Beijing, the largest herbarium (**PE**) in China, c. 2 M
- 3 weeks in Kunming Institute of Botany, Yunnan, the second largest herbarium (**KUN**), c. 1.8 M
- 3 months in New York Botanic Garden, the largest one (**NY**) in the New World, c. 6 M
- More than three years in Harvard Univ. Herbaria, the largest collection of the East Asian Woody Plants in the USA (**A, GH**), c. 5 M



# Content of Presentation

- History of Taxonomy of Genus
- Distribution
- Taxonomic Treatment
- Some Species in Detail
- Some Interesting Species Not Cultivated
- Discussion on Problem and Difficulties
- Horticultural and Economic Uses



# History of Taxonomy

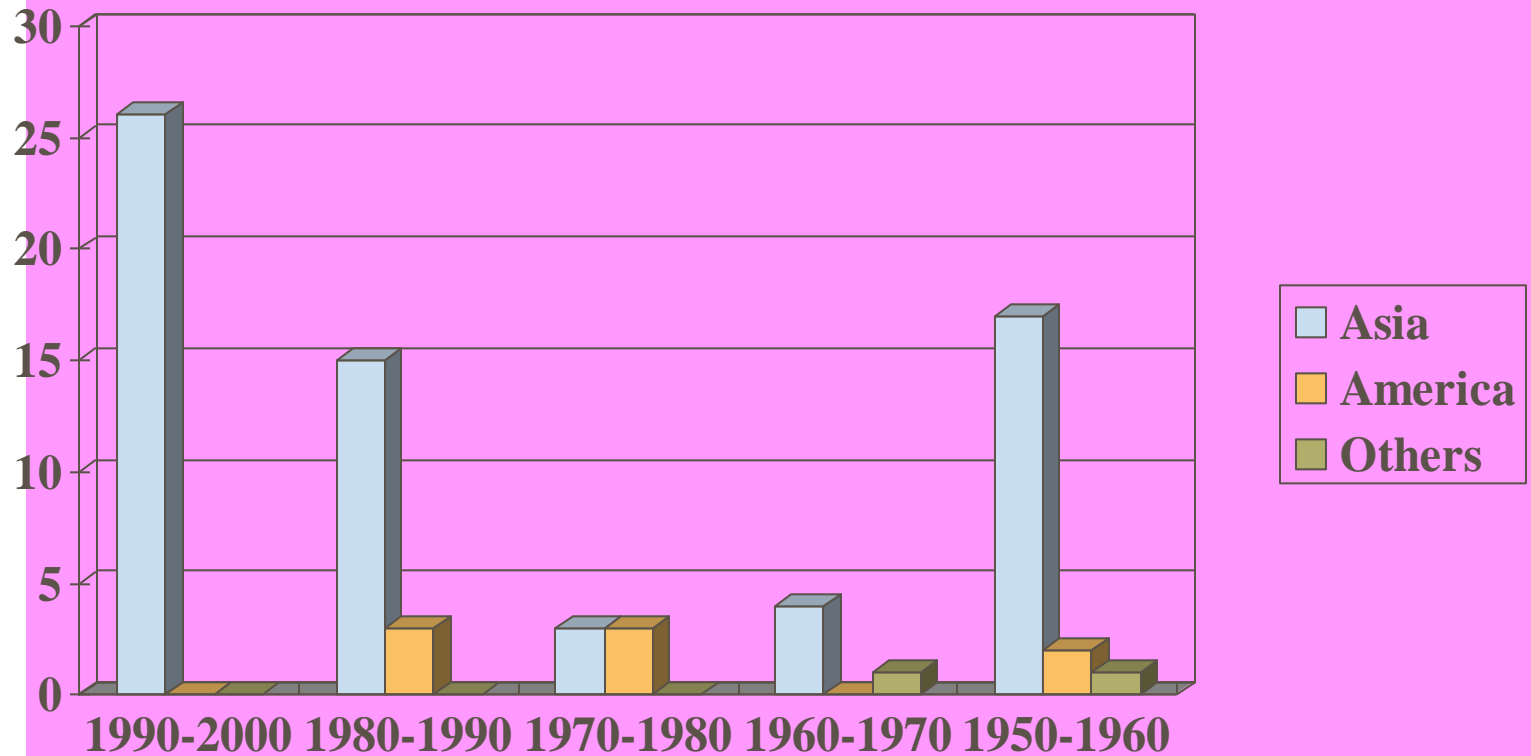
- Worldwide work:
  - Synopsis (Blakelock 1951)
  - Revision (Ma 2001)
- Local work:
  - New Taxa: mainly from Asia: Up to 75 total
  - Floras: mainly by Asia, some Central America



# Blakelock (1951): Synopsis

- Species accepted: 177
- Varieties accepted: 114
- Forms accepted: 26+1+2
- Species unknown: c. 20
- Species needed further work: c. 15
- Species without fruit: c. 18

# New Taxa since Blakelock(1951)







# Distribution of Genus

- Distributed Center: Among Himalayas, South Asia and East Asia
- Most confused Area: Among Himalayas\*, South Asia and East Asia
- Taxonomic Focus: Among Himalayas, South Asia and East Asia



**Behind the mask** (see 1.1) whereas many people think that the Great Wall also divides countries, the situation is not so simple. The people in the 42 weeks winter will be in the snow and the Great Wall is not a wall. The history of the Great Wall of China has been a source of fascination to other cultures for over 1,000 years.







## Specimen used by this work

- China: **KUN**: 8,000; **PE**: 12,000; **PEM** & others: 4,000
- Europe: **K**: 100; **E**: 287; **BM**: 186; **P**: 262; **WU**: 163;
- America: **A** & **GH**: 5,000; **NY**: 350; **MO**: 875; **US**: 1,000; **NA**: 1,000



# Content of Revision (Ma, 2001)

- History
- Morphology
- Distribution
- Economic Values
- Taxonomy
- Citation of Specimens
- Index of Names
- Name Accepted
- Synonyms
- Literatures & Types
- Description
- Distribution
- Discussion
- Specimens Examined



# Revision System (Ma 2001)

- 2 Subgenera: **Kalonymus**, **Euonymus**
- 5 Sections: **Kalonymus**, **Melanocarya**, **Echinococcus**, **Ilicifolia**, **Euonymus**
- 129 Species Recognized
- 50 Species Excluded
- 15 Species Nom. Nud.
- 9 Unknown/uncertain species



# STANDARD CHARACTERS

## **Fruit:**

Globe, Angle, spike,  
Lobes, and winged

## **Flower/fruit/leaves:**

Number, color, size,  
form, and appendix

- **Subgenera:** Fruit and Flower (anther, filament);
- **Sections:** Fruit, esp. shape
- **Species:** Fruit/flower/leaves, number/color/form/size, & others



# The Main Type of Fruits

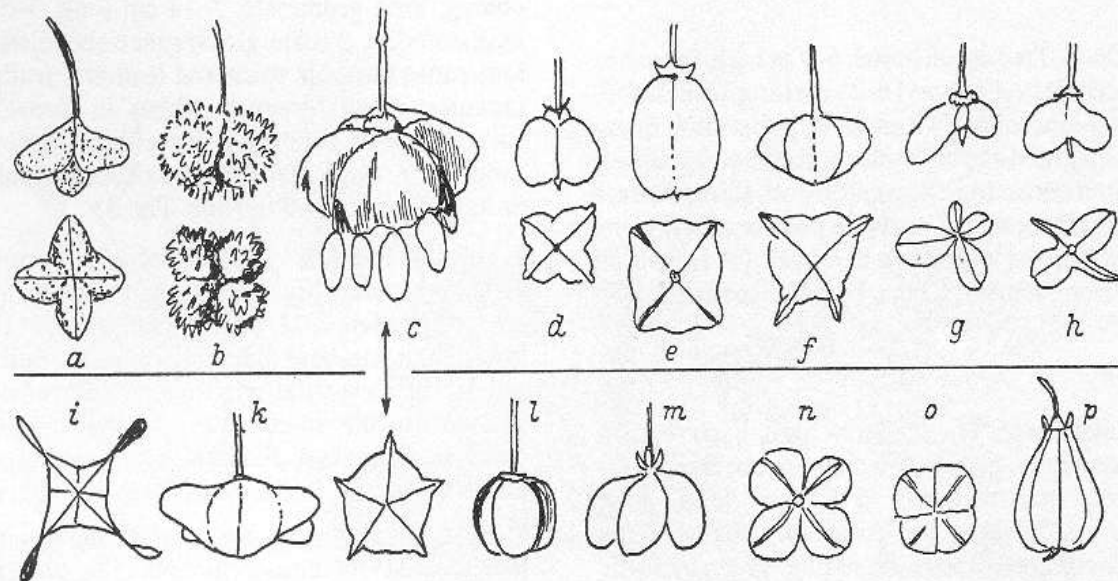


Fig. 35. *Euonymus*, fruit (the first 2 rows are viewed from the side and from beneath respectively). a. *Euonymus atropurpureus*; b. *E. americanus*; c. *E. latifolius*; d. *E. bungeanus*; e. *E. myrianthus*; f. *E. monbeigii*; g. *E. verrucosoides*; h. *E. lucidus*; i. *E. macropterus*; k. *E. sachalinensis*; l. *E. oxyphyllus*; m. *E. europaeus*; n. *E. hamiltonianus* var. *hians*; o. *E. phellomanus*; p. *E. hamiltonianus* (partly from Blakelock)



# SPECIES IN DETAIL

*E. japonica*: longtime cultivated

*E. fortunei* = *E. hederacea*: widely cultivated

*E. hamiltoniana*: widely distribution

*E. bungeana* = *E. maackii*: most cultivated

*E. nitida*: most variable in nature distributed in SE China

*E. pauciflora* = *E. verrucosa*: most widely distribution from Far East to Europe, C Asia





*Euonymus  
japonica*  
“green”



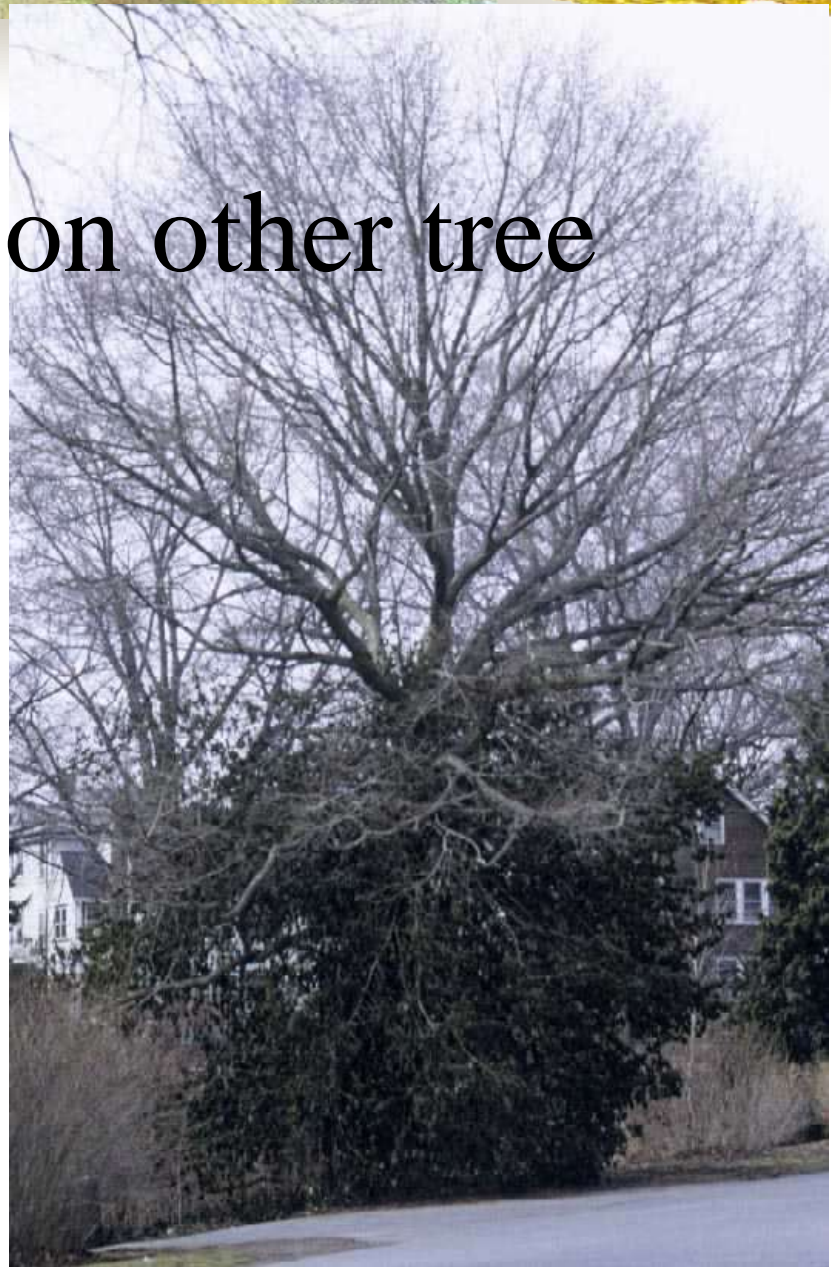




*E. japonica* at early autumn



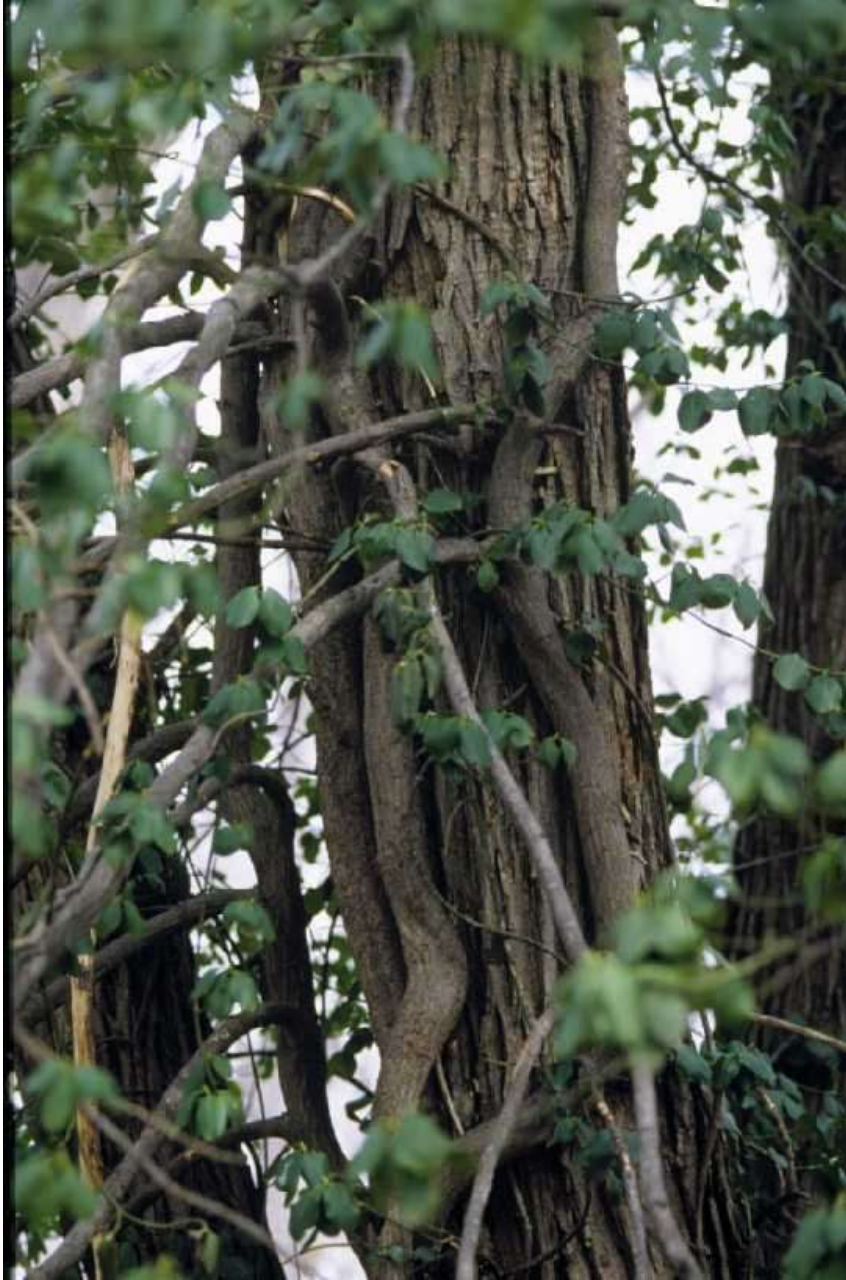
*E. hederacea* on other tree



*E. hederacea*









*Euonymus hederacea* in cult.





*E. hederacea* on the fence



*E. hederacea* w/few white leaves

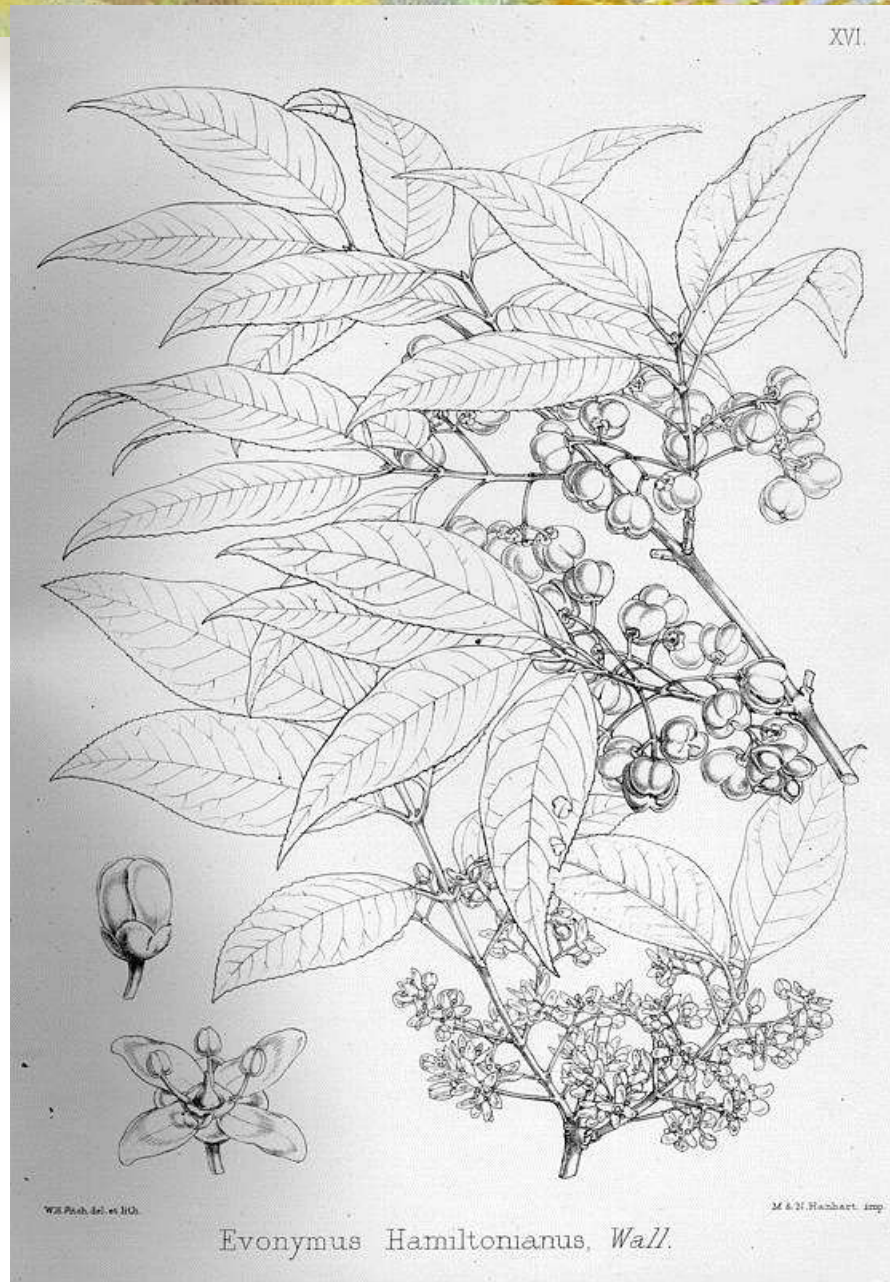




*E. hederacea*



# *E. hamiltonia*



*E. hamiltonia*



N.S. L. 161



*E. hamiltoniana* at early autumn



*E. maackii* at autumn maturity







© Dan Lineberger

*Euonymus bungeanus*  
Winterberry Euonymus



*Euonymus maackii* in autumn





*E. maackii* = *E. bungeana* at autumn



*Euonymus verrucosa* (verrucose)







# The most interesting species

- *E. tingens* from SW China to Himalayas  
W/particular leaves and fruits in autumn;
- *E. szechuanensis* from Sichuan, China  
W/largest flower in the genus (so far);
- *E. venosa* from C China with particular  
Leaves and venation pattern;
- *E. salicifolia* from Yunnan, China and Vietnam
- *E. lichiangensis* from Yunnan, China;
- *E. frigida* from Southwest China;
- *E. cornuta* from the wild collection of China



*E. tingsens*

Fig. 73. *Euonymus tingsens* WALL. – 1. flower branch; 2. petal; 3. fruit.

# *Euonymus szechuanensis*



Fig. 14. *Euonymus szechuanensis* CHEN H. WANG – 1. flower branch; 2. flower; 3. fruit.





*Euonymus  
venosa*



Fig. 46. *Euonymus venosa* HEMSL. – 1. fruit branch; 2. leaves in large; 3. flower; 4. fruit.

# *Euonymus salicifolia*



Fig. 70. *Euonymus salicifolia* Loes. – 1. flower branch; 2. fruit; 3. fruit branch.



*Euonymus lichiangensis* in wild





*Euonymus frigida* w / fruit display





*E. frigida* at later autumn/winter





*Euonymus cornuta* in blooming







# Major Difficulties

- Not enough specimens w/flower & fruit to be used, esp. in S Asia & C. America;
- No bright attractions to the peoples, including professional collectors, some collections are very limited, esp. for some rare/dangerous species;
- Not enough records from field, esp. on some detailed parts of flower & fruit.



# DIFFICULTY OF TAXONOMY

- There are no United Standard in today's taxonomy used by Taxonomists, not only for *Euonymus*, but for all taxa;
- Most taxonomic concepts used by taxonomists are mainly from their experience and their understanding to the taxa they worked on.



# CONCEPT OF SPECIES

- Different in characters: Flower, Fruit, Leaves, Status, Size, Color ... ..
- Independent distribution in geography: distance, barrier, natural isolation ... ..
- Self production system: production for next generation, without hybrid, or abortion without “group”, ... ..





# CONCEPT OF VARIETY

- Different in character: size, color, shape, modification, appendix ... ..
- Different in distribution: short distance, mountain, river, valley, ... ..
- Production system: Maybe / maybe not: most cases without practice, and even no test at all, ... ..



# CONCEPT OF FORM

- Different in one or two character only: any of them ... ..
- Different distribution or share same area ...  
...
- No united system about production system  
... ..



# CULTIVATED TAXONOMY

- Stable character at cultivated condition, which is different from original nature;
- Stable character could be passed to next generation without outside effect;
- Widely accepted both by professionals and by amateurs;
- International Code of Nomenclature for Cultivated Plants is applied - registration





# CULTIVATED TAXONOMY

- Registered on Cultivated / Horticultural Name List and Genetic Conservation Bank are strong recommended / needed;
- Cultivated Taxa should have “Hybrid”, “*Name - Name*”, “CV”, “Cultivar”, followed by epithet, or just ‘*Name*’, but without author’s name.



# Horticultural Values

- Foliage at autumn are attractive, both in the garden / yards and in the fields;
- Opened fruits are particularly beautiful and pretty display with bright colors;
- Hedges and fence as well as lianas-like are special character for some garden, yards as well as in the fields.



# Traditional Chinese Uses

- Barks for substitutes of *Eucommia* with solid latex yields a gutta percha used in Traditional Chinese Medicine longtime;
- Some twigs/braches are also used in the Traditional Chinese Medicine;
- Some timbers are used in dye/color; artistic carving; insecticide too.





# Further Consideration

- Field observation on flower & fruit in detail are very important;
- Evolutional and phylogenetic work should be considered further;
- Cultivated/Horticultural work of Taxonomy are badly needed, esp. for subdivision under common species in today's garden.



# MAJOR REFERENCES


- Wang (1936, 1939): Revision on the Chinese Species;
- Blackluck (1951): Synopsis
- Cheng et al (1999): Flora of China - Chinese Edition: FRPS 44(3);
- Ma (1997, 1998): New Species of Asian *Euonymus*



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- Herbaria: A, BM, E, GH, K, KUN, P, PE, PEM, NA, NY, US, WU;
- Library: Harvard University Herbaria; Arnold Arboretum, Institute of Botany, Chinese Academy of Sciences.





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