

A Revision of *Euonymus* (Celastraceae)

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ABSTRACT: A worldwide revision of the genus *Euonymus* (Celastraceae) is presented, based on materials from most major herbaria. A total of 2 subgenera, 5 sections and 129 species are recognized, including several new combinations, and more than 50 new synonyms, as well as many new distributions. For each recognized species, original literature, type information, synonyms, geographical distribution, specimens examined are covered; detailed descriptions and pertinent discussions are included where necessary. Sequence of the contents is: introduction; history; characters; geographical distribution and floristics, and economic value; taxonomic treatment of subgenera, sections, and 129 recognized species, with mention of nearly 50 excluded species, 20 undescribed species (nom. nud.), and 10 unknown or uncertain species; acknowledgments; major references; species list; citation index; and index of scientific names.

KEYWORDS: *Euonymus*; Celastraceae; revision.

Introduction

My work on *Euonymus* (Celastraceae) for the *Flora of China* began in early winter of 1994. The taxon seemed difficult because I had not approached it before, although there was a semifinished manuscript of *Flora of China* (in Chinese) written by my Ph.D. supervisor, Prof. CHING-YUNG CHENG, who worked on this family for the *Flora of China* for more than 30 years in Beijing Medical University (Herbarium PEM). However, there were at least 20 species names

either in her manuscript or in the herbarium materials left to be confirmed, or sometimes only a name without any sheet information or only the Chinese name without any description. In such situations, I had to search for the specimens annotated by her; and at the same time, I had to search for the other new species in the publications by the others, especially on new species from China and adjacent countries during 1980's-2000.

In the later winter of 1994 to the early spring of 1995, I first worked in Herbarium PE, Institute of Botany, Chinese Academy of Sciences, Beijing, for several months; and then in March 1995, I went to Kunming, to continue my research work on the genus in Herbarium KUN, Kunming Institute of Botany, Chinese Academy of Sciences, since the center of diversity for the genus is mainly in southwest China as well as the neighboring countries of South Asia and the Himalayas. After 2 weeks in Kunming, I returned to PE for further work on specimens not only in that herbarium (PE) and about 200 sheets loaned from KUN, but also including more than 3,000 sheets of loans by Prof. CHENG from various institutes and universities in China in the past 30 years.

After finishing the general work for Flora of China as of July 1995 in China, I was invited to visit the Harvard University Herbaria, to enlarge the original work for Flora of China into the revision of the world, where the primary center for Eastern Asian flora research outside of China, to study the specimens both in the Harvard University Herbaria and many loans from Europe and the Missouri Botanical Garden. The Harvard University Herbaria has become the center for this genus worldwide, because Dr. DAVID E. BOUFFORD and EMILY WOOD had arranged loans from famous Asian collections including those of the Royal Botanical Garden Edinburgh (E) and Kew (K, two loans) as well as the Natural History Museum (BM) in Britain; Paris Natural History Museum Herbarium (P, two loans), Wien University (WU) in Austria, Berlin Botanical Garden (B) in Germany and the Missouri Botanical Garden, St. Louis, USA (MO, two loans). In the latter herbarium are numerous older and recent Chinese collections.

In late 1997, the curators at KUN and PE kindly sent their problematic materials, comprising 484 sheets, to HUH for my further work; and my longtime friend and assistant, Mr. QUANRU LIU at BNU, at my home base either for research or for teaching of Botany in China, sent me his detailed records on the problematic specimens from other institutes and universities but still kept at PEM by Prof. CHENG. During 1996, I also visited the New York Botanical Garden (NY), The Smithsonian Institution (US), and the U.S. National Arboretum (NA) for this work. Based on the above materials (totalling more than 33,000 sheets in 15 herbaria, see below for details), the completion of the present revisionary work has been made possible.

The data on types are attached to the names used in the text. However, International Code of Botanical Nomenclature does not define the status of types of invalid names. Despite this I supplied these data (printed in smaller fonts) since they have been labeled as type in some herbaria and recorded in the Type Database too.

Specimen Statistics (1994 - 2000)

Herbaria	Number of sheets	Geographical Region
A & GH	c. 5,000	Mainly E Asia & N America
B	19	Asia, especially E Asia
BM	c. 287	China & Himalayas
BNU	c. 90	China, especially N China
E	176	China & Himalayas
K	c. 100	Asia, especially S & E Asia
KUN	c. 8,000	China, especially SW China
MO	c. 650+225	China, especially S & SW China
NA	c.1,000	Mostly Asia to Himalayas
NY	c. 350	Mainly North America & E Asia
P	81+181	Mainly China, some S Asia
PE	c. 12,000	China, mainly S & SW China
PEM	c.4,000	China, mainly S & SW China
TEX	48	Central America
US	c.1,000	Asia, Africa and Americas
WU	173	Handel-Mazzetti's collection

Review of History

The most recent work on the genus worldwide is BLAKELOCK's synopsis (1951). This was a complete work at that time since the author identified all the specimens in Kew and the other herbaria in Britain. There were about 177 species in his work and this figure has been considered authoritative in the world since then. However, at that time he did not have adequate materials for study to reflect the detailed information on the taxon in the world, especially from East Asia, the center of diversity for the genus. In fact, he had to leave some species for further work. For example, there are about 15 species in that category in his paper; and also because of the lack of specimens, he had to keep about 20 species as unknown or doubtful, and for another 18 species the specimens were without fruit or other important characters, and thus had to be left for further work or were misidentified by him.

In fact, the fruit is a very important character in this genus (LOESENER 1942, BLAKELOCK 1951, HOU 1963, MA 1997, 1998b). The other question regarding his work was that he divided or recognized too many taxa below the species level, sometimes recognizing up to 20 varieties or forms within one species, such as *E. japonica*. However, these instances should be treated using concepts from horticulture or cultivated plant taxonomy, not general/classic taxonomy. Another problem was BLAKELOCK's misunderstanding of the concept of the species, making one very good species into several "small species" while concurrently mentioning that it should be conspecific with some others in his paper, yet still maintaining them as separate.

Finally, he did not use the proper feminine gender of the genus (PAULT 1998), but used it as masculine. So, it is evident that many species mentioned by

BLAKELOCK are still poorly understood today; this is the major reason for my work on the genus for the *Flora of China*. Since BLAKELOCK's work, many local floras, from both the center of distribution in China and the other continents or countries, were published which provided further detailed information about various species distributions and arrangements. These works include *Flora Malesiana* by D. HOU (1963), *Flora Iranica* by K. H. RECHINGER (1969), *Flora of West Pakistan* by M. A. SIDDIQI (1977), *Flora of Bhutan* by G. D. LONG (1991), *An Illustrated Flora of Vietnam* by P. H. HO (1992), as well as more than 20 local floras within China (MA 1998a). However, like all taxa, some work still remains to be done in the future, especially in some of the developing regions in the taxonomic world, where not enough collected materials are available. Such areas, at least from my review in this work, include Central America, S Asia, Himalayas, and SE Asia (the area covered by *Flora Malesiana*) as well as S and SW China. For these regions, either collections are lacking or in need of taxonomic research, especially compared with our knowledge of the floras of North America and Europe today.

Characters

Habit: Mostly shrubs or shrublike (ascending or climbing stem with adventitious roots on other trees or rocks when available), from less than 1 meter to several meters; sometimes small trees up to more than 10 meters. **Root:** Most species have adventitious roots. At least, all the species in Sect. *Ilicifolia* and Sect. *Kalonymus* except *E. japonica* and *E. oxyphylla* have this character, especially *E. hederacea* always in the climbing form. **Bud:** Mostly small, but some very large, to more than 1 cm long; and this character coevolved with filament and anther sacs, which was used in the first subdivision under the genus. **Stem:** Trunk is generally sympodial and terete in form, and dark brown to green in color; twigs terete or tetragonal, sometimes with 4 winglike, corky angles, such as *E. alata* and *E. phellomana*, gray to green in color, but most are yellow to brown when dried. **Leaves:** Arrangement: almost opposite, rarely combined with alternate or verticillate, such as *E. ternifolia*. Petiole: mostly short, usually less than 1 cm long, occasionally longer and very few without petiole, such as *E. ficoides* in the former and *E. subcordata* in the latter. Shape: mostly ovate, oblong to elliptic, sometimes lanceolate, obovate, even linear, as *E. salicifolia*, *E. euscaphis*; sometimes varied from linear to elliptic even in one species, such as *E. yunnanensis*, and also happening frequently in some cultivated species. Size: mostly middle-sized between 7-10 cm long and 3-5 cm wide; some smaller and less than 3-6 cm long and 1-2 cm wide, or larger than 12 cm long and 6 cm wide. Margin: mostly crenulate or serrate, sometimes entire or denticulate or dentate, such as *E. potingensis* in the former and *E. subcordata* in the latter, or revolute, such as *E. revoluta*. Hairs: almost glabrous, with only a few alpine species having some pubescence below when very young, and very few hairs present at maturity. **Inflorescence:** Typical cyme, but some with only 1 to few (3, 5, 7 etc.) flowers axillary, some terminal, very few with many flowers,

such as *E. acanthocarpa*. Peduncle: mostly short, less than 10 cm long, but the longest may reach more than 10 cm long, such as *E. laxicymosa*. **Flower:** Parts: 4- or 5-merous, mostly so in different species, but sometimes in one species, such as *E. lucida* (syn. *E. pendula*). Sepals: mostly small, less than several mm long, but largest may more than 10 mm long, such as *E. tingens*. Petal Colors: usually two series of colors are present in the genus, one from white to yellow or green, the other from pink, red to purple, and their difference varies even within one species (however, existence of two series in one species has not been observed). Petal Size: mostly small to middle, ca. 3-5 mm long, but several more than 7 mm long, such as *E. grandiflora* and *E. yunnanensis*. Petal Margin: most petals entire, only several ciliate or ciliolate, such as *E. cochinchinensis* and *E. indica*. Stamen: filament present (Subgen. *Euonymus*) or absent (Subgen. *Kalonymus*); anther one (Subgen. *Kalonymus*) or two sacs (Subgen. *Euonymus*), the important characters in the first subdivision of the genus. **Fruit:** Capsule ovoid to globose, with 4- or 5-valves opening on mature fruit (few with only 1 to 3 lobes developed at maturity); fruit shape is used as the most important character in the genus (HOU 1963). There are 5 general types of fruit shape: globose, echinate, lobed, angulate and wings.

Due to such variation, one cannot identify material without mature fruit unless one is very familiar with the genus, especially in the diversity center areas, from E Asia to S Asia and Himalayas (see Geographical Distribution). As for the definition lines among these groups, generally they can be easily discerned, but sometimes may be slightly confused by the fruit shape and appearance. However, these indicate their relationships. For example, *E. oxyphylla*, with obscured angulate or nearly winglike fruits, in the Wings group (since it lacks filament, and also only one sac), connects Globe group and Wings group; another example is that *E. microcarpa* with less angulate and also less globe in the Angulate group, links the Globe and the Angulate groups; and *E. lushanensis* with only several needlelike spines in the Echinate group, but sometimes nearly smooth, like a member of the Globe group, connects between the Echinate and the Globe groups. The above 5 groups are defined as 5 Sections in this paper (see Systematic Treatment). **Seeds:** usually 2 each locule, sometimes only 1 developed, few with more than 2 in each locule; mostly ovoid or rounded, covered by aril perfectly or partly. **Cytology:** Only two chromosome numbers have been reported for *Euonymus*, $2n=32$ and 64 (NATH & CLAY 1972). Although no morphological differences are evident between chromosome complements of *Euonymus* species, different chromosome numbers indicate the occurrence of polyploidy in the genus; and it may reveal interesting relationships from the aspects of hybridization, polyploidy, and apomixis (NATH & CLAY 1972).

Geographical Distribution and Floristics

By continental distribution, among 129 species in the genus, 2 occur in Australia, 3 in North America, 4 in Africa, 4 in Europe, 4 in Central America, and approximately 115 species (c. 88.5%) are found in Asia, as follows: 2 in N Asia, 7

in C Asia, 12 in SE Asia, 15 in Himalayas, 40 in S Asia, and c. 95 species in E Asia. From a floristic consideration, the genus is mainly found in the East Asian Region (including Japan, Korea, Far East of Russia, East, South and Southwest China) to Himalayan Region (including Bhutan, Nepal and Sikkim), as well as South Asian Region (including Bangladesh, Cambodia, India, Laos, Myanmar, Pakistan, Sri Lanka, Thailand and Vietnam), and followed by the Southeast Asian Region (the area covered by Flora Malesiana). By the standard of diversity, most types of the species in the genus are limited to the conjunction area of the E. Asian Region, Himalayan Region and north part of South Asian Region, and here it is called the center of diversity because not only all the types of the species both in the subgenera and in the sections could be found here, but also there are many species centralized in this area, especially compared with the other floristic regions in the distribution area of the genus.

Economic Value

There are two very important contributions to horticulture provided by *Euonymus*: colorful leaves in autumn, and colorful and beautiful fruit shapes. Leaves of many deciduous species leaves turn into rich red/purple and orange tints in the late autumn and even in early winter; and fruits of most species are curious and attractive, especially in the autumn when they have matured and opened with a display visible from a distance. Some species have made a highly valuable contribution to garden landscape as attractive hedges, such as *E. japonica*. Cultivation information from around the world has not yet been summarised, except for Britain (LANCASTER 1981). Another contribution from the genus is medical uses, especially in traditional Chinese medicine. Detailed information is found in the Celastraceae treatment in Flora Reipublicae Popularis Sinicae, Chinese edition of Flora of China (Y. C. CHENG & al. 1999).

Taxonomic Treatment

- Euonymus*** TOURNEF. ex L., Hort. Cliff. 39. 1737 & Sp. Pl. 197. 1753 ('*Evonymus*') (orth. cons.). Type: *E. europaea* L.
 = *Vyenomus* J. PRESL, Bot. Bemerk. 32. 1844 (Type: *V. pendula*).
 = *Melanocarya* TURCZ., Bull. Soc. Imp. Naturalistes Moscou 31: 453. 1858 (Type: *M. pendula*).
 = *Pragmotessera* PIERRE, Fl. Forest. Cochinch. 20: 1, t. 309. 1894 (Type: *P. echinata*).
 = *Pragmotropa* PIERRE, Fl. Forest. Cochinch. 20: 1. 1894 (Type: *P. pendula*).
 = *Sphaerodiscus* NAKAI, J. Jap. Bot. 17: 686. 1941 (Type: *S. cochinchinensis*).
 = *Genitia* NAKAI, Acta Phytotax. Geobot. 13: 21. 1943 (Type: *G. tanakae*).
 = *Kalonymus* (BECK) PROKH. in Kom., Fl. URSS 14: 744. 1949 (Type: *K. maximowicziana*).
 = *Masakia* NAKAI, Acta Phytotax. Geobot. 24: 11. 1949 (Type: *M. carnosa*).
 = *Turibana* NAKAI, Acta Phytotax. Geobot. 24: 11. 1949 (Type: *T. macroptera*).

Shrub, occasionally to small tree, sometimes ascending or clambering, evergreen or deciduous; winter buds present; leaves opposite, rarely combined with alternate or whorled, petiolate. Cymes mostly axillary, occasionally terminal, with one to several dichotomous branches and flowers several to numerous (several dozen). Flower mostly 4-merous, sometimes 5-merous. Sepals small, not evident. Petals large and evident, from light yellow to dark purple in color. Stamens with filament or not; anthers 1-2, disc small and nearly invisible to evident. Ovary 4- or 5-loculed, 2 ovules each locule, sometimes only 1 developed, rarely more than 2. Capsule rugose, globose, echinate, winged or 4- or 5-lobed, septicial, occasionally only 1-3 parts developed; seeds usually 2, sometimes only 1 developed, rarely more than 2, covered wholly or partly by brightly colored aril.

A total of 2 subgenera, 5 sections and 129 species in the genus are recognized in this work, and are generally divided by the following keys into subgenera and sections.

Key to Subgenera and Sections

1. Winter buds usually conic, very acute, large; stamen without filament, anther one cell; capsule winged..... **Subgenus 1. *Kalonymus*, Sect. 1. *Kalonymus***
1. Winter buds usually ovoid, acute, small; stamen with filament or subsessile, anthers 2; capsule without wings.....**Subgenus 2. *Euonymus***
 2. Capsule 4 lobed almost to base, sometimes only 1 to 3 lobes developed **Sect. 3. *Melanocarya***
 2. Capsule unlobed
 3. Capsule echinate, prickly or tuberculate **Sect. 2. *Echinococcus***
 3. Capsule not echinate, prickly or tuberculate
 4. Capsule smooth, rounded or globose **Sect. 4. *Ilicifolia***
 4. Capsule usually rugose and angulate **Sect. 5. *Euonymus***

Subgenus I . *Kalonymus* R. BECK, Fl. Nied.-Oesterr. 2(1): 588. 1892.

Evergreen or deciduous shrubs to small trees; winter buds conic, large, 7 mm - 2 cm long. Flower 4- or 5-merous. Filament sessile, anther of one theca. Ovary 4- or 5-loculed. Capsule with wings, 4- or 5-lobed at maturity after dehiscence.

1 Section and 16 species. Type: *E. latifolia* L.

Sect. 1. *Kalonymus*

Syn.: Sect. *Uniloculares* ROUY & FOUCAUD, Fl. France 4: 159. 1897.

Type: *E. latifolia* L. Same as the subgenus.

16 species total, 1 in Europe, 1 in N Africa, 2 in C Asia, 4 in Himalayas, 4 in S Asia, 15 in E Asia.

Key to Species

1. Flower and fruit always 4-merous
 2. Leaves entire, narrowly lanceolate, 8-12 x 1.5-2 cm; wings of capsule wide and short, more than 5 mm long when fully developed. E Asia.....
..... 7. *E. kweichowensis*
 2. Leaves crenulate to denticulate on margin
 3. Leaves linear or belt-shaped, bamboo-like, the same width from lower to upper, 7-15 cm long, less than 1(-1.5) cm wide, capsule with 4 long wings, up to 1 cm long. E & S Asia, Himalayas..... 2. *E. cornuta*
 3. Leaves ovate to elliptic, various, wider always in middle
 4. Leaves without petiole, ovate-oblong, to 13-15 x 4-6 cm, base cordate, with large serrations on margin. E Asia.... 15. *E. subcordata*
 4. Leaves with petiole, base not cordate, not serrate on margin
 5. Flower red to purple
 6. Wings of capsule short, less than 6 mm long, obtuse at apex. E & S Asia, Himalayas 5. *E. frigida*
 6. Wings of capsule long, more than 6 mm long, sharp at apex. E Asia..... 6. *E. giraldii*
 5. Flower green to yellow
 7. Wings of capsule obtuse at apex; leaves ovate-elliptic, obovate or obovate-elliptic, 5-8 x 2-4 cm. E Asia.....
..... 14. *E. schensiana*
 7. Wings of capsule sharp at apex
 8. Leaves ovate, ovate or obovate, 9-14 x 4-6 cm. E Asia
..... 9. *E. macroptera*
 8. Leaves ovate-elliptic, 6-8 x 3-4 cm. E Asia.....
..... 13. *E. sanguinea*
 1. Flower and fruit usually 5-merous, sometimes combined with 4-merous
 9. Capsule nearly without wing, globose, or with small angles on the connection of locutes; leaves ovate, long-ovate to elliptic; peduncle long, pendulous. E Asia..... 10. *E. oxyphylla*
 9. Capsule always with long and evident wings
 10. Leaves entire; flower and fruit always 5-merous
 11. Leaves broadly elliptic, ovate, ovate-elliptic, 9-13 x 4-6 cm; capsule c. 1.5 cm in diameter, with obscure wings. E Asia 3. *E. ficoides*
 11. Leaves elliptic-ovate or obovate-elliptic, 6-9 x 2.5-4 cm; capsule 1.2-1.4 cm in diameter, with wings less than 5 mm long. E Asia
..... 11. *E. rehderiana*
 10. Leaves margin crenulate to serrate
 12. Flower white, yellow or greenish
 13. Leaves doubly and sharply serrulate; flower 4-, combined with 5-merous; capsule with 4 wings up to 1 cm long, sometimes combined with 5 wings. E, C & S Asia, Himalayas . 4. *E. fimbriata*

13. Leaves singly crenulate to serrulate; flower 4- or 5-merous; capsule with 4-5 short wings less than 6 mm. N Africa, C Asia, Europe..... 8. *E. latifolia*
12. Flower pink, red to purple
14. Leaves ovate-lanceolate, more than 5 times longer than wide; flower 4-5-merous; capsule with 4-5 wings, to more than 1 cm long, E & S Asia, Himalayas..... 1. *E. clivicola*
14. Leaves ovate to elliptic, less than 3 times longer than wide; flower 5-merous
15. Flower large, to 1.2 cm in diam; capsule with 5 wings developed. E Asia 16. *E. szechuanensis*
15. Flower small, 7-9 mm in diam; capsule usually 5 winged, sometimes only 3 or 4 wings developed. E Asia.....
..... 12. *E. sachalinesis*

1. *Euonymus clivicola* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 31. 1917. TYPE: CHINA. Yunnan: Tong Shan, Lat. 27.20 N, alt. 9000 ft, July 1914, G. Forrest 12690 (E?, not seen). [Fig. 1]

= *E. rongchuensis*, C. MARQUAND & SHAW J. Linn. Soc., Bot. 48: 168. 1929. TYPE: CHINA. SE Tibet: Rongchu, F. K. Ward 5791 (E?, not seen).

≡ *E. clivicola* W. W. SM. var. *rongchuensis* (C. MARQUAND & SHAW) BLAKELOCK, Kew Bull. 1951: 279. 1951.

Deciduous shrub, 2-3 m high; branches and twigs slightly sturdy, with striations, brown or gray-brown when dry. Leaves thinly coriaceous or thickly chartaceous, elliptic-lanceolate, 8-12 x 2-3 cm wide, widest in middle, apex acuminate, base subrotund, margin finely crenulate, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole c. 4 mm long. Peduncle slender, to 3-6 cm long, with 1 to 2 dichotomous branches and several flowers; pedicel slender, 4-5 mm long. Flower 4- or 5-merous, 8-11 mm in diam. Sepals subround, short. Petals reddish to purple, ovate, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, 1-1.2 cm in diameter, with 4-5 long and thin wings, to 1.2 cm long when fully developed; seeds with bright red aril.

Phenology. Flowering: May to July; Fruiting: July to November.

Distribution: Bhutan, China (Hubei, Shaanxi, Sichuan, Xizang, Yunnan), Myanmar, Nepal; alt. 2,400-3,850 m, in bushes, in mixed forest; occasional.

SPECIMENS EXAMINED: **BHUTAN:** Gasa, H. Hara et al. 12799 (A), Thimphu, H. Hara et al. 4271 (BM), H. Kanai et al. 729 (A). **CHINA:** HUBEI: Huan-tsao, W. C. Cheng 4122 (A 2 sheets), Shennongjia Forest District, 1980 Sino-Amer. Exped. 608 (A, NY), 639 (A, NA), 865 (A, NA, NY), 1289 (A), 1333 (A, NA, NY), without location, A. Henry 5954 (GH, K); SHAANXI: Taibeishan [Taibaishan], Wm. Purdom 6 (A); SICHUAN: Chingchi [Hanyuan], E. H. Wilson 967a (A), Emeishan, H. G. Xu 4709 (MO), Kuanxian,



Fig. 1. *Euonymus clivicola* W. W. Sm. – 1. fruit branch.



Fig. 2. *Euonymus cornuta* HEMSL. – 1. flower branch; 2. fruit branch.

D. E. Boufford & B. Bartholomew 24768 (A, MO, NY), *E. H. Wilson 3104* (A, MO, US), *3105* (A, US), *3106* (A), *3107* (A), Motienling [Motianling], *F. T. Wang 22459* (A), Omeishan [Emeishan], *C. Y. Chiao & C. S. Fan 805* (A), *W. P. Fang 18871* (A), *23381* (A, P), *Y. S. Liu 1443* (A, NA), Wenchuan, *E. H. Wilson 1049* (A), *4183* (A), Yetsi [Yuexi], *J. F. Rock 24430* (A, NY); XIZANG: Lat. 28.25 N, long. 97.55 E, *F. K. Ward 10124* (A), Lusha Chu (lat. 29.27 N, long. 94.35 E), *F. Ludlow, G. Sherriff & G. Taylor 4667* (A, US), Pome, *F. Ludlow, G. Sherriff & H. H. Elliot 13200* (A, US), *13728* (A), Yume (lat. 28.44 N, long. 93.03 E), *F. Ludlow & G. Sherriff 2222* (A), Tsarung, *G. Forrest 18980* (A), *J. F. Rock 22285* (A, NY), *23159* (A); YUNNAN: Chenkang [Zhenkang], *C. W. Wang 72430* (A), *72511* (A), Chienchuan [Jianchuan] and Mekong divide, *G. Forrest 21544* (A, US), *22025* (A, US), *233426* (PE), Chienchuan [Jianchuan] plain and the Mekong drainage, *J. F. Rock 8597* (A, US), Chungtien [Zhongdian], *T. T. Yu 13438* (A, KUN), Gongshan, *C. W. Wang 66726* (A), Haba Snow Range, *K. M. Feng 1102* (A), Dongchuan, *E. E. Maire s.n.* (P), Lichiang [Lijiang], *R. C. Ching 21583* (A), Mekong and Salween, *H. Handel-Mazzetti 8252* (A, US, WU), *8912* (WU), Mekong-Salween watershed, *J. F. Rock 8808* (A, US), Mekong-Yangtze divide, *J. F. Rock 9164* (A, US), Tali [Dali], *C. Schneider 2722* (A, GH), Weise [Weixi], *H. T. Tsai 59674* (A), *59679* (A), *59716* (A), *63068* (A), *C. W. Wang 64741* (A), *64484* (A, PE 2 sheets), *68673* (A), without locality, *P. J. M. Delavay 3923* (P), *T. T. Yu 8424* (A), Yangbi, *1981 Sino-Brit. Exped. 204* (A). **MYANMAR:** Htawgaw, *F. K. Ward 174* (A), Lat. 28. 20 N, Long. 97. 45 E, *F. K. Ward 9592* (A). **NEPAL:** Thakma, *H. Kanai et al. 6303409* (A).

This species is very similar to *E. cornuta*, but the leaves are usually wider than those of *E. cornuta*, (and it looks like *E. frigida*, which has the widest part of the leaves in the middle), with finely crenulate margin, and capsule with 4 or 5 long wings, which is much different from the latter which has only 4 wings. The species was recorded from Qinghai (Y. R. Li 1993), which cannot be verified by this work.

2. *Euonymus cornuta* HEMSL., Kew Bull. 1893: 209. 1893. SYNTYPES: CHINA. Hupeh: Fang and Chienshih, *A. Henry 5442a* (GH!), *5954a* (GH! US!). [Fig. 2]

- = *E. cornutoides* LOES., Notes Roy. Bot. Gard. Edinburgh 8: 2. 1913. TYPE: CHINA. Yunnan: the eastern flank of the Lichiang Range, Lat. 27.25 N, alt. 10,000-11,000 ft, Oct. 1906, *G. Forrest 3094* (not seen).
- = *E. quinquecornuta* H. F. COMBER. Notes Roy. Bot. Gard. Edinburgh 18: 243. 1934. TYPE: CHINA. Yunnan: Mekong-Salwin divide, lat. 28.10 N, alt. 10,000 ft, Oct. 1914, *G. Forrest 13446* (not seen).
 - ≡ *E. cornuta* HEMSL. var. *quinquecornuta* (H. F. COMBER) BLAKELOCK, Kew Bull. 1948: 241. 1948. TYPE: CHINA. Hupeh: Chienshih or Fang, *A. Henry 6815a* (not seen, this is a wrong typification for the combination made from a previously described name).
- *E. cornuta* HEMSL. var. *typica* BLAKELOCK, Kew Bull. 1948: 240. 1948, nom. inval. TYPE: CHINA. Hupeh: *A. Henry 5442* (BM!).

Deciduous shrub, 2-3 m high; branches and twigs somewhat slender, with striations, brown or gray-brown when dry. Leaves thinly coriaceous or thickly

chartaceous, linear, belt-shaped, or bamboo-like, 7-15 x less than 1 (1.5) cm, same width throughout leaf, apex acuminate, base subrotund, margin sparsely crenulate, lateral veins 8-13 pairs, invisible or disappearing before reaching the margin; petiole c. 4 mm long. Peduncle slender, to 3-5 cm long, with 1-2 dichotomous branches and several flowers; pedicel slender, 4-5 mm long. Flower 4-merous, 7-10 mm in diam. Sepals subround, short. Petals reddish to purple, ovate, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1 cm in diam., with 4 long and thin wings, to c. 1 cm long when fully developed; seeds with bright red aril.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: China (Henan, Hubei, Shaanxi, Sichuan, Xizang, Yunnan), India, Myanmar, Sikkim; alt. 2,200-4,300 m, in bushes or in mixed forest; occasional.

SPECIMENS EXAMINED: **CHINA:** HENAN: Lushih [Lushi], *J. Hers* 1163 (A); HUBEI: Fang Hsien [Fangxian], *E. H. Wilson* 558 (A, US), without locality, *E. H. Wilson* 913 (NY), 2317 (P); SICHUAN: Baoxing, *K. L. Chu* 2971 (P), Chengkou, *P. G. Farges* 1180 (P 2 sheets), s.n. (P), Huili, *H. Handel-Mazzetti* 5158 (WU), Kuanxian, *E. H.* 4291 (A, US), Maochou, *E. H. Wilson* 558a (A), Omeishan [Emeishan], *W. P. Fang* 2909 (A, NY), 7763 (A, NY), 18875 (A), Tahsiangling [Daxiangling], *H. Smith* 10113 (MO), Wenchuan, *F. T. Wang* 21006 (A), 21137 (A), 21142 (A), *E. H. Wilson* 1047 (A, GH, MO, US); YUNNAN: Bijiang, *H. T. Tsai* 58350 (A), 58424 (A), Chienchuan [Jianchuan] plain and the Mekong drainage, *J. F. Rock* 8637 (A, US), Hokin [Heqing], *K. M. Feng* 762 (A), Upper Kiukiang Valley, *T. T. Yu* 19623 (A), Lanping, *H. T. Tsai* 54005 (A), 56292 (A), N'Maikha-Salween divide, *G. Forrest* 18197 (A), Shweli-Salwin divide, *G. Forrest* 19356 (A, US); Yangbi, 1984 *Sino-Amer. Exped.* 317 (A, US), 704 (A, US), without locality, *F. Ducloux* 5302 (P), *P. S. Ten* 187 (A), *H. T. Tsai* 57819 (A), *E. H. Wilson* 3333 (A), *G. Forrest*, 24292 (NY, US), 26244 (A, NY, US), Zhongdian, *Qinghai-Xizang Exped.* 1162 (PE 2 sheets), 1591 (PE). **E HIMALAYA:** Lacheu-Thaugu, *K. Biswas* 6636 (A 2 sheets), Bensar, *G. H. Cave* s.n. (A). **INDIA:** Darjeeling, *H. Hara et al.* 6585 (A), Sirhoi, *F. K. Ward* 17410 (A), West Bengal, Singalila Range, *F. de Vos & E. G. Corbett* 95 (NA). **MYANMAR:** Adung valley, *F. K. Ward* 9469 (A). **SIKKIM:** Phusum, *N. L. Bor & K. Ram* 20585 (A).

This species is very similar to *E. clivicola*, but the leaves in this species are the narrowest in the genus, less than 1 (1.5) cm, linear or belt form, bamboo-like, with the same width from below to above, with sparsely crenulate margin; flower only 4-merous, and fruit only with 4-lobes when open, not 4- or 5-merous or -lobed. The species was reported from Gansu and Hunan (Flora of Sichuan 4: 317. 1988 and Vascular Plants of the Mt. Hengduan 1: 1102. 1993), but the records cannot be verified by this work. The distribution of Shaanxi is from HE & QU's work (1988) and the distribution of Xizang is from Y. R. LI (1993).

3. *Euonymus ficoides* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 10: 94, fig. 6. 1997. TYPE: CHINA. Yunnan: Marlipo, Pan Chia Chu, 31 Oct 1947, ca. 1700 m, *K. M. Feng* 12627 (holotype: PE!, isotype: A!, KUN 2 sheets!).

- *E. dolichopoda* C. Y. CHENG, ms., nom. inval. Type: Yunnan.
- *E. trabeculata* C. Y. WU, in herb., nom. inval.

Evergreen shrub, 2-3 m high; branches and twigs sturdy, brown or gray-brown when dry. Leaves thickly coriaceous, ovate or ovate-elliptic, 9-13 x 4-6 cm, apex acuminate or acute, base semirotund, attenuate, or cuneate, margin nearly entire, sometime revolute, lateral veins 8-12 pairs, curved forward, netting and disappearing before reaching the margin; petiole 1.5-2 cm long, sturdy. Peduncle 5-6 cm long, with 1-2 dichotomous branches and several flowers; pedicel short, less than 1 cm long. Flower 5-merous, not seen. Capsule red when fresh, or dark brown when dry, nearly globose, c. 1.5 cm in diameter, with 5 obscure wings at maturity; seeds 2, with orange aril.

Phenology: Flowering: Unknown; Fruiting: October to November.

Distribution: China (Yunnan); alt. 1,200-2,100 m, in thickets or in mixed forest; rare.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Guangnan, C. W. Wang 87879 (KUN), 88060 (KUN 2 sheets), Marlipo [Malipo], K. M. Feng 12709 (A, KUN 2 sheets, PE), 13556 (A, KUN 2 sheets, PE), Xichou, Q. A. Wu 7359 (KUN 2 sheets), 7428 (KUN 2 sheets).

This is a very interesting species, with large, coriaceous, evergreen leaves, and wings of the fruit that are very short or inconspicuous at first glance, and which is quite similar to *E. oxyphylla*, but not to other species.

4. *Euonymus fimbriata* WALL. in ROXB., Fl. Ind. 2: 408. 1824. SYNTYPES: INDIA. Sewalik: N. Wallich Cat. 4287 (BM! E! 2 sheets, GH! K!). [Fig. 3]

- = *E. lacera* HAM. ex D. DON, Prodr. Fl. Nepal. 191. 1825. TYPE: INDIA. Chamba: R. N. Parker s.n. (K!).
- = *E. micrantha* D. DON, Prodr. Fl. Nepal. 191. 1825. TYPE: NEPAL. N. Wallich Cat. s.n. (not seen).
- = *E. fimbriata* WALL. ex ROXB. var. *serrata* BLAKELOCK, Kew Bull. 1951: 279. 1951. TYPE: NEPAL: W. Hamilton s.n. (not seen).

Deciduous tree, to 15 m tall and 45 cm in diameter; branches and twigs sturdy, young ones usually slender, brown or gray-brown when dry. Leaves coriaceous, elliptic-ovate, 6.5-10 (15) x 4-6 cm, apex acuminate or acute, base semirotund, attenuate, or cuneate, margin sharply doubly serrulate, sometimes combined with single sharp serrulations, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole 5-10 mm long. Peduncle arising from new branches only, slender, 3-4 cm long, with 2-4 dichotomous branches and several to many flowers; pedicel short, slender, c. 6 mm long. Flower 4-merous, sometimes combined with 5-merous, small, less than 6 mm in diam. Sepals deltoid, very small. Petals ovate-rotund, yellow-green or greenish-yellow. Capsule pink to red when fresh, or brown to greenish-brown when dry, nearly compressed-globose, c. 1.2 cm in diameter, with 4 long and flat wings, to more



Fig. 3. *Euonymus fimbriata* WALL. – 1. fruit branch.

than 1 cm long, sometimes combined with 5, opening into 4 lobes or sometimes 5 when fully developed; seeds 2, with orange aril.

Phenology. Flowering: April to May; Fruiting: July to August.

Distribution: Afghanistan (East), China (Xizang), India, Kashmir, Nepal, Pakistan, Sikkim; alt. 2,100-3,300 m, in open ground or open woodland; common.

SPECIMENS EXAMINED: **AFGHANISTAN:** Without locality, *J. E. T. Aitchison* 375 (BM, GH). **CHINA:** XIZANG: Gyirong 1975 *Xizang Exped.* 23 (PE). **HIMALAYAS:** Bashahr, *J. H. Lace* 81 (E), Northwest, *J. H. Lace* 384 (BM, E), 1791 (E), Without locality, *D. Brandis* 893 (A), *J. D. Hooker & T. Thomson s.n.* (GH), *J. D. Hooker & T. Thomson s.n.* (K 2 sheets). **INDIA:** Chamba State, *R. N. Parker s.n.* (A), *R. Ellis s.n.* (K), Chitral, *J. D. A. Stainton* 2349 (BM), Dehra Dun, *C. E. Parkinson* 3988 (E), Garhwal, *J. F. Duthie* 1445 (BM), 1447 (BM), 13002 (BM, WU), *R. Strachey & J. E. Winterbottom* 4 (GH), Jaunsar, *J. S. Gamble* 22957 (K), *K. Nand* 151 (E), 10505 (E), Kagan Valley, *R. N. Parker s.n.* (A 2 sheets), Kangra, *G. S. Hart* 81 (E), Kanjilal, *B. C. Datta* 25 (A), Pradesh, *D. D. Awasthi* 864 (B), Punjab, *W. Koelz* 8499 (NA), 8687 (NA), *R. N. Parker* 2842 (A), *R. R. Stewart* 2886 (A), Tehri, *W. Koelz* 22110 (NA). **KASHMIR:** *J. F. Duthie s.n.* (BM), 14012 (BM, E, WU), *C. R. Lancaster* 42 (BM), 242 (BM), *F. Ludlow* 25 (BM, E). **NEPAL:** Bhartha Logna, *N. V. Polunin et al.* 1943 (BM, E), Dhumpu, *J. D. A. Stainton et al.* 950 (BM), 4247 (BM), 4830 (BM), *J. F. Dobremez* 2003 (BM), 2255 (BM), 2228 (BM), Jumla, *J. D. A. Stainton* 5421 (BM), *H. Ohba et al.* 40213 (A, BM, E), Kali Gandaki, *G. Mieke* 596 (BM), 754 (BM), Khaptad, *T. B. Shrestha* 4060 (US), Kholu, *N. V. Polunin et al.* 875 (A, BM, E), 2034 (A, BM 2 sheets), 2064 (A, BM, E), 2099 (A, BM, E), Kurari, *N. V. Polunin et al.* 1891 (A, BM, E), Lete, *J. D. A. Stainton et al.* 5544 (BM, E), Padmara, *N. V. Polunin et al.* 4045 (BM, E), Pudamigaon, *N. V. Polunin et al.* 3547 (BM, E), Sialgarhi, *N. V. Polunin et al.* 947 (BM), (E), Yamakar, *J. F. Dobremez* 136 (BM). **PAKISTAN:** Lahul, *N. L. Bor s.n.* (E), Punjab, *W. Koelz* 1979b (A), Tuarkhel, *R. R. Stewart* 25495 (BM, GH). **SIKKIM:** Without locality, *J. D. Hooker & Thomson s.n.* (GH).

This is a common species, and is very easily identified in the section due to the sharp and double serrulations on the leaf margin, which are sometimes combined with single serrulations or even becoming erose. Another character of the species is the usually 4-merous flower and fruit, which is sometimes combined with 5-merous parts, which is very rare in the genus. REHDER (1926) and WANG (1939) wrongly identified *E. giraldii* from Shensi [Shanxi] as this species. However, the plants are very different from each other (see above key), and also this species occurs only in the Himalayas, whereas the latter is more widely distributed.

5. *Euonymus frigida* WALL. in ROXB., Fl. Ind. 2: 409. 1824. TYPE: NEPAL. Gosain-Than: *N. Wallich Cat.* 4288a (not seen). [Fig. 4]

= *E. amygdalifolia* FRANCH., Bull. Soc. Bot. France 33: 453. 1886. TYPE: CHINA. Yunnan: in dumetis montis Tsanchan, supra Tali, alt. 3000 m, 10 Jun. 1885, *P. J. M. Delavay* 1891 (not seen, merotype A! E!, photo A! E!).

- = *E. crinita* PAMP., Nuovo. Giorn. Bot. Ital. 17: 417. 1910. TYPE: CHINA. Hupeh: Tcenjuho, 1906, A. *Silvestri* 1351(not seen, merotype A!, photo A! PE!).
- = *E. crinita* PAMP. var. *minor* PAMP., Nuovo. Giorn. Bot. Ital. 17: 418. 1910. TYPE: CHINA. Hupeh: Kaokienscian, alt. 800 m, 1907, A. *Silvestri* 1352 (not seen, merotype A!, photo A! PE!).
- = *E. roseoperulata* LOES., Notes Roy. Bot. Gard. Edinburgh 8: 1. 1913. TYPE: CHINA. Yunnan: Tali, lat. 25.40 N, alt. 8000-9000 ft, May-June 1906, G. *Forrest* 4756 (E!).
- = *E. taliensis* LOES., Notes Roy. Bot. Gard. Edinburgh 8: 3. 1913. TYPE: CHINA. Yunnan: the eastern flank of the Tali Range, lat. 25.40 N, alt. 8000-9000 ft, June-July 1906, G. *Forrest* 4798 (A! E!).
- = *E. dasydictyon* LOES. & REHDER in SARG., Pl. Wilson. 1: 496. 1913. TYPE: CHINA. Western Szechuan: Mupin, alt. 1600-2600 m, July 1908, E. H. *Wilson* 3110 (A! MO! US!, in part, fruiting specimens only).
- = *E. porphyrea* LOES., Notes Roy. Bot. Gard. Edinburgh 8: 2. 1913. TYPE: CHINA. Yunnan: the eastern flank of the Lichiang Range, lat. 27.12 N, alt. 10,000 ft, May 1906, G. *Forrest* 2240 (A!).
- = *E. pygmaea* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 35. 1917. TYPE: CHINA. Yunnan: Western flank of the Shweli-Salween divide, lat. 25.20 N, alt. 7000-8000 ft, Aug. 1912, G. *Forrest* 8961 (A! E! K!).
- = *E. wardii* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 37. 1917. TYPE: BURMA. Htawhaw: valley of Naung-Chaung, Lashi country, East Upper Burma, May 1914, F. K. *Ward* 1543 (not seen).
 - ≡ *E. frigida* WALL. ex ROXB. var. *wardii* (W. W. SM.) BLAKELOCK, Kew Bull. 1948: 239. 1948.
- = *E. frigida* WALL. ex ROXB. var. *elongata* COWAN & A. M. COWAN, Trees N. Bengal 35. 1929. TYPE: SIKKIM. J. S. *Gamble* 10406 (not seen).
 - ≡ *E. frigida* WALL. ex ROXB. f. *elongata* (COWAN & A. M. COWAN) H. HARA, Fl. E. Himal. 2nd Rep. 189. 1971.
- = *E. burmanica* MERR., Brittonia 4: 105. 1941. TYPE: BURMA. F. K. *Ward* 9376 (A!).
- = *E. assamica* BLAKELOCK, Kew Bull. 1948: 242. 1948. TYPE: INDIA. Assam: Delei valley, lat. 28.5 N, long. 96.30 E, alt. 5,000 ft, 19 March 1928, F. K. *Ward* 7972 (not seen).
- = *E. porphyrea* LOES. var. *elliptica* BLAKELOCK, Kew Bull. 1951: 280. 1951. TYPE: CHINA. Sichuan; G. *Forrest* 21240 (A! US!).
- = *E. austro-tibetana* Y. R. LI, Acta Bot. Yunnan. 3(3): 355, f. 5. 1981. TYPE: CHINA. Xizang: Cona, alt. 3,200 m, Sept. 9, 1975, *Qinghai-Xizang Exped. (Suppl.)* 751851 (KUN!, 2 sheets, PE!).
- *E. gongshanensis* Y. R. LI, Vasc. Pl. Mt. Hengduan 1:1104. 1993, nom. nud.
- *E. fugongensis* Y. R. LI in W. T. Wang, Vasc. Pl. Mt. Hengduan 1:1102. 1993, nom. nud. TYPE: CHINA. Yunnan: Fugong, *Qinghai-Xizang Exped.* 7120 (fl., KUN! 2 sheets, PE!), 7240 (fl., PE! 2 sheets).

- *E. frigida* WALL. ex ROXB. var. *typica* BLAKELOCK, Kew Bull. 1948: 238, 1948, nom. inval. TYPE: NEPAL. Gosain Than, *N. Wallich Cat.* 4288a (not seen).

Deciduous shrub to small tree, 3-7 m high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry. Leaves thickly chartaceous or thinly coriaceous, elliptic-lanceolate to ovate-elliptic, with much divergence, 6-11 x 2-3.5 cm, widest part in middle, apex acuminate or acute, base subrotund, cuneate or attenuate, margin finely crenulate, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole less than 1 cm long. Peduncle slender, 7-10 cm long in full development, with 1-2 dichotomous branches and several flowers; pedicel slender, 5-6 mm long. Flower 4-merous, less than 8 mm in diam. Sepals subround, short. Petals reddish to purple or chocolate, ovate, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1 cm in diam., with 4 short and obtuse wings, less than 6 mm long when fully developed; seeds with bright red aril.

Phenology. Flowering: May to July; Fruiting: August to November.

Distribution: Bhutan, China (Guizhou, Henan, Hubei, Ningxia, Qinghai, Sichuan, Xizang, Yunnan), India, Myanmar, Nepal, Sikkim; alt. 500-4,000 m, in bushes or in mixed forest; common.

SPECIMENS EXAMINED: **BHUTAN:** Dam Thamg, S. B. Lyon 3174 (BM), Laya, F. Ludlow & G. Sherriff 17351 (BM), Tashigang-Ngachung La, S. B. Lyon 10060 (E). **CHINA:** GUIZHOU: Anlong, C. Z. Dang 840 (PE); HUBEI: Enshih [Enshi], H. C. Chow 1958 (A), Wudangshan, NACPE 1994 WD 131 (NA 2 sheets); SICHUAN: Baoxing, K. L. Chu 2991 (BM), 3031 (BM), 3190 (BM), S. Y. Hu 1316 (A 2 sheets), Emei, H. G. Xu 5356 (MO), Fengjie, T. Y. Chang 25310 (KUN, PE, SZ), Leibo, *Anonymous* 197 (MO), Lifan [Lixian], S. Y. Hu 2057 (A), Luding, H. L. Tsiang 37838 (IBSC), Maoxian, F. T. Wang 22055 (KUN, PE), Nanchuan, Y. Y. Ho 4829 (NAS), Taining and Maoni, H. Smith 12599 (MO), Tianquan, K. L. Chu 2630 (P), 2631 (P), 2754 (P), Yenyuen et Kwapi, H. Handel-Mazzetti 2296 (WU); XIZANG: Mainling, P. S. Li & S. Z. Cheng 5554 (PE 3 sheets), Medog, P. S. Li & S. Z. Cheng 5221 (PE 2 sheets), Qinghai-Xizang Exped. 74-3930 (KUN, PE 2 sheets), 74-3835 (KUN 2 sheets, PE), 74-3956 (KUN, PE), *Scientific Exped.* 1566 (KUN 3 sheets, PE 2 sheets), Putsang (lat. 29. 05 N, long. 96. 33 E) River, F. K. Ward 10949 (BM), Tsarong, G. Forrest 22945 (E, K), without locality, G. Forrest 23435 (BM, E, K, PE), F. K. Ward 5873 (K 2 sheets), Zayu, Qinghai-Xizang Exped. 10010 (KUN); YUNNAN: Bijiang, H. T. Tsai 58089 (A, NAS), S. K. Wu 8693 (KUN 2 sheets), Dali, H. Handel-Mazzetti 8725 (WU), K. Iwatsuki et al. 1617 (KUN), 1681 (KUN), H. Koyama et al. 738 (A, KUN), 869 (KUN), 1009 (KUN), H. Li et al. 1042 (KUN), T. N. Liou 21225 (PE), J. Murata 33 (A), 1981 *Sino-Brit. Exped.* 812 (A, E), 1984 *Sino-Amer. Exped.* 1187 (A), C. W. Wang 63248 (A), W. T. Wang 458 (KUN), *Zhongdian Exped.* 63-3857 (KUN), Deqen, K. M. Feng 6889 (KUN, PE), Gongshan, K. M. Feng 8310 (KUN, PE), 8142 (KUN, PE), *Nanshuibeidiao Exped.* 8513 (KUN), 8709 (KUN), 9018 (KUN), Qinghai-Xizang Exped. 2165 (KUN), 8165 (KUN, PE 2 sheets), 8396 (KUN 2 sheets), 8480 (KUN 2 sheets), 8784 (KUN 2 sheets), 8810 (KUN), 8937 (KUN), 9606 (KUN, PE), 9799 (KUN), C. W. Wang 67470 (A), 67476 (KUN, PE 2 sheets), T. T. Yu 20664 (KUN, PE), 23248 (KUN, PE 2 sheets), Fugong, Qinghai-Xizang Exped. 7002 (KUN 2 sheets), Jingdong, P. Y. Chiu 52959 (KUN 2 sheets, NAS), 53820 (KUN 2 sheets), M. K. Li 2035 (KUN, PE), C. W. Wang 67467 (PE 2 sheets), Q. A. Wu 9403 (KUN), C. H. Yang et al.

101424 (KUN), Kiukiang Valley, T. T. Yu 19548 (PE 2 sheets), Landsang-djiang [Mekong], H. Handel-Mazzetti 7998 (WU), Landsang-djiang [Mekong] et Lu-djiang [Salween], H. Handel-Mazzetti 8358 (WU), Likiang [Lijiang], R. C. Ching 20469 (A), 20803 (KUN), 20808 (A), 21582 (KUN, PE), 21985 (A, KUN, PE), G. Forrest 5575 (US), Longquan to Dali, 1981 Sino-Brit. Exped. 597 (A, E), 598 (A, E), 844 (A), Lushui, Nujiang Exped. 1816 (KUN 2 sheets), Maikha-Salween divide, G. Forrest 17989 (E), 18101 (A, E), Mekong-Salwin Divide, T. T. Yu 20087 (KUN, PE), 20116 (KUN), Pianma, S. K. Wu 8441 (KUN), 8451 (KUN), Salwin-Kiu Chiang divide, G. Forrest 21614 (A, E, US), Upper Salwin River, J. F. Rock 22127 (A, NY), Shangpa [Fugong], H. T. Tsai 54516 (A), 58725 (A, PE 2 sheets), 59072 (A, SZ), Shunning [Fengqing], T. T. Yu 15979 (A 2 sheets, KUN 2 sheets), Shweli-Salween divide, G. Forrest 15752 (E), 17511 (A, E), 18011 (A 2



Fig. 4. *Euonymus frigida* WALL. – 1. flower branch; 2. fruit branch.

sheets, E), 24298 (BM, E, K, PE), 24268 (BM, E, K, PE), Taron-Taru Divide, T. T. Yu 20003 (A, PE 3 sheets), 20295 (KUN, PE), 20350 (KUN 2 sheets, PE), 20920 (A, KUN 2 sheets, PE 2 sheets), Weisi [Weixi], K. M. Feng 4343 (KUN), 4769 (IBSC, KUN), 7520 (KUN), 20909 (KUN, PE), 24122 (KUN 3 sheets), 24307 (KUN), P. I. Mao 45 (KUN), Nanshuibeidiao Exped. 8374 (KUN), Qinghai-Xizang Exped. 6680 (KUN), C. W. Wang 63803 (IBSC, KUN, NAS), 63961 (A, IBSC, NAS, PE), 67844 (A, KUN, N, PE 2 sheets), Yangbi, 1984 Sino-Amer. Exped. 308 (E), 316 (A, E, US), 630 (A, E, US), Yiliang, H. T. Tsai 52107 (A, IBSC), Yungning [Ningliang], G. Forrest 21232 (A, BM), H. D. McLaren 58 (A, BM), Lat. 27.25 N, long. 99.18 E, G. Forrest 25948 (E, K), Lat. 28.25 N, Long. 99.55 E, F. K. Ward 10152 (A), without locality, G. Forrest 9002 (E), 10467 (A, BM), 15810 (A, E), 18485 (E), 18799 (E), 18800 (E), 26727 (A, E), 28032 (E), 29061 (E), E. E. Maire 439 (A), H. T. Tsai 57374 (A), 57445 (A), P. S. Ten 301 (A), 428 (A, E), 547 (A, E, US), T. T. Yu 11461 (A, KUN), 19275 (IBSC). **INDIA:** Assam, F. K. Ward 11655 (BM), 14348 (BM), Darjeeling, H. Hara et al. 6582 (A), W. Koelz 10538 (NA), without locality, REPGI 11442 (A). **MYANMAR:** Lat. 27.00 N, long. 97.45 E, F. K. Ward 13163 (BM), Lat. 27.45 N, long. 97.50 E, F. K. Ward 9216 (A), 13001 (BM), Northeast, G. Forrest 29667 (E, PE), F. K. Ward 1580 (E), North Triangle, F. K. Ward 21002 (A), 20828 (A). **NEPAL:** Bagmati, D. H. Nicolson 2477 (US), Topke Gola, J. D. A. Stainton 296 (BM), Hurta, J. D. A. Stainton 6311 (BM), Iswa Khola, L. W. Beer 25557 (BM), Jumla, N. V. Polunin et al. 3162 (BM), Jagdula Khola, J. D. A. Stainton 4248 (BM), Dudh Kosi, J. D. A. Stainton 6573 (BM), Timure, O. Polunin 749 (BM). **SIKKIM:** Without locality, J. D. Hooker & T. Thomson s.n. (GH).

This is the most variable species in the genus because its morphological characters change to a great extent: leaves are usually elliptic or long elliptic, sometimes ovate-elliptic or even elliptic-oblong; the wings at fruit apex are usually very short, especially compared to *E. clivicola*. Another important finding is that 3- and 4-merous parts may co-exist in the same specimen (*H. L. Tsiang* 37838 from Sichuan), which is a very rare case in the genus besides *E. sachalinensis*, which is distributed in the Far East of Russia, NE China as well as Japan (see below for detail). The species was reported from Shanxi (Flora of Sichuan 4: 309. 1988 and Vascular Plants of Mt. Hengduan 1: 1101. 1993), although those records cannot be verified in the present work.

6. *Euonymus giraldii* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 442, t.5, fig. C. 1900. TYPE: CHINA. Shensi: Thaipeshan, Sept. 1899, *G. Giraldi* s.n. (A! 2 sheets, here designated). [Fig. 5]

- = *E. sachalinensis* MAXIM., Fl. Tangut. 1: 110. 1889, non MAXIM. 1881, nom. illegit. superfl.
 - ≡ *E. sachalinensis* (FRIEDR. SCHMIDT) MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 28: 446. 1881 (p. p. only Kansu, China).
- = *E. giraldii* LOES. ex DIELS var. *ciliata* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 443. 1900. TYPE: CHINA. Hupeh: A. Henry 6815 (not seen, merotype A!, photo A!).
- = *E. giraldii* LOES. ex DIELS var. *angustialata* LOES., Bot. Jahrb. Syst. 36, nr. 82: 72. 1905. SYNTYPES: CHINA. Shaanxi: Taipashan, Huantoushan, *G. Giraldi*

2747 (not seen) et 2750 (not seen), Huatsopin, *G. Giraldi* 230 (not seen); et LOES. in Sarg., Pl. Wilson. 1: 495. 1913, nom. inval. SYNTYPES: CHINA. Western Hupeh: Hsing-shan, alt. 1300-2300 m, June 5, 1907, *E. H. Wilson* 356 (A! GH! MO! US!); Szechuan: southeast of Sungpan, alt. 2300-3000 m, August 1910, *E. H. Wilson* 4566 (A!); W. China: without precise locality, alt. 3600 m, Sept. 1903, *E. H. Wilson* (*Veitch Exped.*) 3334 (A!).

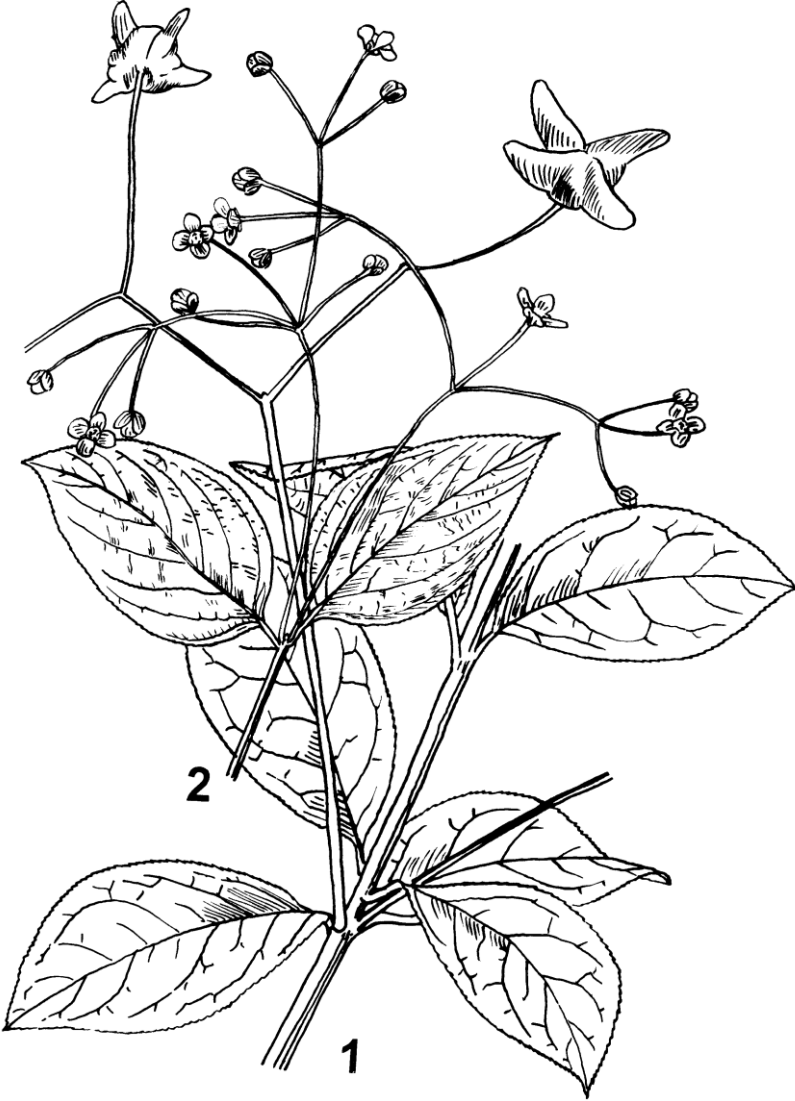


Fig. 5. *Euonymus giraldii* DIELS – 1.fruit branch; 2. flower branch.

- = *E. kansuensis* NAKAI, Bot. Mag. (Tokyo) 49: 418. 1935, in note.
- = *E. pashanensis* S. Z. QU & Y. H. HE, Bull. Bot. Res., Harbin 8(4): 95, f. 8-10. 1988. TYPE: CHINA. Shaanxi: Ningqiang, alt. 1,420 m, Oct. 13, 1963, S. Z. Qu 2948 (not seen).
- = *E. perbellus* C. Y. CHANG, Bull. Bot. Res., Harbin 5(1): 87, photo 2. 1985. TYPE: CHINA. Sichuan: Dege, alt. 3,100 m, June 12, 1977, *Sichuan Exped.* 15069 (not seen).
- *E. giraldii* LOES. ex DIELS var. *genuina* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 443. 1900, nom. inval. TYPE: CHINA. Shaanxi: Hange des Taipaishan, *G. Giraldi* 1478 (not seen, merotype A!, photo A!).

Deciduous shrub or small tree, 3-7 m high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry; leaves thickly chartaceous or thinly coriaceous, elliptic-lanceolate to ovate-elliptic, with much divergence, 6-8 x 2-3.5 cm, widest part in middle, apex acuminate or acute, base subrotund, cuneate or attenuate, margin finely crenulate, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole less than 1 cm long. Peduncle slender, to 5-7 cm long in full development, with 1-2 dichotomous branches and several flowers; pedicel slender, 5-6 mm long. Flower 4-merous, less than 8 mm in diam. Sepals subround, short. Petals reddish to purple, ovate, base cuneate. Ovary with short angles. Capsule green to brown, or yellow-brown when dry, nearly globose, less than 1 cm in diam., with 4 short and sharp wings, more than 6 mm long when fully developed; seeds with bright red aril.

Phenology. Flowering: April to June; Fruiting: July to October.

Distribution: China (Anhui, Gansu, Hebei, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan); alt. 1,800-3,700 m, in bushes or in mixed forest; common.

SPECIMENS EXAMINED: **CHINA:** GANSU: Lichen, *R. C. Ching* 380 (A, US), Lienhoashan [Lianhuashan], *J. F. Rock* 12747 (A), Lintan, *Taohe Exped.* 3438 (KUN 2 sheets), Pingliang, *S. Q. Shen & P. L. Yang* 140 (PE), Tienschui [Tianshui], *H. Handel-Mazzettii* 2701 (A), Minchou, *Wm. Purdom* 1060 (A, US), 1061 (A), 1075 (A, US), Old Taochow, *R. C. Ching* 844 (US), 886 (A, GH, NY 2 sheets, US), Tao River basin, *J. F. Rock* 12961 (A, US), 13569 (A), 13173 (A, NY), Tianshui, *K. M. Liu* 10149 (KUN 2 sheets), 10255 (KUN), *Z. W. Zhang* 182 (PE), Upper Tebbu, *J. F. Rock* 12498 (A), 14695 (A), 14759 (A, US), 14843 (A), Wating, *T. P. Wang* 17202 (PE), Xigu, *W. Y. Hsia* 5735 (PE), 6651 (PE); HEBEI: Wutaishan, *Y. S. Hu* 3111 (PE); HENAN: Hwei Hsien [Weixian], *J. Hers* 759 (A), 2211 (KUN), Lao Kiun Shan [Laojunshan], *J. Hers* 1235 (A), Lushi, *J. Q. Fu* 2054 (KUN 2 sheets), *J. Hers* 936 (A), 1145 (A), *K. M. Liou* 5291 (PE), Songxian, *Z. M. Xu* 15 (PE), Tengfeng, *J. Hers* 203 (A), Tsiyuan [Jiyuan], *J. Hers* 1804 (A), 1883 (A), Yichuan, *Henan Exped.* 20532 (KUN); HUBEI: Badong, *G. X. Fu & Z. S. Zhang* 989 (KUN), Hsiao Lung Tan, *W. C. Cheng* 4209 (A), Ichang (Yichang), *A. Henry* 3929 (P), Shengnongjia Forest District, 1980 *Sino-Amer. Exped.* 261 (A, KUN, NA, NY), 864 (A, NA, NY), 965 (A, KUN), Wan Tsao Shan, *W. C. Cheng* 3929 (A), Without locality, *E. H. Wilson* 707 (A, NY, P); SHAANXI: Changan, *Northwest University Team* 4 (KUN), Y.

Wang & G. L. Zhu 202 (PE), Fuping, K. T. Fu 4778 (PE), 6293 (KUN, MO, PE), P. C. Kuo 1358 (KUN, PE), X. M. Zhang 613 (KUN), Hoschan [Huashan], E. Licent 12135 (A), Huashan, W. Y. Hsia 4271 (PE), T. N. Liou 10743 (PE), 10851 (PE), T. P. Wang 19750 (KUN), Luoyang, K. T. Fu 5674 (MO), Lung Hsien [Longxian], T. P. Wang 4125 (PE), 4178 (PE), Ningshan, H. W. Kung 3152 (PE), J. Q. Xing 6400 (HNWP), 8850 (HNWP), Sanxian, T. P. Wang 15477 (KUN), Shanyang, T. P. Wang 16418 (KUN, PE), Shiquan, Northwest University Team 151 (KUN), J. Q. Xing 2714 (HNWP), 7363 (HNWP), Taibaishan, K. T. Fu 8339 (KUN 2 sheets), S. H. Liu 26 (KUN 2 sheets), Qinling Exped. 329 (KUN), Seed Collection Team 227 (KUN), Taipaishan [Taibaishan], H. Handel-Mazzettii 905 (A), Wm. Purdom 1 (A), 432 (A, US), T. P. Wang 1299 (A), Tsinling [Qinling], H. Handel-Mazzetti 675 (A), without locality, G. Giraldi s.n. (A), Zhongnanshan, H. W. Kung 2122 (PE), 2685 (PE), 2717 (PE), 2818 (PE); SHANXI: Chia-Hsiu [Jiexiu], T. Tang 853 (A), Chinyuan [Qinyuan], K. Ling 9286 (A), 9287 (A), Lao-y-san, G. Giraldi s.n. (A); SICHUAN: Barkam, X. Li 72714 (KUN), 74858 (KUN), 74887 (KUN), 74892 (KUN), Chang-lou-ping, C. Y. Chiao 2066 (A), Chengdu and vicinity, W. P. Fang 12398 (A), Chengkou, T. L. Dai 101618 (MO, PE), Chingchi (Hanyuan), E. H. Wilson 3108 (A, MO, US), 3109 (MO, US), Daochen, Daochen Exped. 2277 (KUN), Dongrergo [Songfan], H. Smith 3491 (A, MO), Emeishan, C. Y. Chiao & C. S. Fan 868 (A), W. P. Fang 2798 (A, NY), Y. S. Liu 1480 (A, US), Fupien (lat. 31. 03 N, long. 102. 00 E), W. P. Fang 21415 (A, KUN 2 sheets), Heishui, Sichuan Economic Pl. Exped. (59) 1308 (KUN), Hungyah [Hongya], E. H. Wilson 967 (A, MO, US), Junlian, Karlong, H. Smith 3017 (A, MO), Kuan Hsien [Guanxian], W. P. Fang 2218 (A, NY), 2376 (A, NY), Lixian, T. He & Z. L. Zhou 13409 (PE), Muli, G. Forrest 21341 (A), J. F. Rock 23894 (A, NY), T. T. Yu 5682 (A, KUN), Mupin [Baoxing], H. Stevens 30 (A, US), Opian [Ebian], T. T. Yu 815 (A), Y. S. Liu 2229 (A), Songpan [Songfan], W. P. Fang 4372 (A, NY), Tachienlu [Kangding], J. F. Rock 17591 (A, GH, NY), E. H. Wilson 4177 (A), Tongjiang, Sichuan Economic Pl. Exped. (59) 3092 (KUN), Wa Shan, E. H. Wilson 968 (A 2 sheets, GH, MO, US), Wanyuan, Sichuan Economic Pl. Exped. (59) 2044 (KUN), Wenchuan, S. Y. Hu 2592 (A), Wuqi, K. H. Yang 58475 (PE), Youyang, Sichuan Economic Pl. Exped. (59) 2562 (KUN), Yutong, T. K. Tang & T. S. Wen 698 (A), 699 (A), without locality, P. W. Bristol 67 (A); WEST CHINA: Without locality, E. H. Wilson 3328 (A), 3331 (A 2 sheets); YUNNAN: Chienchuan [Jianchuan]-Mekong divide, G. Forrest 23181 (A, US), 22376 (A, US), Chungtien [Zhongdian], K. M. Feng 999 (A, KUN 2 sheets), Haba Snow Range, K. M. Feng 1332 (A, KUN 2 sheets), T. T. Yu 11397 (A, KUN 2 sheets), Lichiang [Lijiang], R. C. Ching 30211 (A, KUN 2 sheets), 30650 (A, KUN 3 sheets), G. Forrest 22346 (A, US), J. F. Rock 3580 (A, NY, US), 3741 (A, US), 4685 (A, US), 6070 (A, US), 6784 (US), C. Schneider 3077 (A, GH), C. W. Wang 70835 (A), T. T. Yu 15035 (A), Lichiang [Lijiang] & Youngning [Ningliang], J. F. Rock 5193 (A, US), 17232 (A, NY, US), Shiku [Shigu], J. F. Rock 9552 (A, NY, US), without locality, G. Forrest 10196 (A), 10253 (A), 11292 (A), 22425 (A, US), T. T. Yu 5437 (A).

The leaves of this species are usually shortly elliptic or obovate, and the wing of the fruit is similar to that of *E. frigida*, but with sharp and long wings, which is much different from the latter, which has wings with obtuse apex. This species was also misidentified as *E. sachalinensis* in some local work. However, it differs greatly from it by its smaller leaves, short wings as well as a disconnection in the geographical distribution.



Fig. 6. *Euonymus kweichowensis* CHEN H. WANG – 1. flower branch; 2. flower; 3. fruit.

7. *Euonymus kweichowensis* CHEN H. WANG, Chin. J. Bot. 1: 51, pl. 7. 1936. TYPE: CHINA. Kweichow: Fanchingshan, alt. 1,700 m, Sept. 17, 1931, A. N. Steward *et al.* 606 (A! BM! P! PE! 3 sheets). [Fig. 6]

– *E. integrifolia* BLAKELOCK, Kew Bull. 1948: 242. 1948, in obs., nom. inval.

Deciduous shrub, several meter high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry. Leaves thickly chartaceous or

thinly coriaceous, narrowly lanceolate, 8-12 x 1.5-2 cm, widest part in middle, apex acuminate, caudate or acute, base cuneate or attenuate, margin entire, lateral veins 5-7 pairs, disappearing and obscurely reticulate before reaching the margin; petiole less than 1 cm long. Peduncle slender, up to 10 cm long when fully developed, with 1-2 dichotomous branches and several flowers. Flower 4-merous, not seen. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1 cm in diam., with 4 wide and short wings, more than 5 mm long when fully developed; seeds 2, dark brown, with bright red aril.

Phenology. Flowering: Unknown; Fruiting: August.

Distribution: China (Guizhou); alt. 900 - 1,100 m, in bushes or in forest; rare.

SPECIMENS EXAMINED: **CHINA:** GUIZHOU: Dafang, *Bijie Exped. 1026* (PE), Fangjingshan, *North Guizhou Exped. 394* (PE), *659* (PE), Jiangkou, *1986 Sino-American Guizhou Exped. 556* (A, PE), Songtao, *North Guizhou Exped. 1323* (PE).

This species is very similar to *E. clivicola*, from which it differs by the entire leaves and wide wings of capsule as well as the round apex of the wing. There are only a few locations found so far, and further collections are still needed.

8. *Euonymus latifolia* (L.) MILL., Gard. Dict. ed. 8, n. 2. 1771. [Fig. 7]

Bas.: *E. europaea* L. var. *latifolia* L., Sp. Pl. 197. 1753. TYPE: EUROPE.

= *E. leiophloea* STEV., Bull. Soc. Imp. Naturalistes Moscou 29 (2): 122. 1856.

= *E. sempervirens* RUPR. ex BOISS., Fl. Orient. 2: 10. 1872. TYPE: EUROPE. Caucasus.

≡ *E. latifolia* (L.) MILL. f. *sempervirens* (RUPR.) E. BUSCH, Fl. Cauc. Crit. 3(8): 31, 44. 1912.

= *E. latifolia* (L.) MILL. var. *grandifolia* ROUY & ROUCAUD, Fl. France 4: 160. 1897.

= *E. latifolia* (L.) MILL. var. *parvifolia* ROUY & ROUCAUD, Fl. France 4: 160. 1897.

= *E. latifolia* (L.) MILL. f. *umbrosa* E. BUSCH, Fl. Cauc. Crit. 3(8): 45. 1912.

= *E. latifolia* (L.) MILL. var. *eximia* BECK, Fedde Repert. Sp. Nov. Regni Veg. 17: 451. 1921.

= *E. armasica* GACH., Soobshch. Akad. Nauk. Gruz. SSR 10: 234. 1949. TYPE: EUROPE. Caucasus.

= *E. ketzkhovellii* GACH., Soobshch. Acad. Nauk. Gruz. SSR 10: 232. 1949. TYPE: EUROPE. Caucasus.

– *E. latifolia* (L.) MILL. f. *typica* E. BUSCH, Fl. Cauc. Crit. 3(8): 42. 1912, nom. inval.

Deciduous shrub, up to several meters high; branches and twigs terete, sturdy, with striations, brown or dark brown when dry. Leaves thickly chartaceous or thinly coriaceous, ovate-elliptic or obovate-elliptic, 8-12 x 3-5 cm, apex acuminate or acute, base cuneate, attenuate or semiround, margin finely crenulate, lateral veins 7-9 pairs, curving forward and disappearing before

reaching the margin; petiole less than 1 cm long, sturdy. Peduncle slender, 5-8 cm long when fully developed, with 1-3 dichotomous branches and several to many flowers; pedicel thin and slender, less than 10 mm long. Flower 5-merous, c. 8 mm in diam. Sepals subround, short. Petals whitish-green, with little purple, obovate, apex rotund, base cuneate. Ovary with 5 locules, sometimes only 4 locules developed. Capsule reddish when fresh, brown when dry, nearly globose, c. 1.2 cm in diam., usually with 5 wings, sometimes only 4 wings developed, up to 6 mm long, opening into (4) 5 lobes at maturity; seeds 2 in each locule, with bright red aril.

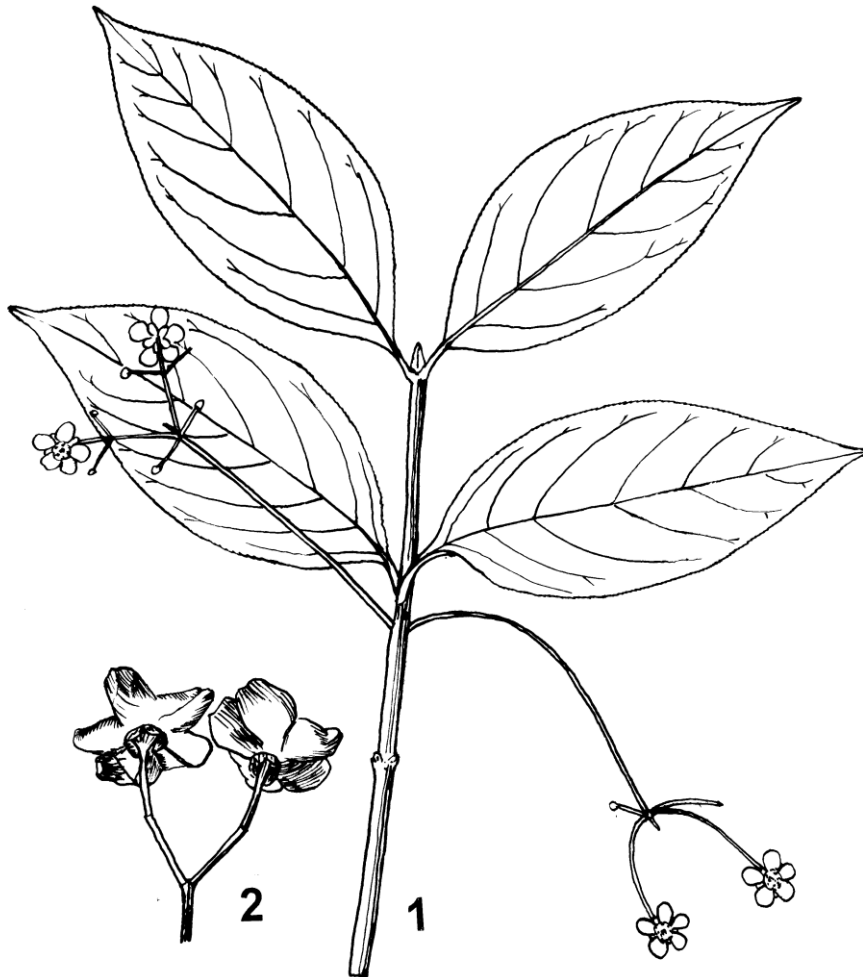


Fig. 7. *Euonymus latifolia* (L.) Mill. – 1. flowering branch ; 2. fruit branch.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: Albania, Algeria, Austria, Bulgaria, Czech Republic (?), France, Germany, Greece, Iran, Italy, Romania, Russia (Crimea), Syria, Switzerland, Turkey, Yugoslavia; alt. 30-1,600 m, in forest or woodland; common.

SPECIMENS EXAMINED: **ARMENIA:** *P. Sintenis* 3060 (A). **AUSTRIA:** *A. Charpin & W. Greuter* 8446 (A). **AZERBAIDZHAN:** *T. Heideman* s.n. (A). **BULGARIA:** *B. Stefanoff* s.n. (A). **CAUCASUS:** *T. Mazurenko* s.n. (A). **CROATIA:** *Vukotinovic* s.n. (A). **FRANCE:** *E. Reverchon* s 18 (A). **GERMANY:** *C. Baenitz* 1398 (GH). **IRAN:** *K. H. Rechinger* 853 (US), 6643 (US). **ITALY:** *A. Fiori & A. Beguinot* 2724 (GH). **RUSSIA:** *V. V. Makarov* s.n. (A). **SWITZERLAND:** *R. N. Parker* s.n. (A). **SYRIA:** *Postian* s. n. (US). **TURKEY:** *E. K. Balls* 2015 (A).

This is the only species within its geographical range that has a winged capsule, outside of the distribution of the genus as a whole.



Fig. 8. *Euonymus macroptera* RUPR. – 1. fruit branch ; 2. flower.

9. *Euonymus macroptera* RUPR., Bull. Phys.-Math. St. Petersburg. 15: 359. 1857.
TYPE: CHINA. Heilongjiang (Amur): Without location, C. J. I. Maximowicz s.n.
(LE?, not seen). [Fig. 8]

= *E. ussuriensis* MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 449. 1881.
TYPE: CHINA. Mandshuria: Ussuri Super, C. J. I. Maximowicz s.n. (GH!).

Deciduous shrub, 2-3 m high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry. Leaves thickly chartaceous or thinly coriaceous, ovate-elliptic, ovate or obovate, with some divergence, 9-14 x 4-6 cm, widest part in middle, apex acuminate or acute, base subrotund, cuneate or attenuate, margin crenulate, lateral veins 7-9 pairs, branching and disappearing before reaching the margin; petiole somewhat sturdy, less than 1 cm long. Peduncle slender, to 7-10 cm long when fully developed, with 2-3 dichotomous branches and several to many flowers; pedicel slender, 5-6 mm long. Flower 4-merous, c. 7 mm in diam. Sepals subround, short. Petals whitish-green or yellow-green, ovate, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 6 mm in diam., with 4 long and sharp wings, more than 1 cm long when fully developed; seeds with bright red aril.

Phenology. Flowering: May to July; Fruiting: August to October.

Distribution: China (Heilongjiang, Jilin, Liaoning), Japan, Korea, Russia (Far East); alt. 300-2,100 m, in bushes or in mixed forest; occasional.

SPECIMENS EXAMINED: **CHINA:** JILIN: Antu, Y. L. Chou et al. 815 (PE), 4327 (PE), Heng Tao Ho Tze, P. H. Dorsett 3215 (A, PE), Jiaohe, Y. L. Chang et al. 965 (PE 2 sheets), without locality, F. H. Chen 609 (A, PE), Forestry Inst. Exped. 84 (MO), 96 (MO), V. L. Komarov 1041 (A 4 sheets, NY), B. W. Skvortzow 9588 (A), s.n. (A); HEILONGJIANG: Acheng, G. Z. Wang et al. 506 (PE), Anning, Y. L. Chang et al. 1249 (PE), Mudianjiang, P. H. Dorsett & J. H. Dorsett 4211 (A, MO, NY, PE), Shangzhi, J. J. Qian et al. 650 (KUN, PE), Y. C. Chu 134 (PE), without locality, S. Korshinsky s.n. (A), C. J. I. Maximowicz s.n. (GH), L. Schrend s.n. (GH); LIAONING: Dandong, W. Wang et al. 1188 (PE), Qianshan, Y. C. Chu 289 (PE); MANSHURIA [Northeast], without locality, C. Wilford s.n. (GH). **JAPAN:** Fujiyama, P. H. Dorsett & W. J. Morse 511 (A, US), Fukushima, T. Kurosawa et al. 4444 (A, NA), Gifu, H. Kanai & H. Ohashi s.n. (A), 731214 (NA, NY, WU), Gunma, D. E. Boufford & M. Kato 23399 (A), M. Ono & S. Kobayashi s.n. (NA), Hokkaido, M. Furuse s.n. (A), C. J. I. Maximowicz s. n. (US 2 sheets), C. S. Sargent s.n. (A), H. Takahashi et al. 8547 (NA), E. W. Wood & D. E. Boufford 3922 (A), E. H. Wilson 7102 (A), Ishikari, M. Furuse 6770 (NA), K. Tokubuchi s.n. (A), Iwashiro, M. Mizushima 614 (A), Kitami, H. Takahashi et al. 2602 (NA), Kozuke, M. Mizushima 399 (A), Kyoto, G. Murata & F. Konta 345 (US), Mino, K. Shiota 6616 (A), Miyagi, H. Ohashi et al. 22348 (NA), Nagano, M. Furuse s.n. (A), H. Kanai et al. 9646 (NA), Nemuro, M. Furuse 6566 (NA), Shizuoka, H. T. Im 2002 (NA), F. Konta 2 (A, NY), Sinano, H. Kanai et al. 3850 (A), Teshio, F. G. Meyer et al. 18933 (NA), Tochigi, H. Ohashi et al. 1455 (A, NA), 28198 (NA), Tshigi, T. Kurosawa et al. 4398 (NA), Yakoska, M. Savatier s.n. (US), Yamanashi, M. Furuse s.n. (A), T. Hashimoto et al. A-13 (US), M. Togashi s.n. (US), 20 (NA, NY, WU). **KOREA:** Chollanam Do, H. Takahashi & C. S. Chang 6395 (NA), 6492

(NA), Kang-won-do, T. B. Lee et al. 527 (A), S. Kankyo, T. Ishidoya s.n. (A), E. H. Wilson 9157 (A), 9162 (A), N. Keian, E. H. Wilson 8619 (A 2 sheets); Kogen, E. H. Wilson 9513 (A), 10484 (A, US), 10704 (A), Ryanggang-do, T. Bojarczuk & A. Boratynski 569 (A), without locality, U. J. Faurie 13262 (WU). **RUSSIA:** Primorsk, Bopomrov et al. s. n. (NA), Sakhalin, P. H. Dorsett & W. J. Morse 1336 (A, US), G. Proskuriakova & G. Porubinovskaia s.n. (NA), J. Shukhobodiniib s.n. (A), 31a (A).

Flora of Henan (2: 520. 1988) recorded this species as well as the synonymous *E. ussuriensis*, but in fact, they are *E. giraldii*. Flora of Anhui (3: 367. 1990) recorded this species from Huoshan and Jinzai in the Dabieshan area of Anhui Province (SE China) as well as in Hebei and Gansu provinces (N and NW China). In fact, *E. kansuensis*, used by CHEN H. WANG (1939), is a synonym of *E. giraldii* in this work. This species is only found in the Far East of Russia, NE China as well as Japan and Korea. It seems very similar to *E. giraldii*, but the flower in this species is whitish-green which is much different from the latter with reddish to purple petals, and the fruit wings in this species are much longer and sharper than in the latter; they are separated also by geographical isolation.

10. *Euonymus oxyphylla* MIQ., Ann. Mus. Bot. Lugduno-Batavum. 2: 86. 1865. TYPE: JAPAN. P. H. Siebold s.n. (not seen). [Fig. 9]

- = *E. latifolia* A. GRAY, Mem. Am. Acad. N.S. 6: 384. 1857, non (L.) MILL. 1771., nom. illegit. superfl. *R. Ueki* s.n. (not seen), non HORT. ex HANDL. 1894.
- = *E. nipponica* MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 447. 1881. TYPE: JAPAN. Nikko: T. Tschonoski s.n. (not seen).
 - ≡ *E. oxyphylla* Miq. var. *nipponica* (MAXIM.) BLAKELOCK, Kew Bull. 1951: 279. 1951.
- = *E. laxiflora* BLUME ex MIQ., Ann. Mus. Bot. Lugduno-Batavum. 2: 86. 1865, non CHAMP. ex BENTH. 1851, nom. illegit. superfl.
- = *E. robusta* NAKAI, Bot. Mag. (Tokyo) 28: 307. 1914. TYPE: KOREA. Kisshu: Aug. 1912.
- = *E. yesoensis* KOIDZ., Fl. Symb. Orient. As. 13. 1930. TYPE: JAPAN. Hakodate: C. J. I. Maximowicz s.n. (1861, GH!).
 - ≡ *E. oxyphylla* Miq. var. *yesoensis* (KOIDZ.) BLAKELOCK, Kew Bull. 1951: 279. 1951.
- = *E. oxyphylla* Miq. var. *kuenbuergia* HONDA, Bot. Mag. (Tokyo) 47: 297. 1933.
- = *E. flavescens* NAKAI, J. Jap. Bot. 18: 605. 1942, non HORT. 1891, nom. illegit. superfl. TYPE: JAPAN. Zen Syakukei 55 (not seen).
- *E. oxyphylla* Miq. var. *chartaceifolia* C. Y. CHENG, ms., nom. inval.

Deciduous shrub to small tree, to 3-4 m tall; branches and twigs terete, sturdy, brown or dark-brown when dry. Leaves thickly chartaceous or thinly coriaceous, ovate-elliptic or ovate-lanceolate, 7-12 x 3.5-5 cm wide, apex acuminate or acute, base cuneate or attenuate, margin finely serrulate, lateral veins 5-7 pairs, reticulating and disappearing before reaching the margin; petiole less than 1 cm

long. Peduncle slender, 6-10 cm long when fully developed, with 1-3 dichotomous branches and several to many flowers; pedicel thin and slender, less than 10 mm long. Flower 5-merous, 6-8 mm in diam. Sepals subrotund, short. Petals white with little purple, obovate, apex rotund or acute, base cuneate. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1.2 cm in diam. and c. 1.0 cm long, without wings or with 5 slight angles only, opening into 5-lobes at maturity; seeds with bright red aril.



Fig. 9. *Euonymus oxyphylla* Miq. – 1. fruit branch.

Phenology. Flowering: April to June; Fruiting: August to November.

Distribution: China (Anhui, Fujian, Henan, Hubei, Jiangxi, Liaoning, Shandong, Taiwan, Zhejiang), Japan, Korea; alt. 40-2,300 m, in forest or woodland; common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Chuhwashan [Jiuhuashan], *R. C. Ching* 2822 (A), Huangshan, *M. Chen* 1247 (PE 2 sheets), Sexian, *K. C. Kuan* 75303 (PE), Wangshan [Huangshan], *R. C. Ching* 2989 (A), Wuyuan, *R. C. Ching* 3251 (A); FUJIAN: Congan, *C. P. Tsieng et al.* 400809 (PE), 400945 (PE); Wuyishan, *Wuyishan Exped.* 160(PE), 169 (MO); HENAN: Songxian, *Henan Forestry Bureau* 1082 (PE); HUBEI: Shengnognjia, 1980 *Sino-Amer. Exped.* 1288 (A, NA); JIANGXI: Dexin, *K. Yao* 11455 (A, NA), Lushan, *S. J. Shen* 723 (PE), Wugongshan, *Jiangxi Exped.* 950 (PE), 1356 (PE 2 sheets), Yinchun, *J. S. Yue et al.* 3386 (PE), Zhangjiang, *P. C. Tam* 63583 (MO); LIAONING: Lushun, *Z. Wang et al.* 998 (PE); SHANDONG: Kunyushan, *T. Y. Choo et al.* 441 (N), *PE Herb.* 3139 (PE 2 sheets), Mengshan, *T. Y. Choo et al.* 6137 (PE); TAIWAN: Hualien, *H. L. Ho & Y. I. Lien* 1253 (A), Miaoli, *C. H. Chen et al.* 652 (A); ZHEJIANG: Changhua, *Y. Y. Ho* 23131 (NAS), 26379 (PE), 29027 (PE), 29184 (PE), 29837 (PE), Linan, *no collector* 832-116 (PE), Tianmushan, *R. C. Ching* 5088 (A), *Y. Y. Ho* 21188 (NAS), 22126 (PE), 22305 (PE), 22459 (PE), 24813 (PE), *T. Hong & P. C. Keng* 212 (KUN), 313 (KUN), *Zhejiang Natural Museum* 3320 (KUN), Tiantai, *G. R. Chen* 2309 (KUN, PE), *R. C. Ching* 1425 (NA), *Zhejiang Exped.* 27972 (PE), 29229 (PE), Wuyanling, *S. Y. Chang* 5665 (PE). **JAPAN:** Aichi, *K. Torri s.n.* (A), Akita, *H. Muroi* 4651 (A), Aomori, *H. Muroi* 4512 (A), Ehime, *T. Takahashi* 2021 (A), Gunma, *S. Kurata & T. Nakaike* 10020 (A), Hondo, *S. Kitamura s.n.* (A), Hokkaido, *K. Deguchi* 7559 (A), *H. Tanahashi et al.* 8547 (NA), Honshu, *K. Tohda et al.* 1107 (A), *H. Ohashi et al.* 21876 (A), Hyogo, *H. Muroi* 6262 (A), Iwate, *H. Muroi* 3941 (A), Kagoshima, *H. Takahashi* 6891 (NA), Kanagawa, *M. Furuse s.n.* (A), Kawaga, *M. Takahashi* 1918 (A), Kushiro, *F. G. Meyer et al.* 19107 (NA), Kyoto, *S. Tsugaru & T. Takahashi* 22778 (A), Mie, *H. Muroi* 1796 (A), Miyagi, *T. Wakasugi* 80 (A), Musashi, *M. Mizushima* 1956 (A), Miyagi, *T. Ohmiya et al.* 28001 (A), Nagano, *M. Furuse s.n.* (A), Niigata, *T. Togashi et al.* 28 (A), Niko, *M. Mizushima* 2111 (A), 2340 (A), Okayama, *H. Muroi* 6039 (A), Oshima, *F. G. Meyer et al.* 19247 (NA), Shiga, *S. Tsugaru et al.* 13263 (A), Shimane, *K. Mumoro & S. Thugaru* 3190 (A), Shinano, *M. Mizushima* 2838 (A), Shizuoka, *A. Takahashi & F. Konta* 11002 (A), Tanba, *G. Murata* 9726 (A), Tochigi, *H. Ohba & S. Akiyama* 1242b (A), Tokyo, *M. Amano* 38 (A), Tottori, *H. T. Im & T. Kawahara* 3357 (A), Toyama, *T. Yamazaki* 9738 (A), Tsuribana, *S. Suzuki* 89 (A), Yamagata, *H. Ohashi et al.* 3475 (A). **KOREA:** Chollabuk Do, *H. Takahashi & C. S. Chang* 6533 (NA), 6537 (NA), Cholla Namdo, *B. R. Yinger et al.* 3058 (NA), Cholla Pukto *B. R. Yinger et al.* 3337 (NA), Chungchung Namdo, *B. R. Yinger et al.* 3502 (NA), Chusan, *C. Wilford s.n.* (GH), Dagelet Is. *E. H. Wilson* 8581 (A), Heiki, *E. H. Wilson* 8726 (A, US), 10638 (A), Hogen *E. H. Wilson* 9246 (A), 9283 (A), Kang-Won Do, *S. G. March et al.* 107 (NA), Kyong Gi, *B. R. Yinger et al.* 2843 (NA), Kyongsan, *Y. S. Kim s.n.* (A), Naejang Mt., *B. R. Yinger et al.* 3343 (A), Quglpaert Is. *E. H. Wilson* 9477 (A), Songni-San, *F. G. Meyer* 22 (NA).

This species is well known and widespread from E. Asia, and can easily be recognized in the section because the wings are too short to be seen, especially compared with others in the section. However, its ovate-elliptic or ovate-lanceolate leaves as well as the long slender peduncle are the major characters

both in the field and in the herbarium. Fruiting specimens are easily identified as members of Section *Illioides* since the wing is extremely short. However, other characters separating them between sections are totally different from each other. SUGAWARA (1940) reported this species from S Sakhalin, and was followed by the Flora of USSR (1974). However, no specimens were cited by them from that area, nor have we seen any from Russia.

11. *Euonymus rehderiana* LOES. in SARG., Pl. Wilson. 1: 488. 1913. TYPE: CHINA. Western Szechuan: Mupin, alt. 1600-2300 m, Oct. 1908, *E. H. Wilson* 1132 (A! MO!). [Fig. 10]

= *E. bicolor* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 8: 260. 1914. TYPE: CHINA. Kouy-Tcheou, Long-Ly, Ma-Jo, Nov. 1907, *M. M. Cavalerie* 2238 (not seen, merotype A!, photo A!).

= *E. proteus* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 8: 260. 1914. TYPE: CHINA. Kouy-Tcheou: Pai-Tchen, 30 Mars 1905, *M. M. Cavalerie* s.n. (not seen).

Deciduous shrub to small tree, c. 5 m high; branches and twigs sturdy, brown or gray-brown when dry. Leaves thickly coriaceous, elliptic-ovate or obovate-elliptic, 6-9 x 2.5-4 cm, apex acuminate or acute, base attenuate, or cuneate, margin entire, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole 1-2 cm long. Peduncle from new branches only, usually pendent, 5-8 cm long, with c. 2 dichotomous branches and several flowers. Flower 5-merous, 6-7 mm in diam. Sepals deltoid, very small. Petals ovate-rotund, yellow-green or greenish-yellow; pedicel short and slender, c. 6 mm long. Capsule pink to red when fresh, or brown to greenish-brown when dry, nearly compressed-globose, 1.2-1.4 cm in diam., with 5 short and flat wings, less than 5 mm long when fully developed; seeds 2, with orange aril.

Phenology. Flowering: April to May; Fruiting: July to October.

Distribution: China (Guangxi, Guizhou, Sichuan, Yunnan); alt. 450-1,600 m, in thickets or forest; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Rongxian, *H. C. Ho* 82434 (PE), 136033 (PE); GUIZHOU: Anshui, *S. W. Feng* 401 (PE), Bijie, *P. H. Yu* 809 (KUN 2 sheets, PE), Ceheng, 420 (PE 2 sheets), Guiyang, *Z. Y. Cao* 278 (PE 2 sheets), Loushan, *Y. Tsiang* 5121 (A, N, NY, PE), Pichieh, *P. Y. Hua* 809 (KUN 2 sheets), *Y. Tsiang* 9029 (A, N 2 sheets, NY), Qingzhen, *Sichuan-Guizhou Exped.* 2136 (PE), Xingren, *C. Z. Dang* 248 (PE); SICHUAN: Ebian, *Z. X. Zhao* s.n. (KUN 2 sheets), 124 (KUN, PE), Emei, *W. R. He* 833 (KUN), *Y. Y. Ho* 6145 (NAS), *Southwest Forestry College Exped.* 3084 (PE), *Z. S. Zheng* 392 (KUN), 444 (KUN), Hanyuan, *T. P. Wang* 8735 (PE), Hongya, *C. W. Yao* 3765 (PE), Liangshan, *Sichuan Economic Pl. Exped.* (59) 188 (KUN), Leibo, *Z. T. Guan* 7833 (PE), *T. T. Yu* 3691 (PE), 3978 (PE), Nanchuan, *Y. Y. Ho* 4374 (NAS), *K. L. Chu* 1431 (PE), *J. H. Xiong & Z. L. Zhou* 90736 (PE), Omeishan [Emeishan], *H. C. Chow* 8157 (A), *W. P. Fang* 3195 (A, N, NY, PE), 7656 (A, NY), 7835 (A), 16075 (A), 18951 (A), *Y. S. Liu* 1775 (A, NA), *S. L. Sun* 197 (KUN), 663 (KUN), 902

(KUN), 3357 (KUN), 3621 (KUN), 3980 (KUN), 17842 (MO), F. T. Wang 23254 (A), E. H. Wilson 4787 (A), T. T. Yu 516 (A, PE 2 sheets), K. H. Yang 54188 (KUN, PE 2 sheets), 54263 (KUN, PE 2 sheets), 54728 (KUN, N), 56000 (KUN), Pingshan, *Sichuan Economic Pl. Exped.* (59) 1100 (KUN, PE), Tianquan, *Erlangshan Exped.* 417 (SZ), H. L. Tsiang 33705 (PE), 33974 (PE), Z. L. Wu 12454 (PE), J. H. Xiong 35315 (SZ), without location, W. C. Cheng 10144 (KUN), 10147 (KUN), Wushan, H. F. Chow 109775 (PE); YUNNAN: Dagan, *Northeast Yunnan Exped.* 2264 (KUN 2 sheets, PE), Pingshan, F. T. Wang 22746 (NAS), Xichou, *Wenshan Seeds & Seedling Team s.n.* (KUN), Zhenxiang, P. Y. Hua 990 (KUN 2 sheets, PE), *Northeast Yunnan Exped.* 1156 (KUN).



Fig. 10. *Euonymus rehderiana* LOES. – 1. fruit branch; 2. flower.

This is one of the most easily recognized species in the genus, for its fruit with five short wings and the thickly coriaceous leaves with short petiole.

12. *Euonymus sachalinensis* (FRIEDR. SCHMIDT) MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 28: 446. 1881. SYNTYPES: CHINA. Mandshuria austro-orientali: *C. Wilford s.n.* (not seen); fl. Suifun: *E. Friedrichsthal s.n.* (not seen), *C. F. Schmidt s.n.* (not seen), *J. Goldenstadt s.n.* (not seen); Sachalin: *E. Friedrichsthal s.n.* (not seen), *C. F. Schmidt s.n.* (not seen); JAPAN. *T. Tschonoski s.n.* (not seen). [Fig. 11]

Bas.: *E. latifolia* (L.) MILL. var. *sachalinensis* FRIEDR. SCHMIDT, Reis. Amur-Land. Bot. 121. 1868.

= *E. planipes* KOEHNE, Mitteil. Deutsch. Dendrol. Ges. 62. 1906. TYPE: JAPAN.

= *E. tricarpa* KOIDZ., Icon. Pl. Koisikav 3: 77. t. 184. 1916.

= *E. erosidens* PROKH. in KOM., Fl. URSS 14: 570. 1949.

= *Kalonymus maximowicziana* PROKH. in KOM., Fl. URSS 14: 744. 1949.

= *E. miniata* TOLM., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 18: 159. 1957. TYPE: RUSSIA. Far East: Dominsk, *A. I. Tolmatchev s.n.* (not seen), *A. I. Tolmatchev et J. Motorina s.n.* (not seen).

Deciduous shrub, 2-3 m high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry. Leaves thickly chartaceous or thinly coriaceous, ovate-elliptic, ovate or wide elliptic, with some divergence, 9-15 x 5.5-8.5 cm, widest part in middle, apex acuminate or acute, base subrotund, cuneate or attenuate, margin crenulate, lateral veins 7-9 pairs, branching and disappearing before reaching the margin; petiole slightly sturdy, less than 1 cm long. Peduncle slender, to 5-8 cm long when fully developed, with 1 to 3 dichotomous branches and several flowers; pedicel slender, 5-6 mm long. Flower 5-merous, 7-9 mm in diam. Sepals subround, short. Petals reddish to purple or chocolate, ovate, base cuneate. Ovary with small angles, 5-locular, sometimes only 3- or 4-locules developed. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1 cm in diam., with 5 short and obtuse wings, less than 5 mm long when fully developed, sometimes only 3-4 wings developed; seeds with bright red aril.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: China (Heilongjiang, Jilin, Liaoning); Japan, Korea, Russia (Far East); alt. 100-2,650 m, in bushes or in mixed forest; occasional.

SPECIMENS EXAMINED: **CHINA:** HEILONGJIANG: Boli, *Y. L. Chang et al. 2107* (PE); LIAONING: Benxi, *Y. C. Chu 1299* (PE), *Z. S. Wang et al. 4391* (PE), Caohekou, *Y. Yabe s.n.* (N 2 sheets), Fengcheng, *W. Wang et al. 1670* (PE), Hengren, *Hengren Exped. 179* (PE), Lusun, *Z. Wang et al. 988* (PE 2 sheets), Xiuran, *W. Wang et al. 1349* (PE 2 sheets), *1542* (PE); NORTHEAST: without locality, *C. J. I. Maximowicz s.n.* (GH). **JAPAN:** Fudziyama, *T. Tschonoski s.n.* (GH), Gifu, *H. Muroi 4295* (A), Gunma, *M. Ono & S. Kohayashi 132958* (NA), Hida, *M. Mizushima 1105* (A), Hokkido, *S. Akiyama 186*



Fig. 11. *Euonymus sachalinensis* (FRIEDR. SCHMIDT) MAXIM. – 1. fruit branch; 2. fruit; 3. flower

(NY), H. T. Im & M. Amano 7726 (NY), M. Kume s.n. (A), K. Mimoro & S. Tsugaru 4924 (NY), 4925 (NY), 5159 (NY), 5275 (NY), F. G. Meyer et al. 18974 (NA), J. Murata & T. Yahara 37602 (NY), C. S. Sargent s.n. (A), H. Takahasi & S. Uematsu 8462 (NA), H. Takahashi et al. 8565 (NA), 6602 (NA), Hondo, E. H. Wilson 7509 (A), Ishikari, H. Takahashi et al. 2525 (NA), Iwashiro, M. Mizushima 1133 (A), Iwate, H. Muroi 412 (A), Kai, M. Furuse s.n. (A), Kitami, M. Furuse 9487 (NA), 9528 (NA), S. Heori s.n. (A), F. G. Meyer et al. 19008 (NA), Kobe, H. Muroi 395 (A), Kozuke, M. Mizushima 607 (A), Kuriles, S. Saito 6078 (A), Kushiro, F. G. Meyer et al. 19110 (NA), Mutsu, K. Hosoi 10198 (A), Nagano, M. Furuse 3863 (A), 3719 (A), Okinawa, M. Furuse 483 (NA), Rikuchu, K. Hosoi 11045 (A), Sapporo, T. Arimoto s.n. (GH), Sinano, T. Yamazaki 156 (A), Teshio, R. K. Beattie & Y. Kurihara 10297 (A, NA), B. Kasapliligil 3565 (NA), Teshiwo, M. Furuse 8733 (NA), F. G. Meyer et al. 18943 (NA), Tochigi, T. Kurosawa et al. 4263 (A), F. Yamazaki 9837 (NA), Toyama, H. Kanai et al. 3957 (A), Yamanashi, M. Togashi 10647 (A),

Yokohama, C. J. I. *Maximowicz* s.n.(NY). **KOREA:** Chol-la-nam-do, H. Takahashi & C. S. Chang 433 (A), Hongo-san, E. H. Wilson 10450 (A, US), 10708 (A), 10502 (A), N. Huan, E. H. Wilson 8619 (A), Kungang-san, T. Bojarczuk & A. Boratynski 783 (A), 784 (A), Kyong-gi-do, C. S. Chang 56 (A), Mt. Hanggii, T. Nakai 2061 (A), without locality, U. J. Faurie 3010 (WU), 3124 (WU 2 sheets), S. Yankyo, E. H. Wilson 9229 (A). **RUSSIA:** Far East, T. Tschonoski & T. Leoviobi 2487 (A), Primorsk, N. Palczewsky s.n. (NA), Sachalin, A. Bunge s.n. (P), P. Glehn s.n. (GH), A. K. Skvortov s.n. (NA), Vladivostok, G. Proskuriakova & G. Porubinovskaia s.n. (A, NA).

The syntype specimens collected by PRZEWALSKI from Gansu (Northwest China) should be another species (for details see *E. giraldii* in this work). The flower and fruit in this species is 5-merous, but sometimes only 3 or 4 locules are developed into mature fruit in the eastern and northern parts of the distribution, especially from northern Japan and northern Far East of Russia; this character is sometimes found in the same specimen (see above citation), so that separation of taxa only by the number of wings or locules in the fruit could not be accepted in this case. This species is very similar to *E. oxyphylla* in the texture of the leaves, but fruit with its very short wing makes it separable from the latter, and it is also different from *E. macroptera* in the same area.

13. *Euonymus sanguinea* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 441, tab. 5: A, B. 1900. TYPE: CHINA. Western Szechuan: Tachienlu, alt. 3000-3300 m, Oct. 1908, E. H. Wilson 1308 (A! designed here). [Fig. 12]

- = *E. sanguinea* LOES. ex DIELS var. *camptoneura* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 442. 1900. SYNTYPES: CHINA. Sichuan: Nanchuan, C. Bock & A. Rosthorn 1565 (A!), 1567 (not seen).
- = *E. sanguinea* LOES. ex DIELS var. *orthoneura* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 442. 1900. SYNTYPES: CHINA. Hupeh: A. Henry 6183 (A!, US!); Sichuan: Nanchuan, C. Bock & A. Rosthorn 491 (not seen).
- = *E. sanguinea* LOES. ex DIELS var. *laxa* LOES., Bot. Jahrb. Syst. 30: 465. 1902. SYNTYPES: CHINA. Shaanxi: G. Giraldi 218 (not seen), 231 (not seen), Wm. Purdom 13 (A!).
- = *E. sanguinea* LOES. ex DIELS var. *pachyphylla* PAMP., Nuov. Giorn. Bot. Ital. 17: 420. 1910. TYPE: CHINA. Hupeh: Monte Niang-niang, alt. 1850 m, 1907, A. Silvestri 1357 (PE!, merotype A!, photo A!).
- = *E. monbeigii* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 34. 1917. TYPE: CHINA. Yunnan: NW, 1907, *Monbeig* 58 (not seen).
- = *E. sanguinea* LOES. ex DIELS var. *lanceolata* S. Z. QU & Y. H. HE, Bull. Bot. Res., Harbin 8(4): 95, f. 4-7. 1988. TYPE: CHINA. Shaanxi: Nanzheng, alt. 770 m, Aug. 5, 1963, M. C. Wang 728 NWCF (not seen).
- *E. sanguinea* LOES. ex DIELS var. *brevipedunculata* LOES. in SARG., Pl. Wilson. 1: 495. 1913, nom. inval. TYPE: CHINA. Western Szechuan: Tachienlu, alt. 3000-3300 m, Oct. 1908, E. H. Wilson 1308 (MO! US!).

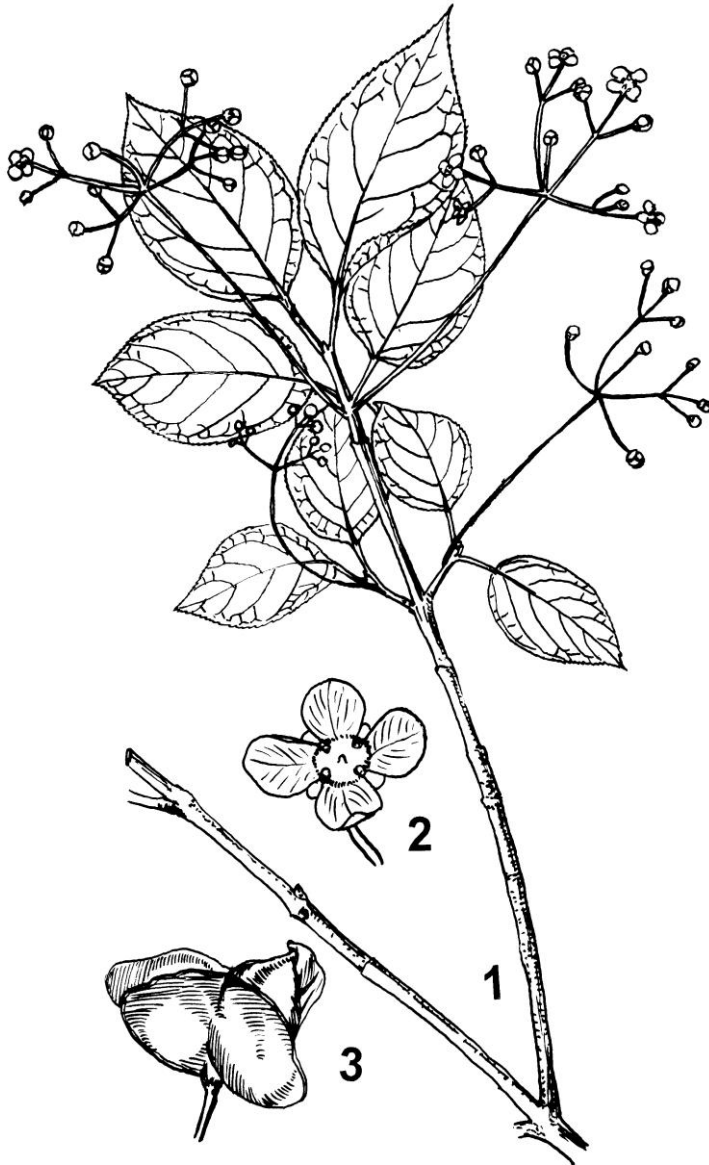


Fig. 12. *Euonymus sanguinea* DIELS. – 1. flower branch; 2. flower; 3. fruit

Deciduous shrub or small tree, 3-5 m tall; branches and twigs sturdy, with striations, brown or gray-brown when dry. Leaves coriaceous, ovate-elliptic, with some divergence, 6-8 x 3-4 cm, apex acuminate or acute, base subrotund, cuneate or attenuate, margin sharply and finely serrate, sometimes combined

with finely crenulate, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole usually less than 1 cm long, occasionally more than 1 cm long. Peduncle to 5-7 cm long when fully developed, with 1-2 dichotomous branches and several to many flowers; pedicel slender, 5-6 mm long. Flower 4-merous, less than 6 mm in diam. Sepals subround, short. Petals whitish-green or greenish white, ovate, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, less than 1 cm in diam., with 4 wide and sharp wings, more than 8 mm long when fully developed; seeds with bright red aril.

Phenology. Flowering: April to June; Fruiting: July to October.

Distribution: China (Gansu, Henan, Hubei, Hunan, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan); alt. 1,800-3,700 m, in bushes or in mixed forest; common.

SPECIMENS EXAMINED: **CHINA:** GANSU: Lanzhou, Y. Q. He 5270 (PE), Pingliang, *Yellow River Exped. 1802* (KUN), without locality, E. Licent 4281 (BM 2 sheets), Yuzhong, C. Y. Wu et al. 9014 (KUN 2 sheets), 9176 (KUN); HENAN: Lingbao, J. Q. Fu 73 (KUN, N), Lushi, J. Q. Fu 1735 (KUN); HUBEI: Ichang [Yichang], A. Henry 3742 (P), Junxian, K. R. Liu 21 (PE), Patung [Badong], E. H. Wilson 589 (A, NY), 589a (A, NY), Shengnongjia, 1980 *Sino-Amer. Exped. 1004* (A, KUN, NA, NY), 1799 (A, KUN, NA, NY), 1871 (A, KUN, NA, NY), Wan Tsao Shan, W. C. Cheng 3942 (A), 4287 (US), W. Hupeh, A. Silvestri 1358 (A), E. H. Wilson 1160 (A, NY, P, US), 2053 (A), 3111 (A, GH, MO), Without locality, A. Henry 5445 (GH), 6039 (A 2 sheets, US), 6507 (GH), 6556 (GH), A. Silvestri 5074 (A), Xingshan, H. J. Li 436 (PE); HUNAN: Sangzhi, T. R. Cao 90126 (KUN); SHAANXI: Chiehhsiu [Jiexiu], H. Smith 5791 (A, MO), 7816 (A), Fuping, K. T. Fu 4823 (KUN, MO), Hu Hsien [Fuxian], Fr. Hugh s.n. (BM), Thaepeisan [Taibaishan], Fr. Hugh s.n. (BM 2 sheets); SHANXI: Yongji, T. W. Liu 277 (MO); SICHUAN: Baoxing, no collector 261 (KUN), Chengkou, T. L. Dai 104901 (KUN), 105534 (KUN), 105595 (KUN sheets), 105871 (KUN), 106666 (KUN), Chengtu [Chengdu] Plain, F. T. Wang 22115 (A, PE), Chuti, G. N. Potanin s.n. (A); Daocheng, *Qinghai-Xizang Exped. 5990* (KUN), Dege, Y. W. Tsui 5106 (KUN), 5829 (KUN), 5864 (KUN), Derong, *Qinghai-Xizang Exped. 3207* (KUN), Emeishan, D. D. Tao 11433 (KUN 2 sheets), Guanxian, D. E. Boufford & B. Bartholomew 24776 (A, MO, NY), Huangning, S. K. Wu 1793 (KUN), Lifan [Lixian], F. T. Wang 21609 (A, KUN), 21659 (KUN); Li Hsien (Lixian), K. F. Li 74238 (KUN), Muli, K. M. Feng 2949 (A, KUN), G. Forrest 16992 (A), 21342 (A, US), *Qinghai-Xizang Exped. 14135* (KUN), 14679 (KUN 2 sheets), T. T. Yu 6114 (KUN 2 sheets), 14150 (A, KUN), S. K. Wu 2491 (KUN 2 sheets), 2630 (KUN 2 sheets), 2705 (KUN 2 sheets), Mupin [Baoxing], T. P. Soong 38286 (KUN), 38307 (KUN), 38856 (KUN 2 sheets, PE), 39022 (KUN), E. H. Wilson 4308 (A), Nanchuan, K. C. Kuan 1250 (PE), K. F. Li 60985 (KUN), 61014 (KUN), 61532 (KUN), 61631 (KUN, PE), 61943 (KUN, PE), 63337 (KUN), 63397 (KUN), 63890 (KUN), *Nanshuibeidian Exped. 4892* (KUN), *West Chinese Academy of Sciences 3177* (PE 2 sheets), J. H. Xiong & Z. L. Zhou 90975 (PE), 93068 (KUN), 93279 (KUN), 93759 (KUN), Pingwu, no collector 10821 (PE), Tatsienlu (Kangding), J. Kachkarow s.n. (A), J. A. Soulie 789 (P), Tianquan, *Sichuan Agricultural College Team 956* (KUN), Xiangcheng, *Qinghai-Xizang Exped. 4140* (KUN 2 sheets), *Sichuan Vegetation Exped. 2934* (KUN), without locality, P. W. Bristol 116 (A), A. Henry 5562 (GH), 7254 (GH); XIZANG: Gyirong, *Qinghai-Xizang Exped. 6266* (KUN 2 sheets), 7023 (KUN 2 sheets), C. Y. Wu et al. 75-563 (KUN 2 sheets), Kangbei, S. Jiang 9931 (KUN), Mainling, *Qinghai-Xizang Exped.*

(Suppl.) 750871 (KUN 2 sheets), Qamdo, Qinghai-Xizang Exped. 73-46 (KUN 2 sheets), 73-380 (KUN), Tsarung, J. F. Rock 23181 (A, US), Tsawarung, C. W. Wang 65165 (A), 66357 (A, KUN), Yadong, Qinghai-Xizang Exped. 74-2205 (KUN), Zayu, Qinghai-Xizang Exped. 73-332 (KUN 2 sheets); YUNNAN: A-tun-tze (Deqen), G. Forrest 13973 (A), C. W. Wang 70042 (A), 70228 (A, KUN), 70261 (A, KUN), T. T. Yu 7824 (BM), 8496 (KUN 2 sheets), 8587 (KUN 2 sheets), Beima Shan, G. Forrest 13810 (A), Bijiang, Bijiang Exped. 1186 (KUN), Deqen, K. M. Feng 5730 (KUN 2 sheets), 9969 (KUN), Qinghai-Xizang Exped. 2951 (KUN 2 sheets), 2593 (KUN 2 sheets), 11131 (KUN), Fugong, Q. Lin 791987 (KUN 2 sheets), Landsang-djiang [Mekong], H. Handel-Mazzetti 8816 (WU), 8872 (WU), Lijiang, C. Z. Bao 20425 (KUN 2 sheets), R. C. Ching 30835a (KUN 2 sheets), Jinshajiang Exped. 4558 (KUN 2 sheets), Botanic Garden 100226 (KUN), Lofa et Tseku, H. Handel-Mazzetti 1709 (A), Mekong-Salween divide, G. Forrest 14124 (A), Mekong-Salween watershed, G. Forrest 20134 (A, US), 21612 (A, US), J. F. Rock 8891 (A, NY, US), Shiongcheng, T. T. Yu 13353 (KUN), Yungning [Ningliang], G. Forrest 21249 (A, US), Weixi, T. T. Yu 8219 (A, KUN), without locality, G. Forrest 10753 (A, BM), 10893 (A, K), 13451 (A), 22423 (A), T. T. Yu 9968 (A), Zhongdian, K. M. Feng 1086 (KUN), 23482 (KUN), 23483 (KUN 2 sheets), Qinghai-Xizang Exped. 1196 (KUN), T. T. Yu 1068 (KUN), 8190 (KUN), 11250 (KUN 2 sheets), 11289 (KUN); N CENTRAL CHINA: Huantousan, Fr. Hugh s.n. (BM), Kuitousan, Fr. Hugh s.n. (BM), Laoyusan, Fr. Hugh s.n. (BM), Miaowangsan, Fr. Hugh s.n. (BM 2 sheets), Ngosan, Fr. Hugh s.n. (BM 2 sheets), Rifongsan, Fr. Hugh s.n. (BM), without locality, Fr. Hugh 118 (BM).

The major characters of this species are the coriaceous leaves of medium size, serrulate or crenate on the margin, 4-merous white flowers, as well as the medium sized capsule with 4 wide and sharp wings which are held nearly horizontal.

14. *Euonymus schensiana* MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 444. 1881. TYPE: CHINA. Schenxi: Han-tschung, *Dr. Piasezki s.n.* (not seen). [Fig. 13]

= *E. elegantissima* LOES. & REHDER in SARG., Pl. Wilson. 1: 496. 1913. SYNTYPES: CHINA, Western Hupeh: Fang Hsien, alt. 1600-2300 m, May 26, 1907, *E. H. Wilson 3114* (A!, GH!, MO!, US!); without locality, *A. Henry 6584* (GH!).

= *E. haoi* LOES. ex CHEN H. WANG, Chin. J. Bot. 1(1): 50. 1936, in note. SYNTYPES: CHINA. Shensi: Huashan, cultivated in the temple of Chaoyongtung, Aug. 25, 1932, *K. S. Hao 4180* (PE! 3 sheets), same locality, Aug. 2, 1932, *K. S. Hao 4125* (PE! 2 sheets), Sianfu, cultivated, June 14, 1933, *Y. C. Wang 20* (not seen).

Deciduous shrub, several meter high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry. Leaves thickly chartaceous, ovate-elliptic, obovate or obovate-elliptic, 5-8 (10) x 2.5-4 cm, apex acuminate or acute, base subrotund, cuneate or attenuate, margin finely crenulate, lateral veins 4-6 pairs, disappearing before reaching the margin; petiole less than 1 cm long. Peduncle slender, up to more than 10 cm long when fully developed, with

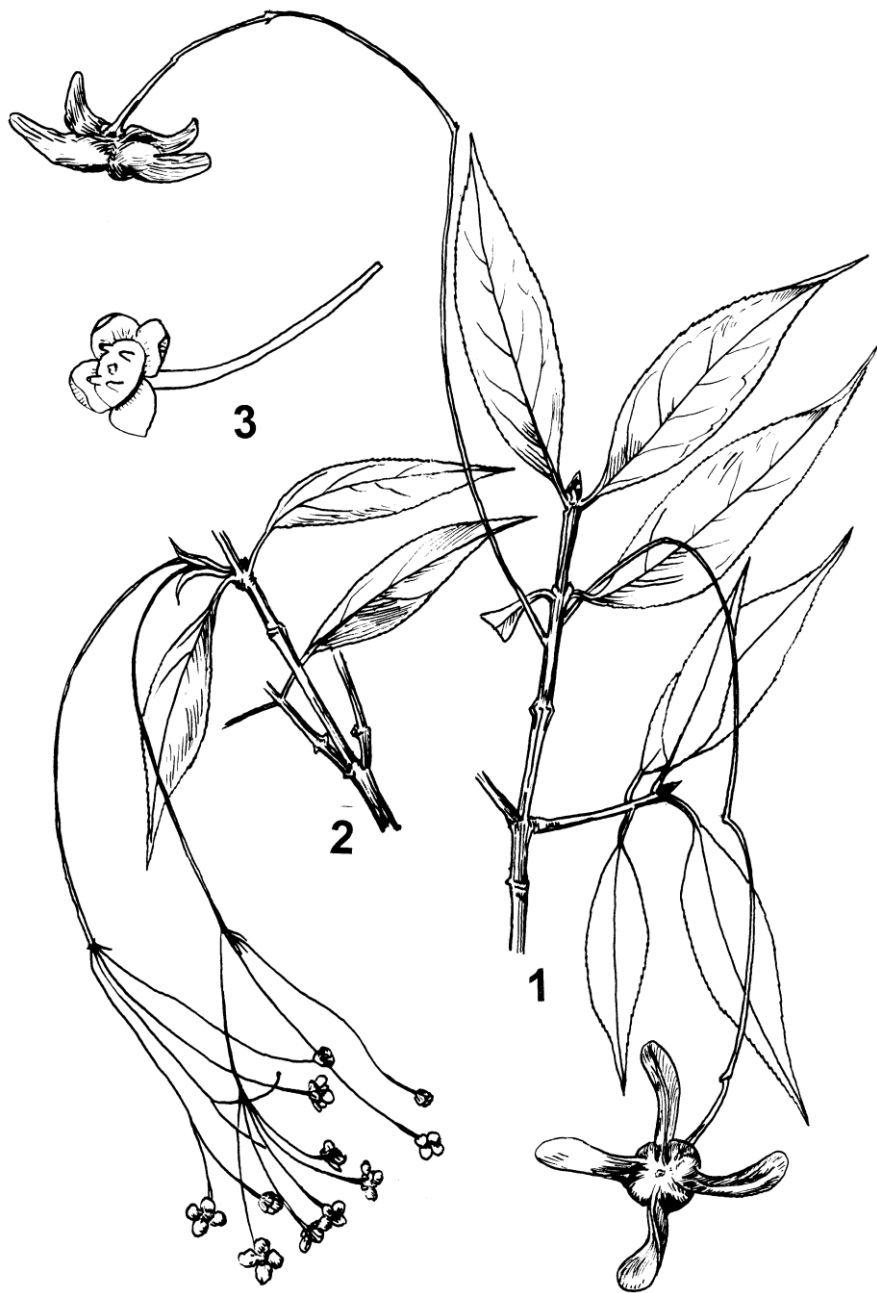


Fig. 13. *Euonymus schensiana* MAXIM. – 1. fruit branch; 2. flower branch; 3. flower in large.

1-2 dichotomous branches and several to many flowers; pedicel thin and slender, c. 10 mm long. Flower 4-merous, c. 7 mm in diam. Sepals subround, short. Petals whitish-green or greenish white, obovate, apex acute, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1 cm in diam., with 4 wide and obtuse wings, more than 8 x 6 mm when fully developed; seeds with bright red aril.

Phenology. Flowering: April to May; Fruiting: September to November.

Distribution: China (Gansu, Henan, Hubei, Ningxia, Shaanxi, Sichuan); in foothills; rare.

SPECIMENS EXAMINED: **CHINA:** GANSU: Tianshui, Q. X. Li 219 (PE), Yuzhong, H. L. Cui et al. 80-395 (PE), without locality, T. P. Wang 5365 (PE); HUBEI: Chuchi, K. M. Liu 8853 (PE); SHAANXI: Huashan, J. Hers 3029 (A), 3031 (A), Leigongshan, T. P. Wang & T. N. Liou 9259 (PE), Mei Hsien [Meixian], T. N. Liou & P. C. Tsoong 1603 (PE), W. Y. Hsia 4596 (PE), Nanzheng, K. T. Fu 11030 (KUN), Taibeishan (Taibaishan), T. N. Liou & P. C. Tsoong 1602 (KUN 2 sheets), 1954 (PE), Wm. Purdom 11 (A, US), Wugong, Agricultural College Team 78 (PE); SICHUAN: Chengdu, H. Yu 531 (PE), Emeishan, Sichuan Exped. 1692 (PE), Hongya, Sichuan Economic Pl. Exped. (59) 1514 (KUN, PE 2 sheets), Leibo, no collector 13371 (PE), Meigu, no collector 13629 (PE), Qingchuan, Qingchuan Exped. 2827 (PE), Without locality, F. Chanix 21 (A).

The species is related to *E. giraldii*, but differs from it by the wide wings on the capsule as well as the long peduncle up to more than 10 cm. However, there is not enough material available at present, and further research is needed. The distribution in Henan and Ningxia are based on local floras, and specimens were unavailable for the present work (Flora of Henan 2: 519. 1988, Flora of Ningxia 1: 442. 1986).

15. *Euonymus subcordata* J. S. MA, Harvard Pap. Bot. 10: 95, fig. 7. 1997. TYPE: CHINA. Guangxi: Longjun [Longjin], S. H. Chun 13297 (MO!).

Shrub, c. 2 m high; branches and twigs sturdy, 4 angled or subulate (winglike) when young, brown or gray-brown when dry. Leaves thickly coriaceous, ovate-oblong, 13-15 x 4-6 cm, apex acuminate, base cordate, margin coarsely serrate, lateral veins impressed on upper surface, prominent on lower surface, sessile. Pedicel thin, c. 10 mm long. Flower 4-merous, not seen. Capsule (young) green, globose, almost 4-winged, c. 1 cm in diam.

Phenology. Flowering: before July; Fruiting: August or later.

Distribution: China (Guangxi); in forest; rare.

This species looks like *E. chloranthoides*, but differs by having a 4-merous capsule, cordate leaves without a petiole, and the nerves impressed on the upper surface. It is still in need of further study, since there are no specimens besides the type, which has only very young fruit.

16. *Euonymus szechuanensis* CHEN H. WANG, Contr. Bot. Surv. Northw. China 1: 49. 1939. TYPE: CHINA. Szechuan: without precise locality, *F. T. Wang 57a* (PE!). [Fig. 14]

Deciduous shrub, several meter high; branches and twigs somewhat sturdy, with striations, brown or gray-brown when dry; leaves thickly chartaceous, ovate-elliptic, obovate or obovate-elliptic, 6-11 x 3-4 cm, apex acuminate, caudate or acute, base cuneate or attenuate, margin finely crenulate, lateral veins 5-6 pairs, disappearing before reaching the margin; petiole less than 1 cm long. Peduncle slender, to more than 10 cm long when fully developed, with 1-2 dichotomous branches and several to many flowers; pedicel thin and slender, c. 10 mm long. Flower 5-merous, up to 1.2 cm in diam. Sepals subround, short. Petals dark red or purple, obovate, apex rotund, base cuneate. Ovary with small angles. Capsule green to brown, or yellow-brown when dry, nearly globose, c. 1 cm in diam., with 5 wide and sharp wings, less than 6 x 5 mm when fully developed; seeds with bright red aril.

Phenology. Flowering: April to July; Fruiting: July to August.

Distribution: China (Shaanxi, Sichuan, Yunnan); alt. 700 - 1600 m, in forest; occasional.

SPECIMENS EXAMINED: **CHINA:** SHAANXI: Nanzheng, *M. C. Wang 728* (PE); SICHUAN: Baoxing, *K. L. Chu 3322* (SZ), *3273* (SZ), Chengdu, *W. P. Fang 12396* (SZ), *S. S. Chien 5291* (SZ), Chengkou, *T. L. Dai 100315* (SZ), *100700* (SZ), Ebian, *K. H. Yang 55153* (KUN, PE), *55480* (KUN), *Z. X. Zhao 769* (KUN 2 sheets), *Z. S. Zheng 160* (KUN), Fupien (lat. 31.03 N, long. 102.00 E), *F. T. Wang 21408* (A, KUN 2 sheets), Kuan Hsien [Guanxian], *F. T. Wang 20849* (A, KUN), Leibo, *Sichuan Economic Pl. Exped. (59) 105* (KUN), *311* (KUN, PE), *689* (KUN), Omeishan [Emeishan], *R. C. Ching 149* (PE), *154* (PE, 2 sheets), *T. H. Tu 90* (PE, 2 sheets), *W. P. Fang 17054* (A, PE), *17342* (A, IBSC, MO), *17917* (A), *T. N. Liou 1124* (PE), *P. Luo et al. 1889* (SZ), *X. B. Peng 6120* (PE), *S. L. Sun 466* (KUN, SZ), *2596* (KUN), *3449* (KUN), *E. H. Wilson 4790* (A, P), *J. H. Xiong et al. 22269* (PE), *30434* (SZ), *31423* (PE), *92310* (PE), *S. N. Xu 708* (PE), *K. H. Yang 55206* (KUN, SZ), *55269* (SZ), *55481* (PE, SZ), *65467* (PE), Pingshan, *T. T. Yu 3119* (PE), Tianquan, *Y. P. He 43434* (SZ 2 sheets), *W. K. Hu 10210* (PE), *H. L. Tsiang 35315* (PE), *Sichuan Economic Pl. Exped. (59) 985* (KUN); YUNNAN: Daguang, *Northeast Yunnan Exped. 101* (KUN 2 sheets), Qiaojia, *Northeast Yunnan Exped. 1444* (KUN 2 sheets), Yiliang, *Northeast Yunnan Exped. 697* (KUN 2 sheets), *H. T. Tsai 52063* (A, PE 2 sheets), Yongshan, *H. T. Tsai 50973* (A, KUN 2 sheets, PE), Zhenxiong, *P. H. Yu 1180* (KUN 2 sheets), Zhaotong, *X. W. Li 221* (KUN, IBSC).

This species has 5 spreading wings on the capsule, and the flower is very large and purple, which makes it very different from others in the section. It seems similar to *E. rehderiana*, but leaves are finely crenulate, and flower is much larger in the latter species.

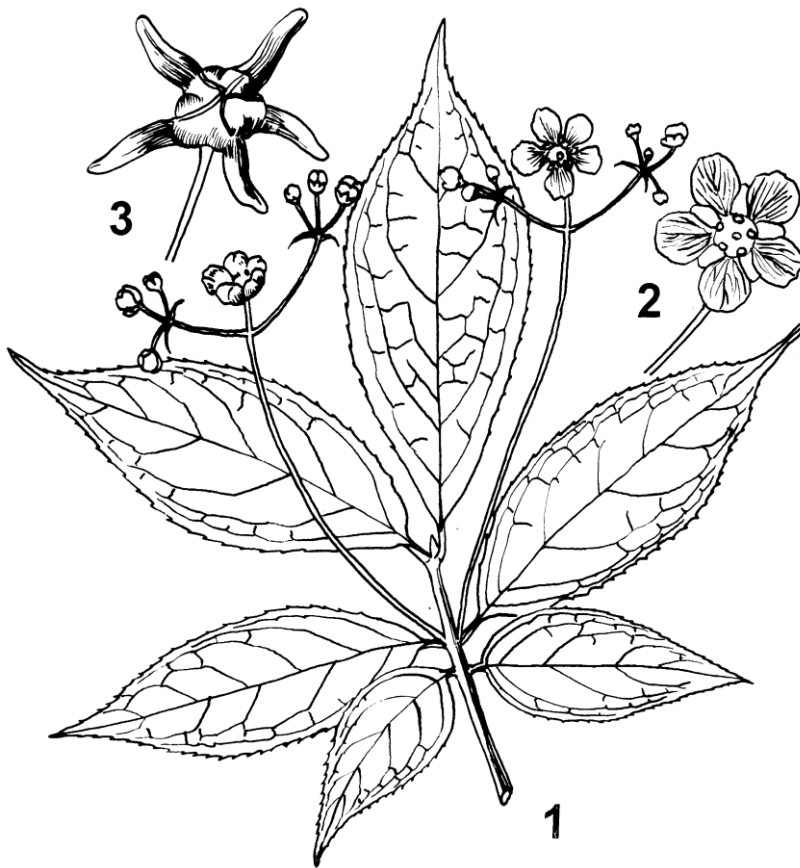


Fig. 14. *Euonymus szechuanensis* CHEN H. WANG – 1. flower branch; 2. flower; 3. fruit.

Subgenus 2. *Euonymus*

≡ *Euonymus* BECK, Fl. Nied.-Oesterr. 2 (1): 588. 1892.

Evergreen or deciduous shrubs to small trees; winter buds ovoid, small, 2-5 mm long. Flower 4- or 5-merous. Stamen with filament or subsessile; anther with two cells. Ovary with 4- or 5-locules. Capsule rugose, without wings, echinate or lobed, 4- or 5-lobed after dehiscence at maturity.

4 sections and c. 113 species. Type: *Euonymus europaea* L.

Sect. 2. *Echinococcus* NAKAI, J. Jap. Bot. 17(11): 617, 1941

Shrubs or shrublike, deciduous or evergreen. Flower usually 4-merous, rarely 5-merous. Capsule with tubercles or spines, 4-lobed when open, occasionally 5-lobed.

18 species total, 1 in N America, 1 in SE Asia, 1 in Himalayas, 2 in C America, 3 in S Asia, 14 in E Asia. Type: *Euonymus echinata* WALL.

Keys to Species

1. Flower and fruit 5-merous, deciduous shrub. N America 21. *E. americana*
1. Flower and fruit always 4-merous
 2. Capsule with tubercles, not spines
 3. Capsules with dense tubercles over the whole surface. E Asia 33. *E. verrucocarpa*
 3. Capsule with depressed tubercles only
 4. Capsule wholly covered by scalelike tubercles. C America 30. *E. mexicana*
 4. Capsule covered by tubercles in angles only. C America 26. *E. chiapensis*
 2. Capsule with spines, not tubercles
 5. Capsule with sparse spines, needlelike or threadlike, or with few spines on the surface
 6. Capsule with fine and slender spines or sometimes only needlelike, large, to 1.3-1.8 cm in diameter. E Asia 29. *E. lushanensis*
 6. Capsule with straight spines, not fine and slender, small, less than 1 cm in diameter.
 7. Leaves entire, oblong-elliptic to elliptic. E Asia . 31. *E. potingensis*
 7. Leaves serrulate to serrate on margin
 8. Dwarf shrub, less than 30 cm high; capsule with threadlike spines. E Asia 20. *E. aculeola*
 8. Shrub, more than 1 m high
 9. Leaves 5-12 x 3-4.5 cm, veins impressed above, prominent beneath, capsule c. 8 mm in diameter. E Asia ... 27. *E. chunii*
 9. Leaves 4-6 x 2-3 cm, veins not impressed nor prominent, but invisible; capsule 8-10 mm in diameter. E Asia 32. *E. spraguei*
 5. Capsule with dense spines, evident on the whole surface
 10. Capsule grayish-green or gray on mature in sicco, spines more than 1 cm long, base flattened; cymes with more than 3 dichotomous branches. E Asia 18. *E. actinocarpa*
 10. Capsule brown, yellow, tawny, black or purple in sicco, spines less than 1 cm long
 11. Inflorescence more than 10 cm long, with more than 10 flowers

- 12. Leaves ovate or ovate-elliptic, yellow, with 5-8 mm long petiole, wrinkled upper surface. E & S Asia22. *E. balansae*
- 12. Leaves oblong to elliptic, petiole 1-2 cm long, never wrinkled upper surface. E & S Asia..... 17. *E. acanthocarpa*
- 11. Inflorescence less than 9 cm long, with fewer than 9 flowers
 - 13. Leaves pubescent below; capsule pubescent. E Asia
 - 24. *E. acanthoxantha*
 - 13. Leaves and capsule not pubescent
 - 14. Leaves sessile or with petiole less than 4 mm long
 - 15. Leaves less than 4 x 2 cm. E Asia25. *E. chenmoui*
 - 15. Leaves more than 4 x 2 cm
 - 16. Leaves ovate to elliptic, 4-8 x 2-4 cm. SE Asia.....
 -23. *E. benguetensis*
 - 16. Leaves ovate, c. 5 x 2-3 cm. E & S Asia, Himalayas
 -28. *E. echinata*
 - 14. Leaves with petiole more than 8 mm long
 - 17. Leaves coriaceous, 7-10 x 3-6 cm; capsule 1-1.5 cm in diameter. E Asia19. *E. aculeata*
 - 17. Leaves thinly coriaceous or papyraceous, 10-15 x 2.5-4.5 cm; capsule 1.5-2.0 cm in diameter. E Asia
 -34. *E. wilsonii*

17. *Euonymus acanthocarpa* FRANCH., Pl. Delavay. 2:129. 1889. SYNTYPES: CHINA. Yunnan: in silvis ad Mao-kou-tchang, supra Tapintze; *P. J. M. Delavay s.n.* (not seen); in monte Che-tcho-tze E provincia Kouï-tcheou, *P. J. M. Delavay 2816* (not seen). [Fig. 15]

- = *E. acanthocarpa* FRANCH. var. *sutchuenensis* FRANCH. ex DIELS, Bot. Jahrb. Syst. 29: 439. 1900. SYNTYPES: CHINA. Sichuan: Chengkou, *P. G. Farges s.n.*; Nanchuan, *C. Bock & A. Rosthorn 1562* (not seen), *1564* (not seen).
- = *E. theifolia* WALL. ex LAWSON var. *scandens* LOES., Bot. Jahrb. Syst. 30: 455. 1902. SYNTYPES: CHINA. Yunnan: apud Mengtze, alt. 2000-2300 m, *A. Henry 10544* (A! K! MO! NY!), *10544a* (A! MO! NY! US!).
 - ≡ *E. acanthocarpa* FRANCH. var. *scandens* (LACE) BLAKELOCK, Kew Bull. 1951: 274. 1951.
- = *Echinocarpus erythrocarpa* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 10: 474. 1912. TYPE: CHINA. Kouy-Tcheou: 9 Oct. 1898, *E. Bodinier 2493* (P! merotype A!).
- = *E. longipes* LACE, Kew Bull. 1915: 396. 1915. TYPE: BURMA. *J. H. Lace 6149* (not seen).
 - ≡ *E. acanthocarpa* FRANCH. var. *longipes* (LACE) BLAKELOCK, Kew Bull. 1951: 273. 1951.
- = *E. tengyuehensis* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 36. 1917. SYNTYPES: CHINA. Yunnan: Tengyueh, *G. Forrest 9313* (not seen), *8658* (not seen), Shweli valley, *G. Forrest 11937* (A! PE!).

= *E. laxa* CHEN H. WANG, Contr. Bot. Surv. Northw. China 1: 12. 1939. TYPE: CHINA. Kweichow: Fan Ching San, alt. 1000 m, Oct. 12, 1931, A. N. Steward et al. 804 (A! NAS! PE! US!).

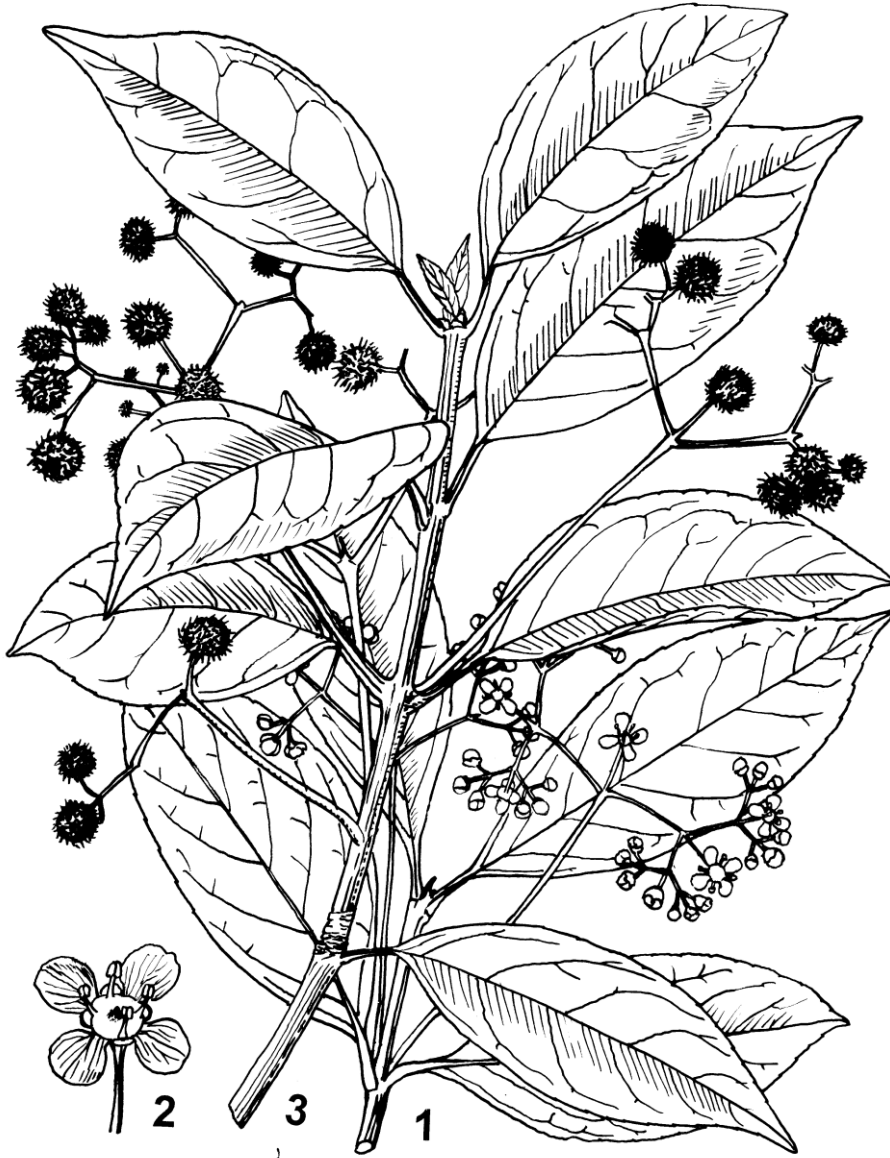


Fig. 15. *Euonymus acanthocarpa* FRANCH. – 1. flower branch; 2. flower; 3. fruit branch.

Deciduous shrub, erect or ascending, 2-3 (8) m tall; branches and twigs sturdy, brown or gray. Leaves coriaceous, oblong, oblong-elliptic, elliptic, 7-12 x 3-5.5 cm, apex acuminate or acute, base semiround, round, cuneate or attenuate, margin irregularly crenulate to crenate, lateral veins 5-8 pairs, disappearing before reaching the margin; petiole 1-2 cm long. Peduncle to 6-10 cm long, usually with more than 3 dichotomous branches and many flowers; pedicel 4-6 mm long. Flower 4-merous, small, 6-8 mm in diam. Sepals subround. Petals yellow-green, obovate, base attenuate; disc round. Filament 2-3 mm long. Ovary densely spiny; stigma long. Capsule brown-red, nearly globose, 1-1.2 cm in diam., densely spiny or prickly on surface, 1-2 mm long, opened into 4-lobes at maturity; seeds with orang aril.

Phenology. Flowering: May to August; Fruiting: August to November.

Distribution: China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang), Myanmar; alt. 700-3,200 m, in woodlands and forests; common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: without location, *K. K. Tsoong* 3160 (PEY); FUJIAN: Congan, *M. C. Wang* 3446 (PE), *Wuyishan Exped.* 2539 (US), *Wuyishan M. C. Wang et al.* 1690 (NAS); GUANGDONG: Yuyuen [Ruyuan], *S. P. Ko* 52846 (PE), 52849 (A, MO, PE, SZ), 53454 (MO, PE, SZ), 54642 (MO, NAS, SZ); GUANGXI: Chuan District [Quanxian], *W. T. Tsang* 27654 (A, NA), Kweilin [Guilin], *W. T. Tsang* 28282 (A, NA, US), Damiaoshan, *S. H. Chun* 17118 (MO), Shangsze [Shangsi], *W. T. Tsang* 24393 (A, NA), Yaoshan, *C. Wang* 40507 (A, SZ); GUIZHOU: Chengfeng, *Y. Tsiang* 4600 (A, N, NY, PE), Sanchiang [Sanjiang], *A. N. Steward & H. C. Cheo* 941 (A), Shuicheng, *Y. Tsiang* 9462 (A, NAS), Tating [Dafang], *Y. Tsiang* 8940 (A, NAS), Tuyun [Duyun], *Y. Tsiang* 5761 (A, NAS), Yinjiang, 1986 *Sino-Amer. Guizhou Exped.* 1610 (A), 1796 (A), Yinkiang [Yinjiang], *Y. Tsiang* 7838 (NAS); HUIBEI: Badong, *H. C. Chow* 770 (PE), Fang Hsien [Fangxian], *E. H. Wilson* 3116 (US), 3120 (A, US), Hefeng, *H. J. Li* 8481 (PE), Ichang [Yichang], *E. H. Wilson* 504 (A), Jianshi, *T. Y. Dai & C. H. Qian* 258 (PE), Patung [Badong], *E. H. Wilson* 3121 (A), Shengnongjia, 1980 *Sino-Amer. Exped.* 574 (A, NA), Xingshan, *Q. L. Chen et al.* 2281 (PE 2 sheets); HUNAN: Longshan, *L. H. Liu* 1793 (PE), Nanyue, *S. H. Chun* 3409 (PE 2 sheets), *Y. X. Liou & Her Father* 359 (PE, NAS), Wukang [Wugang], *F. Heindr* 2501 (A), Yunshan, *F. Heindr* 2209 (A); JIANGXI: Lushan, *N. K. Ip* 1114 (A), 1769 (A), Pingxiang, *Jiangxi Exped.* 750 (PE), Wugongshan, *Jiangxi Exped.* 1162 (PE); SHAANXI: Pingli, *C. L. Tang* 1304 (PE); SICHUAN: Beichuan, *W. P. Fang* 5602 (A), Baoxing, *S. S. Zhang & Y. X. Ren* 7366 (PE), Daliangshan, *T. T. Yu* 3984 (PE), Ebian, *T. N. Liou* 12328 (PE), 12373 (PE), Emeishan, *C. Y. Chiao & C. S. Fau* 508 (A), *W. P. Fang* 7489 (US), *J. H. Xiong & S. S. Zhang* 31947 (NAS), 32601 (NAS), *E. H. Wilson* 4784a (A 2 sheets), Miyi, *W. C. Cheng* 10391 (PE), Muli, *G. Forrest* 22412 (A), Nanchuan, *W. P. Fang* 5783 (A), *Y. Y. Ho* 4443 (NAS), 4825 (NAS), *T. C. Lee* 3554 (US), 3973 (US), *K. F. Li* 64542 (NAS), Wenchuan, *E. H. Wilson* 1089 (A); YUNNAN: Atuntze (Deqen), *T. T. Yu* 7832 (A), Chungtien [Zhongdian], *K. M. Feng* 3286 (A), Dali, *H. C. Wang* 1587 (PE), *H. Handel-Mazzettii* 6847 (US), Daweishan, *X. Wao* 100497 (MO), Likiang [Lijiang] Snow Range *R. C. Ching* 20360 (A, PE), *J. F. Rock* 9793 (A, US), 8969 (US), Mentze [Mengzhi], *A. Heny* 10544b (A), Salwin-Kiu Chiang, *G. Forrest* 20100 (A, US), Songming, *P. Y. Chiu* 55526 (PE), *P. I. Mao* 594 (IBSC), Weisi [Weixi], *C. W. Wang* 70416 (A), 70418 (PE), Without location, *G. Forrest* 20852 (A, US), 21216 (US); ZHEJIANG: Lishui, *S. Y. Chang* 6495 (PE), Longquan, *Y. Y. Ho* 3426 (NAS), *S. Y.*

Chang 7225 (PE, KUN), Putuo, *H. Migo s.n.* (NAS), Taishun, *D. X. Zuo et al. 24032* (NAS, PE 2 sheets), Tianmushan, *H. Migo s.n.* (NAS).

The leaves of this species vary much in size, color and form, but most are long elliptic. The fruit is of medium size, and the spines are small to medium and dense, within the species in the section. This species is the most widespread in the section. The taxon *E. tengyuhensis* was described from flowering specimens having the same flowers, leaves, and cymes as this species, and also the same distribution.

18. *Euonymus actinocarpa* LOES., Bot. Jahrb. Syst. 30: 459. 1902. TYPE: CHINA. Hupeh: juxta Ichang ad Nan-to etc, *A. Henry 4399* (ut 4339, GH!). [Fig. 16]

- = *E. hemsleyana* LOES., Bot. Jahrb. Syst. 30: 460. 1902. SYNTYPES: CHINA. Yunnan: apud Mengtze, alt. 1534 m, *A. Henry 9120* (A! 2 sheets, MO! 3 sheets, NY! 2 sheets, US! 2 sheets), *9124a* (not seen).
- = *E. angustata* SPRAGUE, Kew Bull. 1908: 33. 1908. SYNTYPES: CHINA. Hongkong: Kowloon, near Taimoshan, *Herb. Hongk. 639* (K!, 2 sheets); without locality or collector's name, *Herb. Kew* (K!).
- = *E. contracta* SPRAGUE, Kew Bull. 1908: 31. 1908. TYPE: CHINA. Western China: alt. 1050 m, *E. H. Wilson 3327* (A! 2 sheets, BM! K! P!).

Deciduous shrub, erect or ascending, up to 4 m tall; branches and twigs sturdy, with 4 angles, brown-green or gray. Leaves coriaceous, ovate to ovate-elliptic or elliptic, 7-10 x 3-5 cm, apex acute, base cuneate or attenuate, margin crenulate, lateral veins c. 8 pairs, netted before reaching the margin; petiole 8-12 mm long. Peduncle to 6-10 cm long, usually with more than 3 dichotomous branches and many flowers; pedicel slender, c. 5 mm long. Flower 4-merous, small, c. 5 mm in diam. Sepals subround. Petals yellow-green, ovate, base cuneate; disc with 4 lobes, without filament. Ovary with short stigma and dense, long spines. Capsule gray, nearly globose, 2-2.5 cm in diam., densely spiny on surface, 1-1.5 cm long, base flattened, opening into 4-lobes at maturity; seeds with orange aril.

Phenology. Flowering: January to April; Fruiting: June to January.

Distribution: China (Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan); alt. c. 1,700 m, in woodland or forest; occasional.

SPECIMENS EXAMINED: **CHINA:** GANSU: Chengxian, *W. Y. Hsia 6135* (PE); GUANGDONG: Hongkong, *S. Y. Hu 8778* (A, PE, US), *11627* (A), *11835* (A, US), *12007* (A), *12726* (A, PE), *Y. W. Taam 1178* (A, NY, US), *C. Wright 7029* (A), Lechang, *N. K. Chun 42993* (PE, SZ), Ruyuan, *S. P. Kuo 80153* (MO, PE), *C. L. Tso 20650* (MO), *C. Wang 44437* (MO), Yangshan, *L. Deng 1367* (MO); GUANGXI: Damiaoshan, *T. C. Chen 298* (MO), *S. H. Chun 15138* (MO), Luocheng, *C. H. Tsoong 83818* (IBSC), Xingan, *X. L. Yu 900335* (IBSC 2 sheets), Xiuren, *C. Wang 40623* (A, MO, PE); GUIZHOU: Pitsieh (Bijie), *H. T. Tsai 52751* (KUN 2 sheets, LBG, PE, SZ), Luodian, *South Guizhou Exped. 813* (KUN); HUBEI: Xuanen, *H. J. Li 3112* (KUN); HUNAN: Anjiang, *Z. R. Li 24* (PE),

Lingling, S. H. Chun 608 (MO 2 sheets, PE), Qianyang, Anjiang Agriculture College Team 1156 (PE 2 sheets), Yizhang, S. H. Chun 2557 (MO), Yunfengshan, Z. R. Li 1998 (PE), 2117 (PE 3 sheets), 2730 (PE 2 sheets); SHAANXI: Lueyang, K. T. Fu 5655 (PE); SICHUAN: Fengjie, M. Y. Fang 24550 (KUN), Nanchuan, K. F. Li 61390 (KUN); YUNNAN: Chaotung [Zhaotong], H. T. Tsai 50934 (A, KUN 2 sheets, NAS), Jinghong, Z. H. Tsi 91-360 (A, MO), Mengla, C. Y. Wu et al. 82082 (KUN), without locality, F. Ducloux 696 (K).

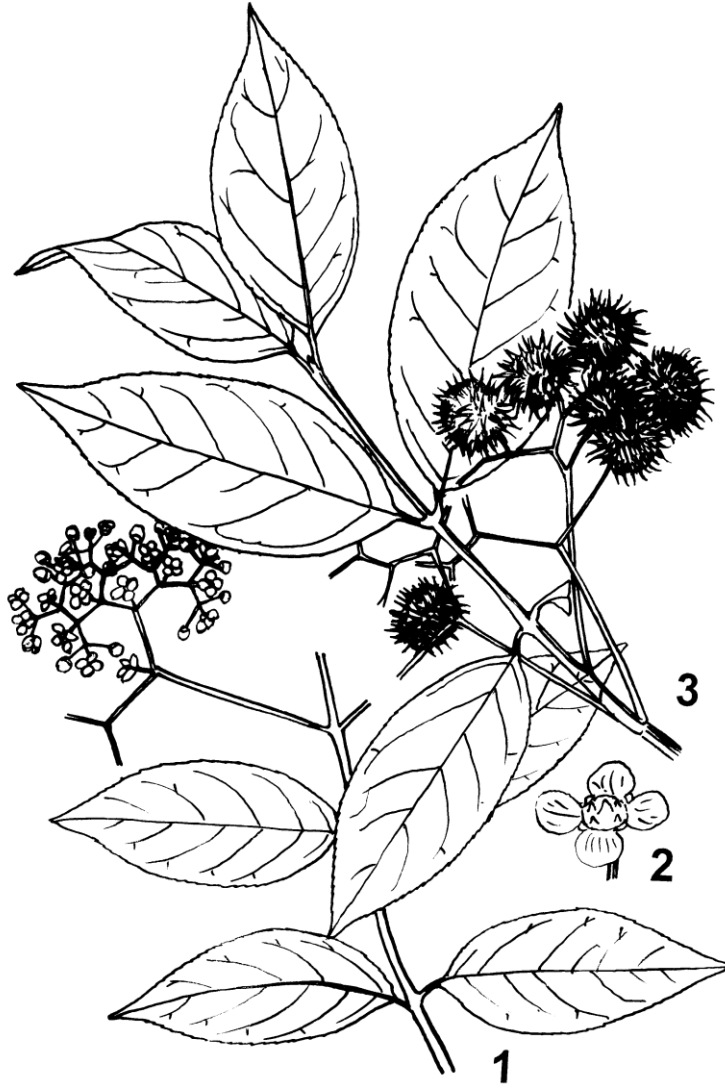


Fig. 16. *Euonymus actinocarpa* LOES. – 1. flower branch; 2. flower; 3. fruit branch.

This species is characterized by the large gray fruit with long and wide spines, which is much different from the others in the section.

19. *Euonymus aculeata* HEMSL., Kew Bull. 1893: 209. 1893. SYNTYPES: CHINA. Hupeh: South Patung, and Szechuan: South Wushan, A. Henry 5335a (GH!), 6143 (not seen). [Fig. 17]

- = *Echinocarpus hederaerhiza* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 10: 474. 1912. TYPE: CHINA. Kwei-Tcheou: Avril 1906, M. M. Cavalerie 2761 (not seen, merotype A!, photo. A!).
- *E. acanthocarpa* auct. non FRANCH.: H. LEV., Fl. Kouy-Tcheou 72. 1914.
- *E. xanthocarpus* C. Y. CHENG, ms. TYPE: CHINA. Guangxi: Tiane.

Evergreen shrub, scandent, 2-3 m tall; branches and twigs sturdy, with striations, brown or gray-brown when dry. Leaves coriaceous, ovate, elliptic, or ovate-elliptic, 7-10 x 3-6 cm, apex acute, base cuneate or attenuate, margin crenulate above middle, nearly entire below middle, lateral veins 5-6 pairs, disappearing before reaching the margin; petiole 8-12 mm long. Peduncle to 4-6 cm long, with 2-3 dichotomous branches and several flowers; pedicel straight, glabrous, 4-5 mm long. Flower 4-merous, small, 6-7 mm in diam. Sepals subround. Petals yellow-green, ovate, base cuneate. Ovary without stigma and with dense, long spines. Capsule red when fresh, yellow-brown when dry, nearly globose, 1-1.5 cm in diam., densely spiny on surface, c. 6 mm long, opening into 4-lobes; seeds with bright red aril.

Phenology. Flowering: April to May; Fruiting: July to September.

Distribution: China (Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan); alt. 330-1,500 m, in bushes and forest; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Damiaoshan, S. H. Chun 14713 (KUN 2 sheets, MO), 15761 (PE), Yangshuo, Z. Y. Chen 53886 (KUN); GUIZHOU: Anlung, Guizhou Exped. 3668 (PE), 4020 (KUN, PE), Fanchingshan [Fanjingshan], A. N. Steward et al. 853 (A, NY, PE, US), Pin-fa [South Guiding], M. M. Cavalerie & P. Fortunat 1690 (P, bios), Nayong, Bijie Exped. 456 (PE), Qingzhen, Sichuan-Guizhou Exped. 1775 (PE), Shiyu, Wulingshan Exped. 2333 (PE), Tuhshan [Tushan], Y. Tsiang 6749 (A), Yinkiang [Yinjiang], Y. Tsiang 7595 (A, N, NY, PE 2 sheets), 7909 (A, N, PE); HUBEI: Badong, Sichuan University Team s.n. (PE), Fang Hsien [Fangxian], E. H. Wilson 1284 (NY), Xuanen, H. J. Li 2498 (PE); HUNAN: Baojing, L. H. Liu 9936 (KUN, PE), Sangzhi, Beijing Exped. 2464 (PE), Yimen, Hupingshan Exped. 87304 (PE), Yizhang, W. T. Tsang 23574 (IBSC), Yongshun, Beijing Exped. 257 (PE), 1369 (PE), Yuling, Wulingshan Exped. 733 (PE), G. C. Zhang et al. 488 (PE); SICHUAN: Emei, T. H. Tu 2499 (PE 2 sheets), R. Q. Zhao 76 (KUN), Fengjie, M. Y. Fang 24569 (KUN, SZ), H. F. Chow 111005 (PE), 26160 (SZ 2 sheets), 26212 (N), Huayingshan, Y. C. Yang 4153 (N), Junlian, Sichuan Economic Pl. Exped. (59) 662313 (PE), Nanchuan, H. F. Chang 21936 (PE), Y. Y. Ho 4132 (NAS), J. H. Xiong & Z. L. Zhou 90601 (SZ 2 sheets), 93425 (KUN, PE, SZ), Omeishan [Emeishan], W. P. Fang 15443 (A), 16676 (A); YUNNAN: Jingdong, M. K. Li 2852 (IBSC, KUN), Marlipo [Malipo], K. M. Feng 13119 (A, KUN), Sichour [Xichou], C. W.



Fig. 17. *Euonymus aculeata* HEMSL. – 1. fruit branch.

Wang 85680 (KUN), *Q. A. Wu 7403* (KUN), *7814* (KUN 2 sheets), *Wenshan, S. K. Wu 3808* (KUN 2 sheets), *Yiliang, K. M. Feng et al. 73-317* (KUN), *Northeast Yunnan Exped. 875* (KUN), *Zhenxiong, Northeast Yunnan Exped. 1085* (KUN 2 sheets), *1208* (KUN 2 sheets, PE).

This species is similar to *E. wilsonii* in some characters, especially in the early fruiting stage. The differences between them are the wide, short, coriaceous leaves and small capsule in this species, compared to the latter species with thinly coriaceous or papyraceous, narrow and long leaves as well as large capsule. This species is also recorded in Flora of Henan, although we could not find any evidence to confirm that record. The species was recorded from Guangdong (Flora of Sichuan 4: 298. 1988), which was not verified by this work.

20. *Euonymus aculeola* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 10: 94, fig. 3. 1997. TYPE: CHINA. Yunnan: Binchuan, Li Zi Yuan Xiang, on the bank of the slope, Nov. 13, 1958, *W. T. Wang 647* (KUN! 2 sheets). [Fig. 18]

Dwarf shrub, 20-30 cm tall only; young branches and twigs sturdy, with 4 angles, green-brown. Leaves coriaceous, ovate, 3-5 x 1-1.5 cm, apex acute or acuminate, base truncate, margin crenulate, lateral veins 5-6 pairs, netting before reaching the margin; sessile. Flower not seen. Capsule axillary, usually only one, occasionally 2 or 3 in a cluster, red when fresh, yellow-brown when dry, nearly globose, 6-8 mm in diam., with very small and slender, needle- or thread-like spines on surface which is modified by 4-grooves; seeds obovoid, black, with bright red aril.

Phenology: Flowering: Not known; Fruiting: November.

Distribution: China (Yunnan); mountain slope; rare.

This species is very unusual because it is the only dwarf (less than 30 cm tall) known in the genus so far, and the fruit has few, short, needle- or thread-like spines only.

21. *Euonymus americana* L., Sp. Pl. 197. 1753. TYPE: NORTH AMERICA. (LINN? not seen). [Fig. 19]

= *E. sempervirens* MARSH., Arbust. Amer. 44. 1785.

= *E. alternifolia* MOENCH, Meth. 71. 1794.

= *E. angustifolia* PURSH, Fl. Amer. Sept. 1: 168. 1814.

≡ *E. americana* L. var. *angustifolia* (PURSH) WOOD, Am. Bot. Fl. 76. 1871.

= *E. obovata* NUTT., Gen. N. Amer. Pl. 1: 155. 1818.

= *E. americana* L. var. *sarmentosa* NUTT., Gen. N. Amer. Pl. 1:154. 1818.

= *E. scandens* HORT. ex G.DON in LOUD., Hort. Brit. 84. 1830, non R. GRAH. 1827, nom. illegit. superfl.

= *E. sarmentosa* G.DON in LOUD., Hort. Brit. 84. 1830, et Gen. Syst. 2: 5. 1832.

= *E. heterophylla* RAF., New Fl. 3: 59. 1838. Type: Appalachian Mt.

= *E. muricata* RAF., New Fl. 3: 59. 1838. TYPE: NORTH AMERICA. Canada to Carolina.



Fig. 18. *Euonymus aculeola* J. S. MA – 1. fruit branch.

Deciduous shrub, less than 2 m tall; branches and twigs sturdy, with 4 angles. Leaves thinly coriaceous to papyraceous, ovate to lanceolate, 4-10 x 2-3.5 cm, apex acute or acuminate, base truncate, margin crenulate-serrate, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole less than 3 mm long or sessile. Peduncle to 2-3 cm long, with 1-2 flowers; flower 5-merous, c. 10 mm in diam.; pedicel straight, glabrous, c. 2 mm long. Flower 4-merous, small, 6-7 mm in diam. Sepals subround. Petals yellow-green, suborbicular, base cuneate. Ovary without stigma and densely spines. Capsule red when fresh, yellow-brown when dry, nearly globose, with 5 small angles, 1-1.5 cm in diam., dense spiny on

surface, c. 2 mm long, subulate, lobes 5-valved; seeds 2 in each locule, round, with bright red aril.

Phenology. Flowering: April to June; Fruiting: August to November.

Distribution: Canada (Ontario), USA (Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia); alt. seashore to 400 m, in bushes and forests; very common.

SPECIMENS EXAMINED: **CANADA:** ONTARIO: Colchester, *J. Macoun s.n.* (GH), Elgin, *J. H. Soper & H. M. Dale 4024* (GH), Norfolk, *A. H. Richardson s.n.* (A), Wentworth, *J. H. Soper 2533* (GH), Wyoming, *J. Macoun 34133* (GH). **USA:** ALABAMA: Cleburne, *S. R. Hill 18489* (GH), Henry, *K. M. Wiegand & W. E. Manning 1908* (GH), Marshall, *R. Kral 51113* (GH), Montgomery, *D. Demaree 36698* (GH), Tuscaloosa, *R. Deramus 344* (GH); ARKANSAS: Clark, *D. Demaree 40502* (GH), Drew, *D. Demaree 24658* (GH), Faulkner, *D. Demaree 37142* (GH), Grant, *D. Demaree 16568* (GH), Garland, *E. J. Palmer 29212* (A), Hempstead, *E. J. Palmer 42071* (A), Hot Springs, *E. J. Palmer 26580* (A), Little Rock, *G. M. Merrill 2148* (A), Miller, *E. J. Palmer 10517* (A), Perry, *D. Demaree 40710* (GH), Phillips, *E. J. Palmer 25121* (A), Polk, *M. Hopkins et al. 483* (A), Pope, *G. M. Merrill 49* (A), Pulaski, *G. M. Merrill 1207* (A), Sebastian, *E. J. Palmer 39327* (A), Scott, *E. W. Wood et al. 4949* (A), Van Buren, *E. J. Palmer 24301* (A); CONNECTICUT: Without location, *A. W. Upnam s.n.* (GH); DELAWARE: New Castle, *R. R. Tatnall 1497* (GH), Sussex, *R. R. Tatnall 4982* (GH); FLORIDA: Alachua, *W. T. Gillis s.n.* (A), Columbia, *D. B. Ward 3440* (GH), Jefferson, *R. K. Godfrey 54290* (GH), Gadsden, *R. K. Godfrey 58283* (GH), Hamilton, *R. Carter 4120* (GH), Hernando, *G. R. Cooley 6499* (GH), Hillsborough, *O. Lakela 26678* (GH), Lake, *G. V. Nash 991* (GH), Leon, *R. K. Godfrey 53080* (GH), Levy, *G. R. Cooley & R. J. Eaton 6524* (GH), Liberty, *K. M. Wiegand & W. E. Manning 1907* (GH), Marion, *M. Wible 393* (A), Ormond, *Y. Y. Kennedy s.n.* (GH); GEORGIA: Bibb, *E. T. Wherry s.n.* (A), Chatham, *E. O. Mellinger s.n.* (GH), Clarke, *S. A. Spongberg & D. E. Boufford 1735* (A), Clay, *M. Ohara 83-378* (GH), Dade, *A. Cronquist 5122* (GH), De Kalb, *J. K. Small s.n.* (A), Gwinnett, *J. S. Small s.n.* (A), Oglethorpe, *D. Blake & F. Montgomery 238* (GH), Rabun, *E. W. Wood & D. E. Boufford 4880* (GH), Randolph, *R. M. Harper 1896* (A), Troup, *K. M. Wiegand & W. E. Manning 1909* (GH); INDIANA: Carroll, *C. C. Deam 17771* (A), Crawford, *C. C. Deam 16408* (A), Decatur, *C. C. Deam 9171* (A), Greencastle, *C. M. Ek s.n.* (GH), Jackson, *R. C. Friesner 22624* (GH), Jennings, *C. C. Deam 37099* (A), Kokomo, *H. A. Joung s.n.* (GH), Monroe, *C. C. Deam 17488* (A), Montgomery, *R. C. Friesner 22666* (GH), Porter, *C. H. Knowlton s.n.* (GH); ILLINOIS: Champaign, *A. S. Pease 13027* (GH), Du Page, *W. S. Moffatt 1154* (A), Mahomet, *H. A. Gleason 2468* (GH); KENTUCKY: Anderson, *C. A. & U. F. Weatherby 6384* (GH), Bell, *R. E. Horsey 1936* (A), Caldwell, *E. J. Palmer 17690* (A), Carter, *T. N. McCoy s.n.* (GH), Edmonson, *E. L. Braun 3918* (GH), Fayette, *H. T. Shacklette 72* (GH), Lexington, *C. W. Short s.n.* (GH), Wayne, *L. B. Smith & A. R. Hodgdon 3885* (GH), Whitley, *R. E. Horsey 2175* (A); LOUISIANA: Jackson, *R. Kral 8868* (GH), Natchitoches, *E. J. Palmer 7498* (A), Parish, *R. D. Thomas et al. 12445* (A); MARYLAND: Calvert, *S. R. Hill 16758* (GH), Cecil, *R. R. Tatnall 4960* (GH), Montgomery, *F. W. Hunnewell 5652* (GH), Talbot, *E. C. Earle 4236* (GH); MICHIGAN: Berrien Spring, *A. S. Pease 17775* (GH), South Haven, *O. E. Lansing 3320* (GH), Washtenaw, *F. J. Hermann 6532* (GH); MISSISSIPPI: Copiah, *D. Demaree 36194* (GH), Lincoln, *J. D. Ray*

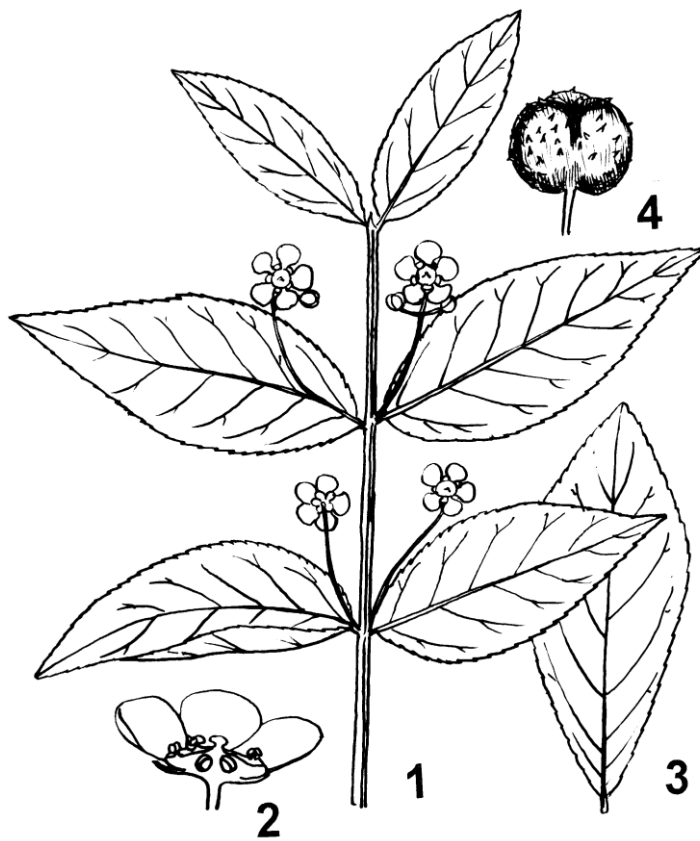


Fig. 19. *Euonymus americana* L. – 1. flower branch; 2. flower; 3. leaves; 4. fruit.

5405 (GH), Tallahatchie, J. W. Hardin 453 (A); MISSOURI: Butler, E. J. Palmer 20698 (A), Dunklin, E. J. Palmer 39061 (A), Madison, E. J. Palmer 31618 (A), Monteer, B. F. Bush 7835 (GH), Pulaski, R. T. Overebo & R. A. Thompson W0646 (GH), Ripley, E. J. Palmer & J. A. Steyermark 41559 (A), Shannon, E. J. Palmer 19351 (GH), Stone, E. J. Palmer 24576 (A), Texas, J. A. Steyermark 14577 (GH); NEW JERSEY: Burlington, B. Long 17299 (GH), Cape May, F. S. Fender 1152 (A), Gloucester, B. Long 16386 (GH); NEW YORK: Chautauqua, K. M. Wiegand 15751 (GH), Seneca, R. T. Clausen 8167 (GH); NORTH CAROLINA: Caldwell, J. K. Small & A. A. Heller s.n. (A), Clay, D. E. Boufford et al. 16992 (A), Forsyth, P. O. Schallert s.n. (GH), Haywood, H. E. Ahles & J. A. Duke 50405 (GH), Johnston, W. B. Fox et al. 1276 (GH), Macon, R. T. Clausen 5615 (GH), New Hanover, R. K. Godfrey 6372 (GH), Onslow, L. F. & F. R. Randolph 936 (GH), Orange, E. J. Palmer 42246 (A), Polk, J. R. Churchill s.n. (GH), Swain, C. R. Bell 3152 (GH), Wake, R. K. Godfrey 6743 (GH); OHIO: Clifton, E. B. Harger 8014 (GH), Columbus, H. A. Gleason s.n. (GH), Portage, R. J. Webb s.n. (GH), Wood, R. E. Horsey

490 (A); OKLAHOMA: Le Flore, *D. Demaree* 42948 (GH), McCurtain, *A. & R. Nelson & G. J. Goodman* 5541 (GH); PENNSYLVANIA: Berks, *B. Long* 12612 (GH), Bucks, *B. Long* 58921 (GH), Erie, *W. F. Westerfeld* 2211 (GH), Jefferson, *H. A. Wahl* 2271 (GH), Lancaster, *J. Galen* 482 (GH), Philadelphia, *W. M. Benner* s.n. (GH); SOUTH CAROLINA: Anderson, *E. W. Wood & D. E. Boufford* 4397 (GH), Berkeley, *R. K. Godfrey & R. M. Tryon* 576 (GH), Dorchester, *F. W. Hunnewell* 8178 (GH), Florence, *K. M. Wiegand & W. E. Manning* 1906 (GH); TENNESSEE: Bevier, *J. A. Steyermark* 65839 (GH), Campbell, *R. T. Clausen* 5410 (GH), Carroll, *H. K. Svenson* 376 (GH), Cheatham, *H. K. Svenson* 334 (GH), Cumberland, *E. B. Harger* 7815 (GH), Knox, *R. E. Shanks* 22262 (GH), Morgan, *H. K. Svenson* 9347 (GH), Polk, *K. E. & L. Rogers* 44864 (GH), Putnam, *R. Kral* 50012 (GH), Sevier, *W. A. Anderson* 1238 (GH), Shelby, *E. J. Palmer* 17456 (A); TEXAS: Angelina, *P. Goodrum* 2006 (A), Cass, *D. S. Correll* 37151 (GH), Hardin, *V. L. Cory* 11259 (A), Harris, *E. J. Palmer* 9616 (A), Jasper, *C. L. Lundell* 11849 (GH), Nacogdoches, *D. S. & H. B. Correll* 31116 (GH), Polk, *E. J. Palmer* 6782 (A), San Augustine, *E. J. Palmer* 12718 (A); VIRGINIA: Accomac, *R. R. Tatnall* 2630 (GH), Brunswick, *M. L. Fernald* 14848 (GH), Dinwiddie, *M. L. Fernald & B. Long* 9976 (GH), Fairfax, *W. W. Eggleston & J. W. Kelly* 22921 (GH), Halifax, *F. R. Fosberg* 15361 (GH), James City, *R. W. Menzel* 303 (GH), Norfolk, *M. L. Fernald et al.* 4452 (A), Northampton, *M. L. Fernald et al.* 5356 (GH), Princess Anne, *L. B. Smith & A. R. Hodgdon* 499 (GH), Stafford, *K. M. Wiegand & W. E. Manning* 1904 (GH), York, *M. L. Fernald et al.* 4933 (GH); WEST VIRGINIA: Cabell, *L. Williams* 457 (GH), Clay, *E. J. Palmer* 39539 (A), Roanoke, *C. E. Wood* 6670 (GH), Smyth, *J. K. Small* s.n. (GH), Wirt, *E. A. Bartholomew* 329 (GH).

This is the only species in North America having a finely and slenderly echinate fruit; leaves are medium sized, and the capsule is more than 1 cm in diameter. *E. obovatus*, or as a variety, represents only the characters which appear to occur in response to poor conditions within its general distribution; one could not be separated from the other during examination of numerous collections from eastern North America.

22. *Euonymus balansae* SPRAGUE, Kew Bull. 1908: 180. 1908. TYPE: VIETNAM. Tonkin: on calcareous rocks at Dong-Dang, *B. Balansa* 1451 (K!).

- = *E. theifolia* WALL. ex LAWSON var. *mengtzeana* LOES., Bot. Jahrb. Syst. 30: 455. 1902. TYPE: CHINA. Yunnan: apud Mengtze, alt. 1670 m, *A. Henry* 10684 (A! MO! US!).
 - ≡ *E. mengtzeana* (LOES.) SPRAGUE, Kew Bull. 1908: 35. 1908 (ut *mengtseana*).
- = *E. rhodacantha* PITARD in LECOMTE, Fl. Indo-Chine 1: 870, fig. 108. 1912. TYPE: VIETNAM. Tonkin: rochers calcaires de Dong-Dang, *B. Balansa* s.n. (not seen).
- = *E. hystrix* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 13: 160. 1921. TYPE: CHINA. Yunnan: Western flank of the Shweli-Salween divide, *G. Forrest* 17907 (A!).

Evergreen shrub, scandent, several meters tall; branches and twigs straight, with 4 angles, brown or gray-brown when dry. Leaves papyraceous, ovate to ovate-elliptic, 10-15 x 4-8 cm, apex acute or acuminate, base cuneate or attenuate, margin crenulate, lateral veins 6-9 pairs, netting before reaching the margin, impressed above and prominent beneath; petiole 5-8 mm long. Peduncle 4-6 cm long, with 2-3 dichotomous branches and several flowers; pedicel straight, glabrous, 4-5 mm long. Flower 4-merous, medium sized, 9-10 mm in diam. Sepals subround. Petals yellow-green, ovate, base cuneate. Ovary without stigma and with dense spines. Capsule red when fresh, black when dry, nearly globose, 1-1.3 cm in diam., densely spiny on surface, c. 3 mm long, opening into 4 lobes at maturity; seeds with bright red aril.

Phenology. Flowering: May to August; Fruiting: July to November.

Distribution: China (Yunnan), Vietnam; alt. 1,000-3,000 m, in bushes and forest; occasional.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Fooning [Funing], *C. W. Wang* 88697 (KUN), 89452 (IBSC), Marlipo [Malipo], *C. W. Wang* 86325 (KUN, PE), 86931 (KUN), Lantsang [Lanchang], *C. W. Wang* 76695 (A), 76698 (A, NAS), Ping-pien [Pingbian], *H. T. Tsai* 60567 (KUN 3 sheets, NAS, PE, SZ), 60762 (A, IBSC, KUN), Sichou [Xichou], *K. M. Feng* 11781 (A, KUN 2 sheets), 12134 (IBSC 2 sheets, PE), *C. W. Wang* 85291 (KUN 2 sheets), 85335 (KUN 4 sheets, PE), 85623 (KUN), 85625 (KUN), Tengcong, *Z. M. Gu* 84-049 (PEM), *W. Q. Yin* 60-1291 (KUN 2 sheets), between Tengyueh [Tengcong] and the Burmese border, *J. F. Rock* 7356 (A, US), without locality, *G. Forrest* 24443 (PE), 29497 (PE), *H. T. Tsai* 55997 (A, KUN 2 sheets).

This species is very distinctive for its impressed veins of the leaves above and less prominent below, and the black capsule with long spines which is rarely found in other species of the section.

23. *Euonymus benguetensis* MERR., Philip. Gov. Lab. Bur. Bull. 29: 26. 1905. SYNTYPES: PHILIPPINES. *A. D. E. Elmer* 5977 (US!), 6245 (not seen).

Scandent or decumbent shrub; branches and twigs sturdy, greenish, terete or slightly angular, usually warty. Leaves membranous or chartaceous, ovate, elliptic, sometimes broad-ovate or -elliptic, 4-8 x 2-4 cm, apex acute to acuminate, sometimes obtuse, base acute or cuneate, margin crenulate, serrulate, sometimes entire below, lateral veins 3-5 pairs, netting and disappearing before reaching the margin; petiole less than 3 mm long or absent. Peduncle to 2-3 cm long, with 3 to many flowers; pedicel straight, glabrous, c. 5-7 mm long. Flower 4-merous. Sepals subdeltoid. Petals whitish-green, round to denticulate, base cuneate. Ovary densely spiny. Capsule nearly globose, to 1-1.5 cm in diam., densely spiny, c. 3 mm long, lobes 4-valved; seeds 2 in each locule, round, with bright red aril.

Phenology. Flowering: January to March; Fruiting: May.

Distribution: Indonesia (Sumatra), Philippines; alt. 1,200-2,300 m, in rain forest; rare.

SPECIMENS EXAMINED: **PHILIPPINES:** Luzon, A. D. E. Elmer 8437 (A, US), 8729 (A, US), M. Ramos & G. Edano 37947 (A, GH, US).

This is the only species in SE Asia that has a spiny capsule. However, due to a lack of material, further work is still required (D. HOU, 1963).

24. *Euonymus acanthoxantha* PITARD, Fl. Indo-Chine 1: 870. 1912. TYPE: VIETNAM. Tonkin: forets du mont Bavi, B. Balansa 3982 (P! 2 sheets).

= *Echinocarpus cavaleriei* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 10: 474. 1912. TYPE: CHINA. Kouy-Tcheou: M. Esquirol s.n. (not seen, merotype A!, photo A!).

= *Echinocarpus esquirolii* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 10: 474. 1912. TYPE: CHINA. Kouy-Tcheou: M. Esquirol 844 (not seen, merotype A!, photo A!).

= *E. blinii* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 259. 1914. SYNTYPES: CHINA. Kouy-Tcheou: Pin-Fa, 5 Mai 1902, M. M. Cavalerie 1273 (not seen), Juin 1905, M. Esquirol 478 (not seen); et Fl. Kouy-Tcheou 71. 1914, nom. inval. TYPE: CHINA. Kouy-Tcheou: M. Esquirol 844 (not seen, merotype A!, photo A!).

= *E. subtrinervis* REHDER, J. Arnold Arbor. 14: 247. 1933, nom. nov.

Evergreen shrub, scandent; branches and twigs straight or slender, with striations, green or brown when dry. Leaves papyraceous, pubescent below, ovate-elliptic, 8-10 x 3-4 cm, apex acute or acuminate, base cuneate or attenuate, margin crenulate to serrate, lateral veins 5-7 pairs, slightly prominent beneath, disappearing before reaching the margin; petiole c. 3 mm long. Peduncle to 4 cm long, with 1-2 dichotomous branches and several flowers. Flower not seen. Capsule yellow-brown when dry, pubescent, nearly globose, 1-1.5 cm in diam., densely spiny on surface, c. 3 mm long, with 4 small grooves; seeds with orange aril.

Phenology. Flowering: Unknown; Fruiting: May to September.

Distribution: China (Guizhou, Yunnan); Vietnam; alt. 700-800 m, in mountain forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUIZHOU: Luodian, *South Guizhou Exped.* 303 (KUN), 659 (KUN), 728 (KUN), Zhenfeng, S. W. Teng 91018 (A, MO, PE); YUNNAN: Fooning [Funing], C. W. Wang 89635 (KUN 2 sheets, PE).

The species is related to *E. aculeata* in some characters, such as the fruit size, shape, and spines. However, it can be differentiated from them by the leaves which are pubescent beneath, and fruit with very short but dense spines, and yellow dry. Concerning the nomenclature of this species, REHDER's work (J. Arnold. Arbor. 14: 247-248. 1933) can not be verified because no *E. blinii* existed before LEVEILLE (1914) or PITARD (1912). Thus the earliest and valid name for this species should be the latter, *Euonymus acanthoxantha* published by PITARD (1912), which has all the same characteristics as the above synonyms. The

name *E. acanthoxanthus* was described as having "prickle". From recently illustrated work (from type by P. H. HO, 1992) and the type loan from P (2 sheets), it should be regarded as a misdescription of this species to say that the capsule is "spotted".

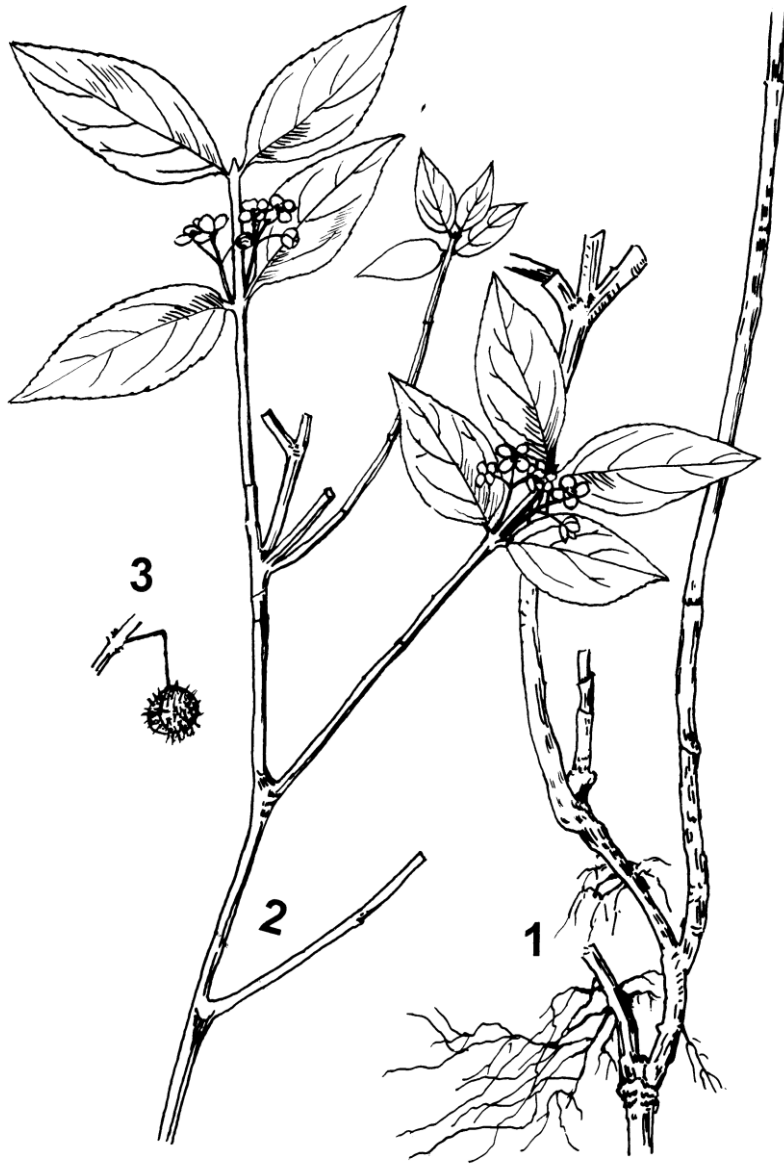


Fig. 20. *Euonymus chenmoui* W. C. CHENG – 1. plant; 2. flower branch; 3. fruit.

25. *Euonymus chenmoui* W. C. CHENG, Contr. Biol. Lab. Chin. Assoc. Advancem. Sci. Sect. Bot. 10: 75. 1935. TYPE: CHINA. Anhui: Hwangshan, W. C. Cheng 4603 (PE!). [Fig. 20]

Deciduous shrub, prostrate, less than 1 m high; branches and twigs straight, with 4 angles, brown or gray-brown when dry. Leaves papyraceous, ovate to ovate-elliptic, 1.8-3.6 x 0.9-1.7 cm, apex acute or short acuminate, base broadly cuneate or rotund, margin finely crenulate, lateral veins 4-6 pairs, slightly prominent on both sides; petiole 1-2 mm long; pedicel straight, glabrous, c. 2 cm long. Flower 4-merous, only one axillary, of medium size, 7-8 mm in diam. Sepals subrotund, very small. Petals yellow-green, ovate or subround, base cuneate, 2-3 mm long and wide. Ovary densely spiny. Capsule dark red to red purple when fresh, black when dry, nearly globose, 1-1.2 cm in diam., densely spiny, c. 2 mm long; seed one in each locule, with orange aril.

Phenology. Flowering: May to July. Fruiting: September to October.

Distribution: China (Anhui, Jiangxi, Zhejiang); alt. 1,000-1,500 m, in woods; rare.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Huangshan, 1988 Bot. Exped. 88073 (NA), Hwangshan [Huangshan], Y. Y. Ho 2328 (NAS), M. B. Deng & K. Yao 79167 (A), M. C. Wang 3853 (PE), Y. Zhou 1608 (PE 2 sheets), Zhou, Xu, Pan & Cheng 450 (PE), Qimen, M. B. Deng et al. 5312 (KUN, PE); JIANGXI: Anda, C. M. Hu 2714 (KUN), Fengxi, S. L. Liu et al. 1269 (KUN), 1393 (KUN), Guixi, M. X. Nie & S. K. Lai 3862 (KUN 3 sheets), Lichuan, M. X. Nie & S. K. Lai 2961 (KUN), Ruijin, M. X. Nie & S. K. Lai 4059 (KUN), Zihua, M. X. Nie & S. K. Lai 3179 (KUN, PE); ZHEJIANG: Changhua, Y. Y. Ho 23122 (NAS).

This species is a very distinct one in the section, due to the small, ovate leaves, the short, black spines on the small- to medium-sized fruit, and scattered range within the distribution area.

26. *Euonymus chiapensis* LUNDELL, Wrightia 4: 136. 1970. TYPE: MEXICO. Chiapas: A. S. Ton 3992 (LL!).

= *E. platyphylla* LUNDELL, Phytologia 56(6): 419. 1984. TYPE: MEXICO. Veracruz: Sept. 8, 1971, J. I. Calzada 494 (not seen, photocopy LL!).

Evergreen shrub, 2-5 m tall; branches and twigs sturdy, with 4 angles, green or brown-green. Leaves papyraceous, ovate-elliptic, 7-13 x 4-7 cm, apex acute or acuminate, base cuneate, margin sparsely crenate in the upper 2/3, nearly entire in the lower 1/3, lateral veins 6-8 pairs, disappearing before reaching the margin; petiole 5-7 mm long. Peduncle in axillary clusters, with 2-3 short dichotomous branches, each with only 1 or 3 flowers; pedicel straight, glabrous, 5-7 mm long. Flower 4-merous, small, c. 8 mm in diam. Sepals orbicular, very small. Petals ovate-orbicular. Ovary obscurely tuberculate. Capsule nearly

globose, 7-8 mm (immature) in diam., with irregular and compressed tubercles on 4 angles only, c. 2 mm long; seed not seen.

Phenology. Flowering: April to May; Fruiting: September to October.

Distribution: Mexico; alt. 180-1,750 m, in forest; rare.

SPECIMENS EXAMINED: **MEXICO:** Oaxaca, *T. Wendt et al. 4812* (LL), Santa Cruz, *A. Mendez Ton 9616* (LL), Veracruz, *G. C. Martinez 2217* (LL), *S. C. Santiago 1430* (GH), *M. Vazquez et al. 177* (LL), *2598* (LL), *T. Wendt 4328* (LL), *4382* (LL).

The species is very distinctive because of the irregular, compressed tubercles on the angles of the capsule, which is not found on any other species, even in the Old World. Based on original information given for the synonym, *E. platyphylla* should be the same as this species. However, more material of the mature plant is desirable for further consideration.

27. *Euonymus chuii* HAND.-MAZZ., Oesterr. Bot. Z. 90: 121. 1941. TYPE: CHINA. Sichuan: Mupin, *K. L. Chu 2979* (KUN! PE!). [Fig. 21]

– *E. mupinensis* auct., non LOES. & REHDER: C. Y. CHENG, Icon. Corm. Sin. 2: 669, t. 3068. 1972.

Deciduous shrub, scandent, 2-3 m tall; branches and twigs straight, with striations and angles, brown or gray-brown when dry, sometimes black. Leaves thinly coriaceous or thickly papery, ovate, obovate, elliptic or ovate-oblong, 5-12 x 3-4.5 cm, apex acute or acuminate, base cuneate or attenuate, margin sparsely serrate, lateral veins 6-8 pairs, evidently impressed above and prominent beneath, disappearing before reaching the margin; petiole less than 1 cm long. Peduncle 1-2 cm, with 1-3 flowers. Flower 4-merous. Sepals very small, semiround. Petals round, greenish-yellow. Capsule red when fresh, brown when dry, nearly globose, c. 8 mm in diam., sparsely echinate, 1-2 mm long; seeds with bright orange aril.

Phenology. Flowering: May to July. Fruiting: September to November.

Distribution: China (Gansu, Hubei, Hunan, Sichuan, Yunnan); alt. 1,400-2,600 m, in bushes and forest; occasional.

SPECIMENS EXAMINED: **CHINA:** GANSU: Kang Hsien [Kangxian], *W. Y. Hsia 6233* (PE); HUBEI: Enshih [Enshi], *H. C. Chow 1968* (A, PE), Hefeng, *H. J. Li 6698* (KUN, PE), *7521* (PE), Lichuan, *W. C. Cheng & W. Y. Hsia 1037* (PE); HUNAN: Sangzhi, *T. R. Cao 90101* (KUN), *90190* (KUN); SICHUAN: Baoxing, *K. L. Chu 3176* (PE), *3429* (PE), *3743* (PE), *3921* (PE), *T. H. Tu 4985* (PE), Chengkou, *T. L. Dai 106242* (KUN), Dujiangyan, *D. E. Boufford & B. Bartholomew 24904* (A, BM, NY), *24726* (A, NY), Ganlou, *Anonymus 4345* (PE), Hanyuan, *W. P. Fang 3783* (A), Kangbei, *T. S. Ying 10045* (KUN), Liangshan, *H. T. Tsai 51258* (A, PE 2 sheets), Nanchuan, *K. F. Li 64354* (KUN), *J. H. Xiong & Z. L. Zhou 93568* (KUN), *94061* (KUN), Obian [Ebian], *W. C. Cheng 6320* (PE), *Z. X. Zhao 6666* (PE), *s.n.* (PE), Omeishan [Emeishan], *Y. Chen 7321* (NAS), *C. Y. Chiao & C. S. Fan 520* (A), *T. Y. Chiao & K. S. Tsu 321* (NAS), *H. C. Chow 12262* (A), *T. D. Tu 243*

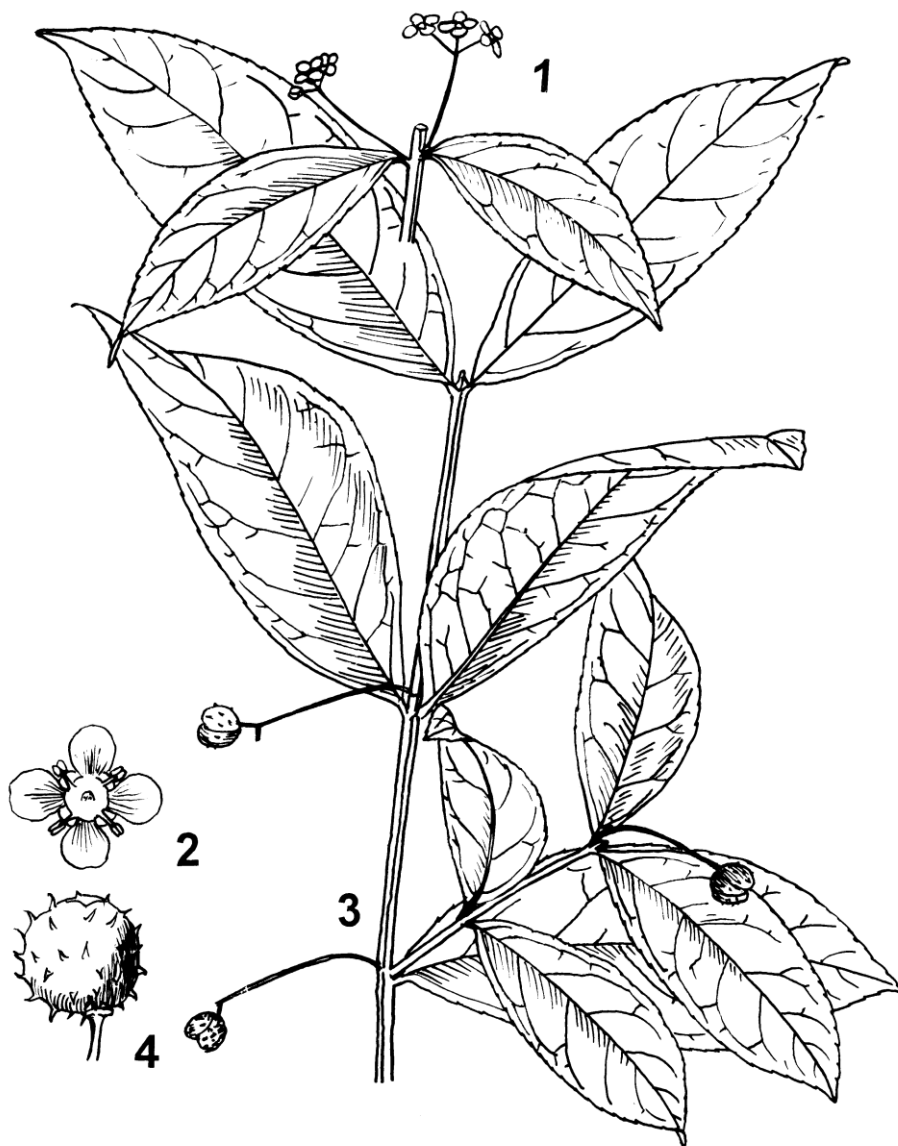


Fig. 21. *Euonymus chuii* HAND.- MAZZ. – 1. flower branch; 2. flower; 3. fruit branch; 4. fruit.

(NAS, PE 3 sheets), 725 (NAS, PE 2 sheets, SZ), *W. P. Fang* 15729 (A), 17701 (A, PE), 52441 (SZ), *Y. S. Liu* 1706 (A, NA), *X. B. Peng* 6116 (PE), *J. H. Xiong* 30514 (PE), 31936 (NAS, PE), 32394 (NAS), *E. H. Wilson* 4793 (A), Oshan [Eshan], *K. H. Yang* 55144 (PE), 55146 (PE), 55498 (PE), 55541 (NAS, PE), 56680 (PE), 57473 (KUN, PE), Rongjing, *Yaan Exped.* 72-064 (PE), Ta-hsiang-ling [Daxiangling], *H. Smith* 2069 (A), Tianquan, *W. K. Hu* 11668 (PE), *Z. L. Wu* 12458 (PE), Yaan, *Nanshuibeidian Exped.* 10045 (PE); YUNNAN: Dagan, *Northeast Yunnan Exped.* 265 (KUN 2 sheets), Deqen, *K. M. Feng* 23851 (KUN 3 sheets).

The species is similar to *E. lushanensis*, but differs from the latter by its middle- to large-sized leaves, sparse spines and large capsule; it is very similar to *E. bockii* in the leaves, but the fruit of the latter is not spinose or echinate.

28. *Euonymus echinata* WALL. in ROXB., Fl. Ind. 2: 410. 1824. TYPE: NEPAL. *N. Wallich Cat. s.n.* (not seen). [Fig. 22]

- = *E. scandens* GRAHAM, Edinb. N. Phil. Journ. 386. 1827. TYPE: NEPAL. *N. Wallich Cat. s.n.* (K!).
- = *E. subsessilis* SPRAGUE, Kew Bull. 1908: 32. 1908. SYNTYPES: CHINA. Hupeh: Neighbourhood of Ichang, *A. Henry* 3116, 3511 (GH! US!), 3511a (GH! US!), 3511b (GH!); Szechuan: Mt. Omi, alt. 1050 m, *E. Faber* 198 (NY!), *E. H. Wilson* 4784 (A! PE!), 4785 (A! 2 sheets).
- = *E. trichocarpa* HAYATA, J. Coll. Sci. Imp. Univ. Tokyo 25, Art. 19: 69. 1908. TYPE: CHINA. Taiwan: Morrison, *T. Tawakami et U. Mori* 1791 (not seen).
- = *E. mupinensis* LOES. & REHDER in SARG., Pl. Wilson. 1: 498. 1913. TYPE: CHINA. Western Szechuan: Mupin, alt. 1300-1600 m, June 1908, *E. H. Wilson* 3115 (A! MO! US!).
- = *E. arboricola* HAYATA, Icon. Pl. Formos. 5: 17. 1915. TYPE: CHINA. Taiwan: Mt. Arisan; *I. Tanaka & B. Hayata s.n.* (not seen).
- = *E. fungosa* OHWI, Acta Phytotax. Geobot. 5: 186. 1936. TYPE: JAPAN. Liukiu: *S. Kawagoe s.n.* (not seen).
- = *E. fungosa* OHWI ssp. *chinensis* P. S. HSU, Acta Phytotax. Sin. 11(2): 195, pl. 25. 1966. TYPE: CHINA. Fujian: Changting, Sept. 13, *FUS Exped.* 94774 (not seen).

Evergreen or semievergreen shrub, scandent, 2-3 m tall; branches and twigs slender, with striations and angles, brown or gray-brown when dry, sometimes black. Leaves thinly coriaceous, ovate, c. 5 x 2-3 cm, apex acute or acuminate, base cuneate or truncate, margin sparsely serrate, lateral veins 6-8 pairs, sometimes impressed above and prominent beneath, disappearing before reaching the margin; petiole short, c. 3 mm long. Peduncle 2-3 cm, with 1-3 flowers; pedicel c. 1 cm. Flower 4-merous. Sepals small, semiround. Petals round, attenuate at base, greenish-yellow, c. 6-8 mm in diameter. Capsule red when fresh, brown when dry, nearly globose, c. 10 mm in diam., densely echinate, 1-2 mm long; seeds with bright orange aril.

Phenology. Flowering: April to July; Fruiting: September to January.

Distribution: Bhutan, China (Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang), India, Japan (Liukiu), Myanmar, Nepal, Pakistan, Sikkim, Thailand; alt. 1,300-3,500 m, in bushes and forest; common.

SPECIMENS EXAMINED: **CHINA:** FUJIAN: Kushan, *H. H. Chung* 7566 (A); GANSU: Wenxian, *Y. Q. He* 1125 (PE), *T. Y. Chang* 14430 (PE); GUANGDONG: Dabu, *X. G. Li* 202717 (PE), Hongkong, *S. Y. Hu & P. P. But* 20710 (A, MO), Yangshan, *S. P. Ko* 50871 (MO, N, PE); GUANGXI: Huajiang, *Guangxi Exped.* 1153 (PE), Lingle, *Z. D. Li* 603260 (KUN, PE), Longsheng, *Z. D. Li & Y. C. Chen* 600005 (IBSC, KUN), Luo Cheng, *Y. Tsiang* 5841 (N), Xingan, *Guangxi Exped.* 420 (PE), *Xingan Exped.* 173 (IBSC, KUN), *S. L. Yu* 900420 (IBSC), Yaoshan, *C. H. Tsoong* 808411 (PE); GUIZHOU: Chishui, *Bijie Exped.* 1220 (KUN, PE 2 sheets), Guiyang, *Y. Tsiang* 8513 (A, N, NY), Songtao, *T. P. Zhu & Z. F. Liu* 1522 (KUN), Tungze [Tongzhi], *Y. Tsiang* 4906 (A, N, NY), Xishui, *Bijie Exped.* 1707 (PE 2 sheets), Yinjiang, *Guizhou Exped.* 7886 (PE), 8733 (PE), *Y. Tsiang* 7692 (A, N, NY); HUBEI: Badong, *H. C. Chow* 243 (A, NY, PE), Hefeng, *H. J. Li* 6021 (KUN), 7966 (KUN), Xingshan, *H. J. Li* 534 (PE), without locality, *A. Henry* 5978 (BM, US), 6110 (BM, US), Zigui, *T. P. Wang* 11825 (PE); HUNAN: Qianyang, *Anjiang Agricultural College Team* 587 (PE), Yongshun, *Hunan Agricultural College* 3645 (PE), Yunfengshan, *Z. Y. Li* 2117 (PE), 3154 (PE), Zili, *West Hunan Exped.* 883 (PE); JIANGXI: Huichang, *C. M. Hu* 3106 (PE), Jinggangshan, *S. K. Lai et al.* 4204 (KUN), Ruijin, *C. M. Hu* 4059 (PE), Tunghuashan, *Y. Tsiang* 10065 (N), Yifeng, *S. K. Lai et al.* 478 (PE), Yongxin, *S. K. Lai* 1238 (A, PE), Yongxiu, *S. K. Lai* 2027 (KUN), Ziqi, *M. C. Wang et al.* 2625 (MO, PE); SICHUAN: Beipei, *Sichuan-Guizhou Exped.* 674 (PE), Ebian, *Z. X. Zhao s.n.* (KUN), *Z. S. Zheng* 30 (KUN), Emeishan, *C. H. Li* 96-105 (MO), *G. S. Zhou* 81226 (PE), Fengjie, *H. F. Chow* 108893 (PE), Hongya, *C. W. Yao* 2592 (PE), 2698 (PE), Huangning, *S. K. Wu* 2188 (PE), Jiyunshan, *C. Pei* 10325 (NAS), Nanchuan, *K. L. Chu* 1670 (PE), *W. P. Fang* 10284 (PE), *Y. Y. Ho* 5238 (NAS), *K. F. Li* 64126 (KUN), 61286 (KUN), *J. H. Xiong & S. S. Zhang* 31635 (IBSC, PE), 33402 (NAS, PE), 33474 (PE), Omeishan [Emeishan], *W. C. Cheng* 10516 (KUN), 10543 (KUN), *T. Y. Cheo et al.* 321 (NAS), *W. P. Fang* 15166 (A, KUN), 15344 (KUN, PE), 15478 (A), 15580 (KUN), *Y. Y. Ho* 5954 (NAS), 6477 (NAS), *T. C. Lee* 4631 (KUN), *T. N. Liou & Z. Wang* 880 (KUN), *S. L. Sun* 484 (KUN), 532 (KUN), 2311 (KUN), 2509 (KUN), *F. T. Wang* 23186 (A, P), *E. H. Wilson* 1215 (A), *K. H. Yang* 55925 (KUN, N), 56194 (KUN, PE), 57112 (KUN, N), 57193 (KUN), Pingshan, *T. T. Yu* 3135 (PE), 3582 (PE), Songpan [Songfan], *Songpan Exped.* 1733 (KUN, PE), Tianquan, *W. P. Fang* 3463 (A, NY, PE); TAIWAN: Alishan, *C. J. Bernard* 20054 (A), *A. Faurie* 418 (P), 420 (P), Chiayi, *Y. F. Chen* 3852 (MO), *J. L. Creech* 1477 (NA), 1558 (NA), *R. Kanehira* 2845 (US), *W. P. Leu* 195 (A), *W. S. Tang* 596 (A, MO), Hwalian, *C. C. Chuang & M. T. Kao* 4378 (NA), Nantou, *C. F. Hsieh & M. T. Kao* 5849 (NA), *W. P. Leu* 1169 (A), *C. I. Peng* 8194 (A), Pingtung, *S. F. Huang* 3367 (MO), Taichung, *J. C. Wang et al.* 3843 (A); XIZANG: Dinggye, *Qinghai-Xizang Exped.* 5615 (PE 2 sheets), Nyalam, *Y. T. Chang & K. Y. Lang* 3365 (KUN, PE 2 sheets), 3447 (PE 2 sheets), *Xizang Drugs Exped.* 1422 (PE), without locality, *F. K. Ward* 10389 (BM); YUNNAN: Chienchuan [Jianchuan]-Mekong divide, *G. Forrest* 23597 (MO), Degen, *T. T. Yu* 10327 (PE 3 sheets), 10611 (PE), Gongshan, *P. I. Mao* 531 (PE), Heqing, *K. M. Feng* 23940 (PE), Huize, *P. I. Mao* 2058 (PE), Likiang (Lijiang), *R. C. Ching* 22315 (PE), 239940 (PE), 31138 (PE), *K. M. Feng* 9018 (PE 3 sheets), 9340 (PE 2 sheets), 21615 (PE), *C. W. Zhao* 21625 (PE), Luquan, *P. I. Mao* 1959 (PE), Mongtze [Mengzhi], *C. W. Wang* 81674 (IBSC, PE), Shweli-Salween divide, *G. Forrest* 17646 (A), Songming, *P. I. Mao* 227 (PE),



Fig. 22. *Euonymus echinata* WALL. – 1. flower branch; 2. flower; 3. fruit.

Tapintze [Binchuan], *P. J. M. Delavay* 3995 (P), without locality, *G. Forrest* 10556 (BM); ZHEJIANG: Angshan, *R. C. Ching* 2462 (A), Lishui, *S. Y. Chang* 6230 (PE), Longquan, *S. Y. Chang* 4196 (PE), 6903 (KUN, PE). **E. HIMALAYA:** Ghoompuhur, *G. H. Cave* s.n. (A); **NW HIMALAYA:** Mussoorie, *R. R. Stewart* 14417 (A, NA, US), 14971 (A). **INDIA:** Chamba, *R. N. Parker* s.n. (A), Garhwal, *M. A. Rau* 10108 (A), Kumaon, *R. Strachey & J. E. Winterbottom* 3 (GH), Punjab, *R. N. Parker* 2844 (A), *R. R. Stewart* 1988 (A), Tihri-Garhwal, *J. S. Gamble* s.n. (WU). **JAPAN:** Liukiu, *S. Kawagoe* s.n. (A), *C. Wright* 52 (GH, K), 555 (GH). **NEPAL:** Bagmati, *D. H. Nicolson* 3345 (US), Bhabua, *B. Ram* 441 (A), Kawa, *N. V. Polunin et al.* 863 (A), Parbat, *H. Kanai et al.* 8310251 (A), 8340122 (A), Posdi, *J. L. Creech & F. de Vos* 1250 (NA), Shermathang, *Herbarium Banerji* 1781 (A), Siklis, *J. D. A. Stainton et al.* 4967 (A). **PAKISTAN:** Azad Kashmir, *R. R. Stewart* 25496 (GH). **SIKKIM:** without locality, *J. D. Hooker & T. Thomson* s.n. (GH). **THAILAND:** without locality, *L. L. Put* 356 (A).

This is the most complicated and variable species in the section, and its main characters are in the small leaves, showing some characters of alpine or subalpine conditions in the habit, with crenulate to crenate margin, capsule of medium size and black when dry. Undoubtedly, it is related to *E. chunii*, but the echinate projections on the fruit of the latter are much fewer and sparser, and the leaves have impressed veins, which are not too evident in this species. It is also similar to *E. vagans*, especially in the leaves, but in the latter the fruit is not spiny or echinate. The type of *E. scandens* is without flower and fruit, only with adventitious roots on the branch, and seems to be conspecific with this one. However, it is difficult to treat because of the absence of flowers or fruit, but all the other characters fit with this species very well, including the distribution area.

29. *Euonymus lushanensis* F. H. CHEN & CHEN H. WANG, *Acta Phytotax. Sin.* 3(2): 239, f. 1. 1954. SYNTYPES: CHINA. Jiangsi: Lushan, Biyunshi, Sept. 20, 1946, *Y. K. Hsiung* 4921 (NAS! PE!), 852 (PE!), *R. C. Ching* 11962 (not seen), 11854 (not seen); Wuning, Zhujiashan, Aug. 10, 1938, *Y. K. Hsiung* 1214 (not seen); Xiushui, Yubiaoshan, Nov. 15, 1947, *Y. K. Hsiung* 6520 (not seen); Yifeng, Huanggangshan, Oct. 15, 1947, *Y. K. Hsiung* 6354 (A!). [Fig. 23]

- = *E. furfuraceus* Q. H. CHEN, *Acta Bot. Yunnanica* 21(2): 167, 1999. Type: China: Guizhou, Wengan, Zhujiashan, in forests, alt. 1120 m, 1982-8-11, *C. Z. Dang* 1997 (Holotype, GHAS, not seen).
- *E. sp. nov.* BLAKELOCK, *Kew Bull.* 1951: 274. 1951, in obs., nom. inval. TYPE: CHINA. Jiangsi: Lushan, *H. C. Cheo* 417, not seen.
- *E. wushanensis* C. Y. CHENG, ms., nom. inval. TYPE: CHINA. Sichuan: Wushan, *K. H. Yang* 59987 (PE!).

Deciduous shrub, scandent, 2-3 m. tall; branches and twigs straight, with striations and angles, brown or gray-brown when dry. Leaves thinly coriaceous or thickly papyraceous, ovate to elliptic, or ovate-oblong, 9-15 x 3-4.5 cm, apex acute or acuminate, base cuneate or attenuate, margin crenate, lateral veins 6-8 pairs, disappearing before reaching the margin, slightly impressed above and slightly prominent beneath; petiole 1-2 cm long. Peduncle 2-10 cm long, with 2 to

3 dichotomous branches and several to many flowers. Flower not seen. Capsule red when fresh, brown when dry, nearly globose, 1.3-1.8 cm in diam., with sparse, needlelike spines, c. 3 mm long, opening into 4-lobes at maturity; seeds with bright red aril.

Phenology. Flowering: May to August; Fruiting: October to November.

Distribution: China (Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Zhejiang); alt. 600-1,000 m, in bushes and forest; rare.



Fig. 23. *Euonymus lushanensis* F. H. CHEN & CHEN H. WANG – 1. fruit branch; 2. fruit.

SPECIMENS EXAMINED: **CHINA:** GUIZHOU: Songtao, 1986 *Sino-Amer. Guizhou Exped. 2020* (A, NY, PE); HUBEI: Metasequoia Area, *W. C. Cheng & C. T. Hwa 1004* (A, PE); HUNAN: Sinning [Xinning], *C. S. Fan & Y. Y. Li 655* (A); JIANGXI: Fenyi, *K. Yao 9156* (A, MO, NY), Hsiushui [Xiushui], *Y. K. Hsiung 6295* (A), Jingan, *S. K. Lai 1420* (PE); ZHEJIANG: Haining, *S. Y. Chang 3973* (PE).

This species has a large fruit, but only few, needlelike and fine spines on the fruit, which is not found in other species in the section. It is similar to *E. echinata*, but differs from it by the large leaves and large fruit as well as the sparse needlelike spines on the fruit; it is also related to *E. acanthocarpa*, but differs from it by the large fruit with needlelike spines.

30. *Euonymus mexicana* BENTH., *Pl. Hartw.* 36. 1840; LUNDELL, *Wrightia* 4(5):157. 1971, *describ. ampl.* TYPE: MEXICO. Hidalgo: *T. Hartweg 279* (K, not seen, fragment LL!).

= *E. hernandezii* LUNDELL, *Phytologia* 63(2): 73. 1987. TYPE: MEXICO. Oaxaca: alt. 250 m, Oct. 27, 1984, *H. Hernandez 523* (LL!).

Semievergreen shrub, several meters tall; branches and twigs slender, with 4 angles, green or brown-green. Leaves papyraceous, elliptic-oblong, 5-6 x c.1 cm, apex acute or acuminate, sometimes caudate, base cuneate or attenuate, margin sparsely and finely crenulate, lateral veins invisible; petiole 2-3 mm long. Peduncle axillary, 2-3 cm long, slender, with 2-3 short dichotomous branches, each with only 1 or 3 flowers; pedicel slender, glabrous, c. 5 mm long. Flower 4-merous, small, c. 8 mm in diam. Sepals orbicular, very small. Petals ovate-oblong, yellow-green. Ovary obscurely tuberculate. Capsule nearly globose, c. 6 mm in diam., the tubercles only scalelike; seeds with red aril.

Phenology. Flowering: March to April; Fruiting: September to November.

Distribution: Mexico; alt. 2,000-2,700 m, in forests; rare.

SPECIMENS EXAMINED: **MEXICO:** Hidalgo, *M. Martinez 100* (LL), *4005* (GH), *s.n.* (LL, US), *H. E. Moore 1871* (GH, US), *2314* (GH, US), *A. J. Sharp 46220* (GH), Oaxaca, *H. Hernandez 123* (LL), Veracruz, *G. Castillo & F. Vazquez 1449* (LL).

This is another C American species with a tuberculate capsule. However, the species is a small shrub, with small elliptic-oblong leaves 5-6 x c. 1 cm, crenulate on margin, and the medium sized fruit c. 6 mm in diam, with scalelike tuberculate, dehiscent at maturity, and seed with red aril. From the original description and paratype information, the name of *E. hernandezii* should be the same as this species.

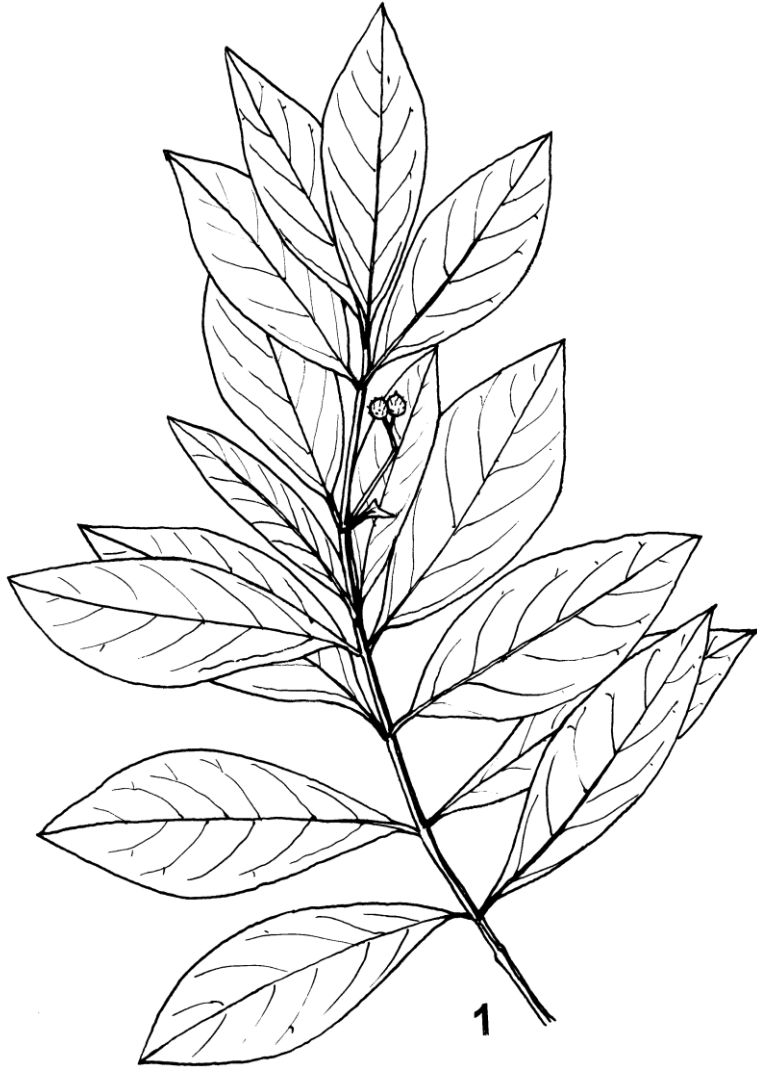


Fig. 24. *Euonymus potingensis* J. S. MA – 1. fruit branch.

31. *Euonymus potingensis* CHUN & F. C. HOW ex J. S. MA, Harvard Pap. Bot. 10: 94, fig. 4. 1997. TYPE: CHINA. Hainan: Poting (Baoting), F. C. How 72526 (Holotype: IBSC; Isotypes: A! BM! MO!). [Fig. 24]

Evergreen shrub or small tree, scandent; branches and twigs brown or dark-brown, obscurely angled when young. Leaves thinly coriaceous or thickly

papyraceous, oblong-elliptic to elliptic, 6-10 x 3-4.5 cm, apex and base attenuate, margin entire, lateral veins 5-7 pairs, disappearing before reaching the margin; petiole c. 4 mm long. Peduncle 3-4 cm long, with several flowers. Flower 4-merous. Sepals and petals not seen. Capsule (immature) globose, with several sparse spines.

Phenology. Flowering: Unknown. Fruiting :May.

Distribution: China (Hainan); alt. 1,100 m, in valley forest; rare.

SPECIMENS EXAMINED: **CHINA:** HAINAN: Poting (Baoting), *F. C. How* 72803 (A, MO).

This is the only species with a spiny capsule on the Island of Hainan. It seems very distinct, without close relatives in the section due to its entire leaves and sparsely spiny surface of the capsule.

32. *Euonymus spraguei* HAYATA, *Icon. Pl. Formosan.* 1: 137, t. 20. 1911; *J. Coll. Sci. Imp. Univ. Tokyo* 30, Art. 1: 59. 1911. TYPE: CHINA. Taiwan: *K. Ito* s.n. (not seen).

= *E. kuraruensis* HAYATA, *Icon. Pl. Formosan.* 9: 12, pl. 8. 1920. SYNTYPES: CHINA. Taiwan: *B. Hayata* s.n. (not seen); *S. Matsuda* s.n. (not seen).

Deciduous shrub, scandent, 4-5 m tall; branches and twigs with striations and angles, brown or gray-brown when dry, sometimes green. Leaves thinly coriaceous, ovate-elliptic, c. 5 x 2-3 cm, apex acute or acuminate, base cuneate or truncate, margin sparsely crenulate, lateral veins 6-8 pairs, sometimes invisible and disappearing before reaching the margin; petiole 5-14 mm long. Peduncle 2-3 cm long, with 1-3 flowers; pedicel c. 1 cm long or less. Flower 4-merous. Sepals small, semiround. Petals round, attenuate at base, greenish-yellow, c. 6-8 mm in diam.. Capsule red when fresh, brown when dry, nearly globose, 8-10 mm in diam., sparsely echinate or nearly smooth, 1-2 mm long, opening into 4-lobes at maturity; seeds with bright orange aril.

Phenology. Flowering: April to July; Fruiting: August to February.

Distribution: China (Taiwan); alt. 1,100-2,800 m, in bushes and forest; occasional.

SPECIMENS EXAMINED: **CHINA:** TAIWAN: Arisan, *T. C. Huang & M. T. Kao* 1683 (MO), *R. Kanehira & S. Sasaki* 31 (A), *E. H. Wilson* 9719 (A, US), *without collector* 420 (A), *without collector* 80924 (PE Herb. No.), without location, *S. Suzuki* s.n. (PE), Hassen-zan, *R. Kanehira* 21188 (A), Koshun, *E. H. Wilson* 11031 (A, US), Nanhutashan, *T. Yamazaki et al.* 20 (A), Nantou, *M. H. Chen* 80 (A), *H. L. Ho* 617 (A, MO), Pingtung, *T. P. Chiang & W.H. Hu* 145 (A, MO), Taichung, *C.L. Huang* 5 (MO), *T. S. Liu et al.* 262 (A).

The species is very close to *E. echinata*, but the fruit is only sparsely echinate, compared to the latter which has much denser spines on it; it is also related to *E. chunii*, but leaves are never impressed above, and are long petiolate, as well showing a long distance disconnection in the distribution.



Fig. 25. *Euonymus verrucocarpa* J. S. MA – 1. fruit branch.

33. *Euonymus verrucocarpa* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 3(2): 231, fig. 1. 1998. TYPE: CHINA. Yunnan: Lungling (Longling), alt. 2,400 m, *H. T. Tsai 54558* (Holotype: A!, Isotypes: KUN! PE! 3 sheets); Tengcong, Second District, Ping Di, Gan Li Gong Shan, alt. 2,400 m, *J. Chen 319* (KUN! 2 sheets). [Fig. 25]

– *E. parvilimbus* C. Y. WU, in herb., nom. inval.

Deciduous shrub to small tree, to 5 m (15 ft.) tall, DBH (= Diameter of Breast Height) to 13 cm (5 inch, by the field record). Stem green to gray-green, 4-

angled, glabrous; twigs green to light-green, 4-angled when dried; winter buds very small, generally acute and with several yellow scales. Leaves more or less papyraceous, ovate or elliptic-ovate, acuminate or acute at both ends, margin shortly denticulate, lateral veins 4-6 pairs, disappearing before reaching margin or unclear, glabrous on both sides; petiole 2-3 mm long. Peduncles axillary, to 10 mm long, usually with only 1 flower, sometime to few flowers. Flower unknown. Fruit usually 1, sometimes 2-3; pedicel c. 5 mm long. Capsule densely and very shortly tuberculate, less than 6 x 5 mm, opening into 4-lobes at maturity, red when fresh (by the field record); seeds 2 in each locule, nearly round, or oblong-round, ca. 4 x 3 mm, black when dry, covered by aril only basally.

Phenology. Flowering: Unknown; Fruiting: November.

Distribution: China (Yunnan); in thickets; rare.

This species is similar to *E. echinata* in growth pattern, but much different from the latter in its dark brown capsule with densely tuberculate, not echinate, surface; it is also similar to *E. aculeola* in many ways, but this species is a shrub or small tree to 5 m tall, with capsule densely and very shortly tuberculate, not sparsely needlelike-echinate like the latter.

34. *Euonymus wilsonii* SPRAGUE, Kew Bull. 1908: 180. 1908. SYNTYPES: CHINA. Western China: Mt. Omi, *E. H. Wilson 4788* (A!); without precise locality, *E. H. Wilson 3330* (A! 2 sheets). [Fig. 26]

Evergreen shrub, scandent, 3-4 m tall; branches and twigs sturdy, with striations, green or brown when dry. Leaves thinly coriaceous or papyraceous, elliptic, ovate-elliptic or long-elliptic, 10-15 x 2.5-4.5 cm, apex acute, acuminate or caudate, base cuneate or attenuate, margin crenulate above 2/3, nearly entire below 1/3, lateral veins 6-8 pairs, impressed above and prominent beneath, netting before reaching the margin; petiole 1-1.4 cm long. Peduncle to 4-6 cm long, with 2-3 dichotomous branches and many flowers; pedicel straight, glabrous, 5-7 mm long. Flower 4-merous, small, 6-7 mm in diam. Sepals subround. Petals green, ovate, base attenuate. Ovary without stigma, densely long-spinose. Capsule red when fresh, yellow-brown or gray when dry, nearly globose, 1.5-2.0 cm in diam., densely spiny, 6-7 mm long, opening into 4 lobes; seeds with bright red aril.

Phenology. Flowering: April to May; Fruiting: July to September.

Distribution: China (Guangxi, Guizhou, Hubei, Shaanxi, Sichuan, Yunnan); alt. 1,000-2,550 m, in bushes and forests; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Damiaoshan, *S. H. Chun 15082* (KUN, PE), Longlin, *Jinzhongshan Team 100860* (IBSC), *Y. K. Li 420* (PE), *Nanzhidi Team 4976* (IBSC 2 sheets), Mubian, *D. Li 602364* (IBSC); GUIZHOU: Anlung [Anlong], *C. Z. Dang 1169* (PE), *Y. Tsiang 9357* (A, N, NY), Libo, *Y. K. Li & X. Chen 10016* (PE), Nayong, *Bijie Exped. 630* (PE 2 sheets), Panxian, *Anshun Exped. 1243* (PE 2 sheets), Shuicheng, *P. C. Tsoong 1800* (KUN, PE), Weining, *Y. Tsiang 9168* (A, NY), Xingren, *C. Z. Dang 80465* (PE), Xingyi, *Guizhou Exped. 6492* (PE); HUBEI: Laifeng, *H. J. Li 7034*



Fig. 26. *Euonymus wilsonii* SPRAGUE – 1. flower; 2. fruit branch; 3. fruit

(PE), Shengnongjia, *Shengnongjia Exped.* 22495 (PE); SHAANXI: Fuping, *T. S. Ying et al.* 605 (MO); SICHUAN: Badong, *K. H. Yang* 65611 (KUN), Chengkou, *T. L. Dai* 106116 (KUN, PE), 106278 (KUN, PE), Eshan, *K. H. Yang* 27190 (PE), Hongya, *C. W. Yao* 3908 (PE), Nanchuan, *Jinfoshan Exped.* 1102 (PE 2 sheets), 2030 (PE), Omeishan [Emeishan], *W. C. Cheng* 10823 (KUN 2 sheets), *C. Y. Chiao & C. S. Fan* 379 (A), *W. P. Fang* 3139 (A, NY, PE 2 sheets), 12653 (A, N), *T. H. Tu* 416 (N), *W. P. Fang* 4822 (NAS), *Y. Y. Ho* 5561 (NAS), 6085 (NAS), *Y. S. Liu* 1490 (NA), 1709 (A, NA), *S. L. Sun* 170 (KUN), *C. W. Wang* 23496 (KUN), *F. T. Wang* 23496 (A), *J. H. Xiong et al.* 32190 (PE), 32880 (N), Tianquan, *H. L. Tsiang* 33790 (PE, SZ); YUNNAN: Dagan, *B. X. Sun*

et al. 657 (KUN), Funing, C. W. Wang 88362 (PE), 87077 (PE), Guangnan, C. W. Wang 87557 (PE), 87575 (IBSC, PE), 87735 (PE), 87906 (PE), 87916 (IBSC), Q. A. Wu *et al.* 9798 (KUN 3 sheets), Jingdong, Q. A. Wu 9271 (KUN), Luoping, Y. D. Yu *et al.* 612 (KUN), Marlipo [Malipo], C. W. Wang 86282 (PE), Pingpian [Pingbian], H. T. Tsai 61888 (A, KUN, N, PE, SZ), 62476 (A, PE), 62655 (A, KUN, PE, SZ), C. W. Wang 82613 (KUN, PE), Shuijiang (lat. 28. 00 N, long. 103.20 E), B. X. Sun *et al.* 544 (KUN), Shunning [Fengqing], T. T. Yu 16743 (A, KUN 2 sheets, PE 2 sheets), Sichou [Xichou], K. F. Feng 11951 (A, KUN 2 sheets, PE), Weixi, S. Y. Bao 285 (KUN 2 sheets), Wenshan, K. M. Feng 22213 (KUN 2 sheets), 23012 (KUN 2 sheets), H. T. Tsai 51750 (A, PE, SZ), Yungning [Ningliang], H. D. McLaren 114 (BM). **GREAT BRITAIN:** London, F. G. Meyer *s.n.* (US, cultivated).

The leaf of this species is longer than the others in the section, the lateral veins are impressed above and prominent beneath, and the petiole is long; the fruit and spines are also large and long, but the fruit is yellow to gray when dry, which is very similar to *E. aculeata* and may be confused with it when immature (see above discussion under the species).

Sect. 3. *Melanocarya* (TURCZ.) NAKAI, J. Jap. Bot. 17(11): 617, 1941

Shrubs or shrublike, mostly deciduous, few evergreen. Flower 4-merous. Capsule 4-lobed to base, opening into 4 lobes, sometimes only 1-3 lobes developed.

11 species total, 1 in S Asia to Himalayas, 11 in E Asia, including one cultivated in Europe and N America. Type: *Euonymus alata* (THUNB.) REGEL.

Key to Species

1. Leaves deciduous
 2. Young branches and twigs with 4 wing-like corks; seed almost covered by aril; leaf margin crenulate. E Asia, Europe (cult.), N America (cult.) 35. *E. alata*
 2. Young branches and twigs without wing-like cork
 3. Leaves broadly linear, or belt-lanceolate, 8-15 x 1.8-2.2 cm. E Asia 39. *E. euscaphis*
 3. Leaves ovate to elliptic, less than 4 times as long as wide
 4. Leaves obovate or elliptic-obovate, large, 6-11 cm long, margin crenulate, serrulate to serrate, rarely ciliate. E Asia...36. *E. centidens*
 4. Leaves ovate to ovate-elliptic
 5. Leaves finely and sharply serrulate; flower greenish-pink to red; style long-persistent. E Asia45. *E. verrucosoides*
 5. Leaves crenulate; flower light yellow or greenish-yellow; style short and invisible. E Asia 38. *E. disticha*
1. Leaves evergreen
 6. Flower 5- or 4-merous; cymes with many flowers; leaves elliptic or oblong-elliptic, ciliate on margin. E & S Asia, Himalayas.....42. *E. lucida*

6. Flower 4-merous; cymes with less than 7 flowers, leaves not ciliate on margin
 7. Leaves entire. E Asia.....41. *E. hukuangensis*
 7. Leaves crenulate to serrate
 8. Leaves small, 4-7 cm long
 9. Leaves ovate-lanceolate, apex long caudate; flower small, c. 6 mm in diameter. E Asia.....43. *E. lutchuensis*
 9. Leaves with apex not long caudate; flower large, c. 1 cm in diameter. E Asia.....44. *E. tashiroi*
 8. Leaves large, 9-15 cm long
 10. Leaves mainly obovate, base cuneate or attenuate, often serrulate to ciliate on margin; lobes of capsule often bent backward. E Asia37. *E. dielsiana*
 10. Leaves mainly elliptic, base cuneate or attenuate, entire or obscurely crenulate on margin; lobes of capsule never bent backward. E Asia40. *E. hainanensis*

35. *Euonymus alata* (THUNB.) SIEBOLD, Verh. Batav. Genootsch. Kunsten 12: 49 1830. TYPE: see below. [Fig. 27]

- Bas.: *Celastrus alata* THUNB., Fl. Jap. 98. 1784. TYPE: JAPAN. (not seen).
 = *C. striata* THUNB., Fl. Jap. 98. 1784.
 = *E. striata* (THUNB.) LOES., Bot. Jahrb. Syst. 30: 463. 1902.
 = *E. subtriflora* BLUME, Bijdr. Natuurk. Wetensch. 1147. 1826. TYPE: JAPAN. *P. F. Siebold s.n.* (not seen).
 = *E. thunbergiana* BLUME, Bijdr. Natuurk. Wetensch. 1147. 1826. TYPE: ASIA OR. (not seen).
 = *E. verrucosa* SCOP. var. *tchefouensis* DEBEAUX, Fl. Tchef. 38. 1876. TYPE: CHINA. Shandong: Chefoo, *J. O. Debeaus s.n.* (not seen).
 = *E. alata* RUPR. var. *pubescens* MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg, ser. 3, 27-27: 454. 1881, nom. nov.
 = *E. striata* LOES. ex GILG & LOES., Bot. Jahrb. Syst. 34, Beibl. 75: 49. 1905. TYPE: CHINA. Shandong: *Zimmermann 184* (not seen).
 = *Microrhamnus taquetii* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 8: 284. 1910. TYPE: KOREA. *T. Taquet 153* (not seen).
 = *E. loeseneri* MAKINO, Bot. Mag. (Tokyo) 25: 229. 1911.
 = *E. striata* MAKINO, Bot. Mag. (Tokyo) 25: 229. 1911.
 = *E. alata* RUPR. var. *pilosa* LOES. & REHDER in Sarg., Pl. Wilson. 1: 494. 1913. TYPE: CHINA. Chili: Weichang, 1909, *Wm. Purdom 30 (A!)*.
 = *E. kawachiana* NAKAI, Bot. Mag. (Tokyo) 35: 145. 1921. TYPE: JAPAN. *Nakai s.n.* (not seen).
 = *E. sacrosancta* KOIDZ., Bot. Mag. (Tokyo) 39:12. 1925. TYPE: JAPAN. *J. Matsumura s.n.* (not seen).
 = *E. arakiana* KOIDZ., Acta Phytotax. Geobot. 1: 174. 1932. TYPE: JAPAN. *Araki s.n.* (not seen).

- = *E. alata* RUPR. var. *microphylla* CHEN H. WANG, Contr. Bot. Surv. Northw. China 1: 18. 1939. TYPE: CHINA. Kiangsi: without precise locality, S. H. Hsiung 577 (PE!).
- *E. alata* RUPR., Bull. Phys.-Math. Acad. Petersb. 15: 135. 1856, in obs. , nom. inval.
- *E. alata* RUPR. var. *elliptica* CHEN H. WANG, Contr. Bot. Surv. Northw. China 1: 12. 1936. (Note: No such publication exists in the original work; the citation is copied from CHENG'S ms., in Chinese).
- *E. elliptica* (CHEN. H. WANG) C. Y. CHENG, ms., nom. inval.

Deciduous shrub, 1-4 m tall; young branches usually with 2 or 4 winglike corks, wings to more than 5 mm wide and 1-2 mm thick; twigs 4-angled, green or brown when dry. Leaves thinly coriaceous to papyraceous, obovate or obovate-elliptic, sometimes ovate-elliptic or oblong-elliptic, 4.5-10 x 2-4 cm, apex acute, acuminate or caudate, base cuneate or attenuate, margin crenulate to serrulate, lateral veins 5-7 pairs, curving forward and disappearing before reaching the margin; petiole absent or very short, 2-4 mm long. Peduncle slender, short, 1-2 cm long, usually with 1 dichotomous branch and 3 flowers, rarely 2 branches and more flowers; pedicel slender, 5-7 mm long. Flower 4-merous, medium sized, c. 9 mm in diam. Sepals subround. Petals green, light yellow or greenish-yellow, ovate, base attenuate. Capsule reddish-brown when fresh, dark brown or gray when dry, 4-lobed, 1-1.3 cm in diam., sometimes only 1-3 lobes developed, each lobe ovoid when open at maturity; seeds with bright red aril.

Phenology. Flowering: April to July; Fruiting: July to November.

Distribution: China (Anhui, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Shandong, Sichuan, Zhejiang), Japan, Korea, Russia (Sakhalin); Europe (cult.); N America (cult.); alt. 40-2,700 m, in bushes, woodland, and forest; very common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Anqing, J. S. Yue *et al.* 2866 (NAS), Chienshan [Qianshan], C. S. Fan & Y. Y. Li 10 (A), Chiuwashan [Jiuhuashan], R. C. Ching 2677 (A), 2876 (A 2 sheets), East China Station 5928 (NAS), Jinzhai, K. Yao 8887 (A), Tongling, J. S. Yue *et al.* 3155 (NAS); GANSU: Kuwanshan [Guanshan], G. Fenzel 1917 (A), Xinjiashan, J. H. Hao 1945 (NAS); GUANGDONG: Yuyuen [Ruyuan], S. P. Ko 52750 (A, MO, NAS); GUIZHOU: Fanchingshan, A. N. Steward *et al.* 831 (A), Kwangcheng, Y. Tsiang 8599 (A), Meitan, C. C. Wu 389 (NAS), Shiqian, 1986 Sino-Amer. Guizhou Exped 2397 (A), Tsingchen, S. W. Teng 90109 (A), Tuyuan, Y. Tsiang 5781 (A 2 sheets), Without location, C. C. Wu 149 (NAS), 214 (NAS), Yinjiang, 1986 Sino-Amer. Guizhou Exped. 1739 (A); HEBEI: Beijing, S. Y. He *et al.* 813025 (A), Donglingshan, N. H. Cowdry 1332 (A), Siaowutaishan [Xiaowutaishan], J. Hers 1471 (A), 1489 (A), F. G. Meyer 1354 (A), H. Smith 790 (A), 965 (A), Weichang, Wm. Purdom 4 (A), 1013 (A), Without location, C. F. Li 11172 (NAS); HEILONGJIANG: Harbin, P. H. & J. H. Dorsett 4049 (US), 4136 (A, US), Shuifenghe, B. W. Skvortzov s.n. (A); HENAN: Chengchow [Zhengzhou], J. Hers 333 (A), Kikungshan [Jigongshan], A. N. Steward 9784 (A), Neixiang, D. E. Boufford *et al.* 26142 (A), 26289 (A), Tsiyuan [Jiyuan], J. Hers 2650



Fig. 27. *Euonymus alata* (THUNB.) SIEBOLD – 1. fruit branch; 2. young shoot; 3. flower.

(A), 2803 (A); HUBEI: Danyang, Z. D. Jiang & G. F. Tao 70 (A), 121 (A), Ichang [Yichang], E. H. Wilson 354 (A 4 sheets, GH 2 sheets), 354a (A 2 sheets, GH), 3103 (A), 3538 (A), Lichuan, C. T. Hwa 112 (A), Metasequoia Area, C. T. Hwa 524 (A), Patung [Badong], H. C. Chow 132 (A), 335 (A), 612 (A), 746 (A), Shengnongjia, 1980 Sino-Amer. Exped. 374 (A), 1152 (A), 1284 (A), Wuchang, S. C. Sun 1074 (A), Xingshan, Z. D. Jiang & G. F. Tao 213 (A); HUNAN: Sinning [Xinning], C. S. Fan & Y. Y. Li 522 (A, NAS), Wukang, H. Handel-Mazzetti 37 (A); JIANGSU: Bowhuashan [Baihuashan], W. C. Cheng 4250 (A), Eshing [Yixing], R. C. Ching 4898 (A), Ishing [Yixing], Y. L. Keng 2429 (A), K. Ling 12278 (A), Liulinshan, J. Hers 632 (A), Kuyung, Chen & Teng 142 (A), Nanjing, C. Y. Chiao 11997 (A), Y. L. Keng 1518 (A), 2091 (NAS), Soochew [Suzhou], F. G. Meyer 22995 (US), C. L. Tso 843 (A), without location, J. Hers 1036 (A), 2281 (A); JIANGXI: Jiujiang, M. C. Wang et al. 1839 (NAS), Lushan, H. H. Chung & S. C. Sun 419 (A), 529 (A), Y. Guo 1111 (LBG), H. Migo s. n. (NAS), M. X. Nie 7194 (LBG), M. C. Wang et al. 321 (LBG), 1183 (LBG), 1970 (NAS), 2277 (NAS), E. H. Wilson 1580 (A), K. Yao 8596 (A), Y. K. Hsiung 9570 (LBG, NAS), Y. Zhou 220 (NAS), Matuo, Y. K. Hsiung 4098 (NAS), Pingxiang, Jiangxi Exped. 2926 (LBG), Wuning, Y. K. Hsiung 5220 (LBG), Xiushui, S. L. Liu 890449 (A); JILIN: without location, B. W. Skvortzow s.n. (A); LIAONING: Tsienshan [Qianshan], H. W. Kung 776 (A); SHAANXI: Fengxian, T. Y. Chang 44 (NAS), Fuping, X. M. Zhang 376 (NAS), Hanchung [Hanzhong], Wm. Purdom 375 (A), Huashan, J. Hers 3039 (A), Meixian, X. M. Zhang 681 (NAS), Tsingling [Qingling], G. Fenzel 255 (A), J. Hers 2934 (A), 2981 (A), T. P. Wang 17868 (NAS); SHANDONG: Chifu or Chefoo [Yantai], N. H. Cowdry 566 (A), Fei Hsien [Feixian], T. Y. Cheo et al. 156 (A), 170 (A), Laoshan, C. Y. Chiao 2687 (A), Tsingtao [Qingdao], C. Y. Chiao 2478 (A), 2615 (A); SHANXI: Chiehhsiu [Jiexiu], H. Smith 5638 (A), Fangshan, T. Tang 1485 (A), Lungchow, J. Hers 2376 (A), Taipeishan [Taibaishan], Wm. Purdom 9 (A, US), 14 (A), Yen-an, Wm. Purdom 342 (A), Yuan-chu, H. Smith 6744 (A); SICHUAN: Chengko, T. L. Dai 100313 (MO), 100317 (MO), 104781 (MO), 101608 (MO), Kai Xian, T. L. Dai 100378 (MO), Wushan, A. Henry 7054 (A), Nizhi 260 (SZ); ZHEJIANG: Changhua [Zhanghua], Y. L. Keng 611 (A), Hangchow [Hangzhou], T. Tang & W. Y. Hsia 344 (A), Longquan, Y. Y. Ho 3302 (NAS), Ningbo, D. MacGregor 1908 (A 2 sheets), Tientaishan [Tiantaishan], R. C. Ching 1354 (A, NA), 1531 (A, GH, US). **JAPAN:** Akita, T. Nemoto & H. Hoshi 4543 (A), Aomori, T. Kurosawa et al. 4591 (A 2 sheets), H. Muroi 4573 (A), Chiba, T. Jujii et al. E47 (A), Echime, K. Deguchi 5558 (A), Fukui, H. Ohashi et al. 8784 (A), Fukushima, T. Nemoto 2352 (A), K. Yonekura 3695 (A), Gifu, H. Muroi 3706 (A), Gunma, J. Murata 1927 (A), Hokkaido, W. P. Brooks 43 (A), 46 (A), 58 (A), 572 (A), Honshu, S. Suzuki 1327 (A), Hyogo, H. Muroi 6506 (A), E. W. Wood & D. E. Boufford 3860 (A), Ibaraki, M. Furuse s.n. (A), Iwate, H. Muroi 3561 (A), 4123 (A), 4252 (A), Kagawa, M. Takahashi 1788 (A), 1854 (A), 1919 (A), Kagoshima, S. Hatusima 16510 (A), H. Muroi 2894 (A), Kanagawa, S. Suzuki 25 (A), Kawachi, M. Tagawa 10964 (A), Kobe, H. Muroi 2028 (A), K. Uno 18778 (A), Kyoto, H. Muroi 4928 (A), S. Tsugaru & T. Takahashi 19336 (A), Mie, H. Muroi 1731 (A), Mino, K. Shiota 4937 (A), 9647 (A), Miyagi, T. Kurosawa et al. 3975 (A), A. Yokota et al. 327 (A), Musashi, H. Aoki 587 (A), U. Mizushima 1523 (A), Mutsu, K. Hosoi 2503 (A), 10978 (A), Nagasaki, M. Hotta & M. Ito 42 (A), C. J. I. Maximowicz s.n. (GH), Nagano, M. Furuse s.n. (A), M. Togashi 9767 (A), Niigata, M. Furuse s.n. (A 2 sheets), E. W. Wood & D. E. Boufford 3719 (A), 3729 (A), Okayama, H. Muroi 6040 (A), Osaka, H. Muroi 657 (A), 6691 (A), Sagami, M. Furuse 2781 (A), Sapporo, S. Arimoto s.n. (A), Settsu, M. Togasi 1506 (A), Shiga, S. Tsugaru et al. 13214 (A), 13232 (A), Shimane, T. Naito s.n. (A), Shimotsuke, M. Mizushima & U. Mizushima 2066 (A), Shinano, J. G. Jack s.n. (A), M. Mizushima 1857 (A), Tochigi, H. Ohashi et al. 11094 (A), Tokyo, K. Sakurai s.n. (A), Toyama, D. E. Boufford et al. 25333

(A), *J. Jutila et al.* 234 (GH), Tukuoka, *K. Ichikawa* 209 (A), Uchino, *H. Kanai et al.* 6006 (A), Yamagata, *Y. Adachi et al.* 17 (A), *Y. Ajiki et al.* 314 (A), Yamanashi, *Y. Kadota* 2146 (A), *M. Togashi s.n.* (A), Yokohama, *C. J. I. Maximowicz s.n.* (A). **KOREA:** Anyang, *R. Moran* 4258 (GH), Chonnam, *B. Y. Sun s.n.* (A), Chungchong Namdo, *B. R. Yinger et al.* 2630 (A), Heiki, *E. H. Wilson* 8453 (US), Hongosan, *E. H. Wilson* 9281 (A), Kyonggi, *B. R. Yinger et al.* 2344 (A), 2491 (A), Mansan, *R. Moran* 5501 (A, US), Pingyang, *J. G. Jack s.n.* (A), Quelpaert Island, *U. Gaurie* 1622 (A), *E. H. Wilson* 9408 (A, 2 sheets), 10437 (US), Samsongsan, *R. Moran* 4333 (GH), Seoul, *J. G. Jack s.n.* (A), South Pyongan, *A. Boratynski* 134 (A), 137 (A), 714 (A). **RUSSIA:** Far East, *N. A. Palczewsky s.n.* (A), *A. K. Skvortsov s.n.* (A), Novosibirsk, *T. Elias et al. s.n.* (US, cult.). **USA:** CONNECTICUT: New London, *S. R. Hill* 10063 (GH); NEW JERSEY: Morris, *E. T. Wherry s.n.* (NA).

The species is widespread not only as the common shrub in the distribution area but also as an ornamental plant cultivated in gardens and yards, in both the Old and New Worlds. However, the species is highly variable in both the vegetative and non-vegetative condition, especially at different stages of collection or different locations. For example, *E. alata* RUPR. var. *elliptica* CHEN H. WANG was described from flowering specimens only. In fact, it was in the early stages of growth, which seem to have much different leaves and branches than the fully developed plant. However, the flowers of the variety are really identical with the species (specimens from Jiangxi Province, Nanchang City, *X. X. Yang* 10060 IBSC, *Y. Lin* 13167 IBSC). The leaves of the species can change into pinkish, reddish, even purple in the later autumn, yielding a high value in the ornamental environment. *Y. R. Li* stated that the species is also from Yunnan and Guangxi (Vascular Plants of Mt. Hengduan 1: 1100. 1993), although its occurrence in these states have not been verified during the present work. The distribution in Qinghai of China is from the Flora of Qinghai (vol.2, 1990).

36. *Euonymus centidens* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 262. 1914. TYPE: CHINA. Yunnan; Long-Ky, alt. 700 m, Juin 1912, *E. E. Maire s.n.* (not seen, merotype A!). [Fig. 28]

- = *E. euscaphioides* F. H. CHEN & M. C. WANG, Acta Phytotax. Sin. 3(2): 235, f. 2: 1-2. 1954. TYPE: CHINA. Jiangsi: Lushan, Wurushi, June 6, 1951, *M. C. Wang* 710 (LBG! PE! 2 sheets).
- = *E. euscaphioides* F. H. CHEN & M. C. WANG var. *serrulata* F. H. CHEN & M. C. WANG, Acta Phytotax. Sin. 3(2): 236. 1954. TYPE: CHINA. Jiangsi: Yifeng, Huanggangshan, Oct. 15, 1947, *Y. K. Hsiung* 6397 (A! LBG!).
- = *E. streptoptera* MERR., Sunyatsenia 1: 198. 1938. TYPE: CHINA. Kwangtung: Lokchong, May 14 and 17, 1929, *C. L. Tso* 20487(MO!).

Deciduous shrub, 2-4 (5) m tall; branches terete, twigs 4-angled, green or brown when dry. Leaves thinly coriaceous or thickly papyraceous, obovate or elliptic-obovate, 6-11 x 2.5-4.5 cm, apex acute, acuminate or caudate, base cuneate or attenuate, margin crenulate, serrulate to serrate, sometimes ciliate,

lateral veins 5-7 pairs, obscure to clearly visible on upper surface, curving forward, netting and disappearing before reaching the margin; petiole absent or very short, less than 3 mm long. Cymes single or clustered when young, axillary; peduncle slender, 2-3 cm long, usually with 1-2 dichotomous branches and 3 flowers, rarely more flowers; pedicel slender, 5-7 mm long. Flower 4-merous, medium sized, 7-8 mm in diam. Sepals subround. Petals green, light yellow or greenish-yellow, ovate, base attenuate. Capsule reddish-brown when fresh, dark brown or gray when dry, 4-lobed, 1.3-1.5 cm in diam., sometimes only 2-3 lobes developed, each lobe ovoid when open at maturity; seeds with bright red aril.

Phenology. Flowering: May to June; Fruiting: September to November.

Distribution: China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang); alt. 250-1,400 m, in bushes, woodland and forest; very common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Huangshan, *M. B. Deng & K. Yao* 9134 (A, NY), *Y. Zhou* 1722 (PE), 1743 (PE), Qimen, *M. B. Deng et al.* 2169 (PE), *X. Y. Dong* 93379 (A), *K. Yao* 10323 (MO), *Y. Chen* 1743 (PE), Xiuning, *K. Yao* 11046 (A), 11180 (A); FUJIAN: Changding, *C. M. Hu* 3869 (PE), *M. X. Nie* 3689 (KUN), Congan, 236 Group 508 (PE), 580 (PE), 692 (PE), *M. C. Wang et al.* 3141 (NAS, PE), Jiangle, *Longxishan Exped.* 1181 (PE 2 sheets), 1200 (PE), 3145 (PE 2 sheets), Liancheng, *Y. Ling* 3441 (PE 2 sheets), Wuyishan, *M. C. Wang et al.* 1574 (PE 2 sheets, NAS), 1986 (NAS), 2405 (NAS), 2491 (NAS, PE); GUANGDONG: Canton [Guangzhou], *Canton Christian College* 12095 (A), *W. Y. Chun* 5746 (A), *F. A. McClure* 13794 (A), Heping, *Z. F. Wei* 120515 (KUN, MO), 120310 (KUN, MO), *G. C. Zhang* 4 (MO), Hoyuen [Heyuan], *W. T. Tsang* 28731 (A, P), Jenhwa [Renhua], *W. T. Tsang* 26368 (A), Lechang, *S. H. Chun* 188 (MO, PE), 1616 (KUN, MO, PE), 3038 (MO 2 sheets), *Y. Li* 2180 (MO, PE), *P. H. Liang* 84653 (MO), *C. L. Tso* 20597 (MO, NY), Liannan, *P. C. Tam* 59120 (KUN, MO 3 sheets, PE), Lianping, *Y. G. Liu* 148 (MO), 306 (MO), *Z. F. Wei* 120076 (MO, PE), Lianshan, *P. C. Tam* 58013 (KUN, MO 2 sheets, PE), Lianxian, *P. H. Liang* 83292 (MO), *P. C. Tam* 59978 (KUN, PE), Lungmen [Longmen], *W. T. Tsang* 25320 (A), Pingyuan, *X. G. Li* 200235 (PE), Nanxiong, *L. Deng* 6318 (MO, PE), Pingyuan, *L. Deng* 4064 (KUN, MO), *X. G. Li* 202185 (MO, PE), Qujiang, *C. Wang* 31541 (KUN, PE), Rongshui, *S. H. Chun* 8829 (MO), Ruyuan, *P. P. Ko* 53486 (MO), *Y. G. Liu* 413 (MO, PE), 376 (MO), *Ruyao Team* 415 (MO), Sanshui, *M. X. Huang* 110021 (MO), Shixing, *L. Deng* 6704 (MO), *Z. Y. Li* 802 (MO), *X. W. Wang et al.* 25 (A), 137 (A), 544 (A), Tsengcheng [Zengcheng], *W. T. Tsang* 20188 (A, PE), Wentang, *H. Y. Liang* 60454 (PE), Xinfeng, *Guang* 77-5636 (MO), Xinyi, *S. P. Ko* 51419 (KUN, MO, PE), 51448 (MO), *C. Wang* 31856 (MO), 32285 (MO, PE), Yangshan, *L. Deng* 38 (KUN, MO, PE 2 sheets), 1308 (PE), Yaoshan, *S. S. Sin* 9365 (A), 9749 (A, NY), Yingde, *L. Deng* 812 (KUN, MO), Yuyuan [Ruyuan], *S. H. Chun* 1359 (MO), *S. P. Ko* 52547 (A, KUN, PE); GUANGXI: Changwu, *S. H. Chun* 10369 (KUN, MO), Chuan Hsien [Quanxian], *W. T. Tsang* 27563 (A, NA, US), Guilin, *C. H. Tsoong* 85038 (MO), Lingui, *S. Q. Zhong* A60207 (KUN), Nandan, *C. Wang* 41169 (A, PE), Paishou [Baishou], *Y. W. Taam* 74 (A, NA), Rongxian, *S. H. Chun* 9658 (KUN), Waitsap, *W. T. Tsang* 23362 (A), Xingan, *Guangxi Exped.* 950 (PE), *Q. H. Lu* 2123 (PE), *S. L. Yu* 900314 (PE), Xiuren, *C. Wang* 40620 (A, PE), Yangsuo, *Z. Y. Chen* 53215 (KUN), 53394 (KUN); GUIZHOU: Fenggang, *North Guizhou Exped.* 2455 (PE 2 sheets), Jiangkou, 1986 *Sino-Amer. Guizhou Exped.* 921 (A, PE), 1123 (A, PE), 1251 (A, PE, NA), *Y. Tsiang* 7513 (A), Xishui, *Bijie Exped.* 1466 (PE),

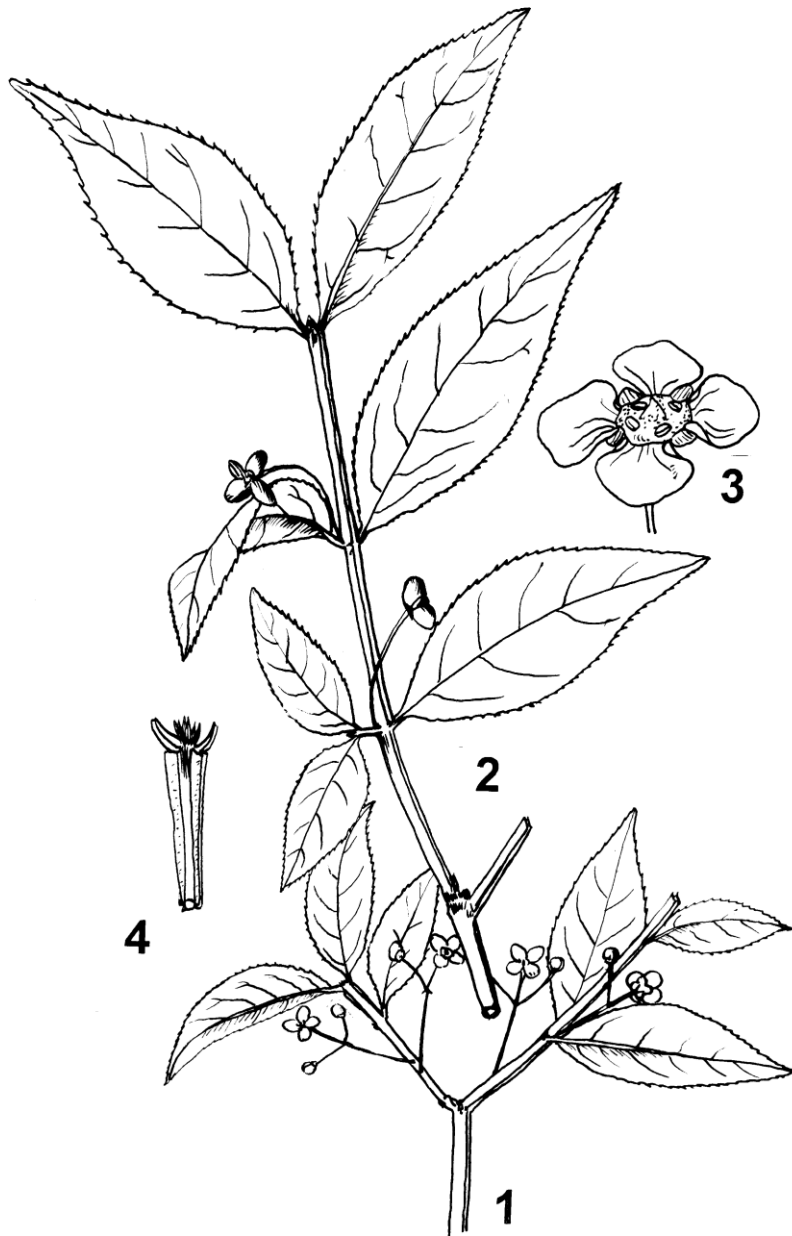


Fig. 28. *Euonymus centidens* H. LEV. – 1. flower branch; 2. fruit branch; 3. flower; 4. young shoot in large.

Yinjiang, 1986 *Sino-Amer. Guizhou Exped.* 1533 (A, PE); HENAN: Xinxian, *Xinxiang Teaching College Exped.* 8256 (PE); HUBEI: Hefeng, *H. J. Li* 6822 (KUN, PE), Enshih [Enshih], *H. C. Chow* 1833 (A, NY), *H. J. Li* 6079 (KUN, PE), Xianfeng, *H. J. Li* 9381 (PE); HUNAN: Anjiang, *Anjiang Agriculture College Team* 224 (PE), 516 (PE), *Z. R. Li* 2684 (PE 2 sheets), Huitong, *D. Z. Wang* 166 (IBSC), Jiangyong, *P. C. Tam* 61508 (MO), Qianyang, *X. G. Li* 203342 (MO), Xinning, *Z. C. Luo* 735 (PE), Yizhang, *S. H. Chun* 1007 (MO), 2927 (MO), 3594 (MO), *P. H. Liang* 84653 (PE), *W. T. Tsang* 23490 (A 2 sheets, BM), 23679 (A 2 sheets, BM), 23774 (A 2 sheets, BM), Yongshun, *Hunan Exped.* 376 (PE), Zhijiang, *P. C. Tam* 60874 (MO), Zili, *X. G. Li* 203833 (MO); JIANGXI: Anfu, *S. K. Lai* 1894 (KUN, PE), *J. S. Yue et al.* 3004 (KUN), Anyi, *Y. Tsiang* 10560 (NAS), Anyuan, *M. X. Nie & S. K. Lai* 2041 (PE), 2161 (PE, KUN 2 sheets), 2423 (KUN), 2522 (KUN, PE), 2591 (KUN 2 sheets), 2712 (KUN 2 sheets), 2714 (PE), 2718 (PE), Chongyi, *M. X. Nie et al.* 8590 (KUN), Dayu, *M. X. Nie et al.* 9143 (KUN), *N. B. Yang & K. Yao* 1357 (PE), *J. S. Yue et al.* 1049 (KUN), Dexing, *M. X. Nie* 5601 (KUN), 5390 (KUN 2 sheets, PE), *K. Yao* 11547 (A, NA), Fenyi, *K. Yao* 9279 (A), Fengxin, *S. L. Liu et al.* 1189 (KUN), Guangchang, *C. M. Hu* 5161 (KUN 2 sheets, PE), *J. S. Yue et al.* 2576 (KUN, PE), Huichang, *M. X. Nie & S. K. Lai* 2881 (KUN 2 sheets, PE), 3395 (KUN 2 sheets), Huinan, *J. Xiong* 1504 (PE 2 sheets), Jian, *S. K. Lai* 672 (KUN), *Jiangxi Exped.* 138 (PE 2 sheets), 332 (PE 2 sheets), Jiujiang, *C. M. Tan* 92135 (MO), Kiennan, *S. K. Lau* 4068 (A, US), Lianhua, *S. K. Lai* 1398 (KUN, PE), 2830 (KUN, PE), Lichuan, *M. X. Nie* 2558 (KUN 2 sheets), Lungnan [Longnan], *S. K. Lau* 4555 (A, BM, US), Lushan, *K. L. Chu* 4020 (P), *S. J. Shen* 517 (PE), *Y. K. Hsiung* 3083 (NAS), 4001 (NAS), 7087 (PE), 9884 (PE 2 sheets), Nanfeng, *M. X. Nie & S. K. Lai* 2312 (KUN 2 sheets), 2340 (KUN, PE), 2347 (KUN 2 sheets), Nankang, *M. X. Nie et al.* 9875 (KUN), Pingxiang, *Jiangxi Exped.* 645 (PE 2 sheets), 2731 (PE), Quannan, *J. Xiong* 1204 (PE), 1072 (PE), Ruijin, *M. X. Nie & S. K. Lai* 3517 (KUN 2 sheets, PE), 3567 (KUN 2 sheets, PE), 4063 (KUN, PE), 4015 (PE), 4101 (PE), 4154 (KUN, PE), Shangrao, *Jiangxi Exped.* 1173 (PE 2 sheets), *M. X. Nie et al.* 8246 (KUN), Shicheng, *M. X. Nie & S. K. Lai* 4744 (KUN, PE), Xingguo, *Institute of Botany Exped.* 846 (PE), Wanzai, *S. K. Lai et al.* 1606 (PE), Wugongshan, *X. M. Gao* 1738 (A), Wuning, *Y. K. Hsiung* 5138 (A, PE), Wuyishan, *M. C. Wang et al.* 2552 (PE), Xiushui, *S. L. Liu* 890372 (A), Xunwu, *C. M. Hu* 1257 (PE), 1468 (PE), 1576 (PE), Yifeng, *Y. K. Hsiung* 6429 (A, PE), Yinlin, *M. C. Wang* 4004 (PE 2 sheets), Yudu, *W. H. Wan & Z. R. Yu* 1884 (PE), Zhixi, *M. X. Nie & S. K. Lai* 3139 (KUN 2 sheets, PE), 3411 (KUN 2 sheets, PE), without location, *Y. K. Hsiung* 437 (NAS), Kianghsi [Jiangxi] to Fukien [Fujian], Dunghwa-schan, *T. H. Wang* 204 (for *H. Handel-Mazzettii*) (A, WU), 350 (for *H. Handel-Mazzettii*) (A, E, WU); SICHUAN: Daliangshan, *T. T. Yu* 4020 (PE 2 sheets), Ebian, *K. H. Yang* 57562 (KUN, PE), Fengjie, *T. Y. Chang* 25631 (PE), Nanchuan, *W. P. Fang* 1267 (A, PE), 5815 (NAS), 5819 (A, PE), 63775 (SZ), 64244 (KUN, PE), *K. F. Li* 62486 (KUN, PE, SZ), *J. H. Xiong* 91885 (PE, SZ), Omeishan [Emeishan], *E. Faber s.n.* (WU 2 sheets), *W. P. Fang* 33403 (PE), *W. P. Fang* 20259 (PE), *W. P. Fang & Y. X. Tao* 52188 (SZ), *M. Cheng* 828 (PE), *E. H. Wilson* 4792 (A), *S. Z. Yu* 49590 (SZ), *J. H. Xiong et al.* 30634 (PE), 30909 (PE), 30934 (PE), 30959 (PE), 33051 (PE), 33066 (PE), 33203 (PE), Rongjing, *T. P. Wang* 9405 (PE), Tianquan, *W. K. Wu & C. He* 11915 (PE), Yaan, *Y. Chen* 5890 (NAS), 12804 (PE), *C. Y. Chiao* 1257 (A), *Y. Y. Ho* 6936 (NAS), without location, *E. Faber* 226 (NY), 652 (NY), *W. P. Fang* 4895 (NAS); YUNNAN: without locality, *E. E. Maire s.n.* (BM, P), Xichou, *C. P. Tsien et al.* 696 (PE), Yiliang, *Northeast Yunnan Exped.* 848 (PE, KUN); ZHEJIANG: Hangzhou, *S. Y. Chang* 1500 (PE), Leqing, *S. Y. Chang* 5303 (PE), 5321 (PE), Longquan, *S. Y. Chang* 2714 (PE 2 sheets), 6826 (KUN, PE), 6959 (KUN, PE), Ningbo, *S. Y. Chang* 920 (PE 2 sheets), Shouchang, *without collector* 29476 (PE), Tianmushan, *Y. Y. Ho* 27172 (NAS),

Taishun, S. Y. *Chang* 3697 (PE 2 sheets), D. X. *Zuo et al.* 23738 (NAS), Zhenhai, Y. Y. *Ho* 27296 (PE).

The species is similar to *E. dielsiana*, but is easily differentiated from it by the leaves which are deciduous, small, and usually thickly papyraceous, and small fruit.

37. *Euonymus dielsiana* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 440, tab. 4: l. 1900. SYNTYPES: CHINA. Hupeh: Ichang, A. *Henry* 3315 (A! BM! E! GH! 2 sheets, US! 2 sheets), 3962 (E! GH!), 3962a (A! E!). [Fig. 29]

= *E. dielsiana* LOES. var. *fertilis* LOES., Bot. Jahrb. Syst. 29: 441. 1900. TYPE: CHINA. Sichuan: Nanchuan, C. *Bock* & A. *Rosthorn* 1245 (not seen, merotype A!, photo A! PE!).

≡ *E. fertilis* (LOES.) C. Y. CHENG ex C. Y. CHANG, Bull. Bot. Res., Harbin 5(1): 81. 1985. TYPE: CHINA. Sichuan: Shizhu, alt. 1,150-1,800 m, July 25, 1978, Y. *Chen* 2954 (not seen, this is a wrong typification for the combination made from a previously described name).

= *E. dielsiana* LOES. var. *latifolia* LOES. in DIELS, Bot. Jahrb. Syst. 30: 455. 1902. TYPE: CHINA. Yunnan: apud Mengtze, alt. 2180-2200 m, A. *Henry* 10810 (A! MO! NY!).

= *E. leclerei* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 260. 1914. TYPE: CHINA. Kouy-Tcheou: Ma-Jo, 5, Sept. 1907, J. *Cavalerie* 3058 (not seen, merotype A!).

= *E. cavaleriei* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 259. 1914. SYNTYPES: CHINA. Kouy-Tcheou: Pin-Fa, 17 Fevr. 1903, M. *M. Cavalerie* 865 (BM!, E!), rochers de Ouen-Pi, Li-Tseou-Gai, 23 Juill. 1912, M. *M. Cavalerie* 87 (A! BM! E!); Fl. Kouy-Tcheou 71. 1914. TYPE: CHINA. Kouy-Tcheou: J. *Equirol* s.n. (not seen).

= *E. dielsiana* LOES. var. *latifolia* H. LEV., Fl. Kouy-Tcheou 71. 1914. SYNTYPES: CHINA. Kouy-Tcheou: M. *M. Cavalerie* 87 (A! BM! E!), 865 (E! BM!, merotype and photo A!).

= *E. dielsiana* LOES. var. *euryantha* HAND.-MAZZ., Symb. Sin. 7: 661. 1933. TYPE: CHINA. Hunan: Wukang, alt. 400-1400 m, T. *H. Wang* 513 (WU!).

≡ *E. fertilis* (LOES.) C. Y. CHENG ex C. Y. CHANG var. *euryantha* (HAND.-MAZZ.) C. Y. CHANG, Fl. Sichuan 4: 261. 1988.

Evergreen shrub to small tree, 2-8 m tall; branches terete, twigs with striations, green or brown when dry. Leaves coriaceous or thickly coriaceous, obovate or elliptic-obovate, 9-15 x 4.5-6 cm, apex acute, acuminate or caudate, base cuneate or attenuate, upper 3/5-4/5 of margin crenulate, serrulate to serrate, sometimes ciliate, 1/5-2/5 entire, lateral veins 6-8 pairs, obscure to distinct, curving forward, netting and disappearing before reaching the margin; petiole sturdy, short, less than 1 cm long. Cymes single or in axillary clusters when



Fig. 29. *Euonymus dielsiana* DIELS. – 1. flower branch; 2. fruit branch.

young; peduncle slender, 2-3 cm long, usually with 1-2 dichotomous branches and 3 flowers, rarely more flowers; pedicel soft, 4-6 mm long. Flower 4-merous, small, c. 6 mm in diam. Sepals subround. Petals green, light yellow or greenish-yellow, ovate, base attenuate. Capsule reddish-brown when fresh, dark brown or gray when dry, 4-lobed, lobes bent backward, 1.8-2.4 cm in diam., sometimes

only 2-3 lobes developed, each lobe ovoid when open at maturity; seeds dark brown, with bright red aril.

Phenology. Flowering: April to July; Fruiting: September to November.

Distribution: China (Guangdong, Guangxi, Guizhou, Henan? Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang?); alt. 500-1,800 m, in bushes, woodland, and forest; very common.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Fengkai, *C. Wang* 164366 (MO), Liannan, *P. C. Tam* 59208 (KUN, MO), Lianxian, *Z. Y. Li* 100 (MO), *P. C. Tam* 59806 (KUN), Ruyuan, *Z. Y. Li* 886 (MO), *S. P. Ko* 53560 (MO), *S. K. Lau* 29073 (MO), *Y. G. Liu* 420 (MO), 672 (MO), Yangshan, *L. Deng* 178 (KUN, MO, PE 2 sheets), 977 (KUN, MO), 1306 (KUN), *Z. Y. Li* 1436 (MO), Ying Tak [Yingde], *W. T. Tsang & K. C. Wong* 3131 (A), Yuyuan [Ruyuan], *W. Y. Chun* 10768 (KUN, MO, PE), *S. P. Ko* 54794 (KUN), *C. Wang* 42266 (MO 2 sheets, PE), 43290 (KUN); GUANGXI: Guilin, *W. T. Tsang* 27798 (A, NA, US), Lingchuen, *C. H. Tsoong* 83626 (A), Lingui, *Guangxi Exped.* 4025 (PE), Lingwun [Lingyun], *S. K. Lau* 28603 (A, KUN, MO, NAS, PE), *A. N. Steward et al.* 207 (NY), 467 (NY), Luchen, *R. C. Ching* 5130 (NAS, NY, PE), 6200 (NAS), Nam Tanyuen, *C. Wang* 40874 (A), 40952 (A), Tiane, *C. Wang* 43321 (MO), without locality, *C. Wang* 41183 (A), Xingan, *Guangxi Exped.* 415 (IBSC, PE); GUIZHOU: Anlong, *Guizhou Exped.* 4316 (KUN), 4317 (KUN, PE), Bijie, *P. H. Yu* 762 (KUN 2 sheets, PE), Chengfeng, *Y. Tsiang* 4658 (A, NAS, NY), Dafang, *Bijie Exped.* 869 (KUN, PE 2 sheets), Daozhen, *Jinfoshan Exped.* 2501 (PE 2 sheets), Fanjingshan, *A. N. Steward et al.* 811 (A, BM, E, NAS, NY, PE, US), *P. C. Tsoong* 832 (KUN 2 sheets, PE 2 sheets), *T. P. Zhu & Z. F. Liu* 473 (KUN), 989 (KUN), 1216 (KUN), Hsifeng [Xifeng], *S. W. Teng* 90570 (A), Huangping, *South Guizhou Exped.* 2419 (KUN), 2571 (KUN), Huaxi, *Z. Y. Cao* 370 (PE), 371 (PE), Jiangkou, 1986 *Sino-Amer. Guizhou Exped.* 523 (A, PE), 1259 (A, BM, MO, NY, PE), Kaili, *South Guizhou Exped.* 1390 (KUN), 1924 (KUN), Leishan, *C. P. Tsien et al.* 50216 (KUN), 50815 (KUN, PE), 50729 (KUN), Meitan, *C. C. Wu* 443 (NAS), Nayong, *Biejie Exped.* 510 (KUN, PE 2 sheets), 568 (KUN, PE 2 sheets), Songtao, 1986 *Sino-Amer. Guizhou Exped.* 2055 (A, NA, PE), Qingzhen, *Sichuan-Guizhou Exped.* 1981 (P), 2144 (PE), Rongjiang, *South Guizhou Exped.* 2809 (PE 2 sheets), *C. P. Tsien et al.* 51361 (KUN), Suiyang, *West Chinese Academy of Sciences* 3358 (PE), Tinfan, *Y. Tsiang* 8579 (A, NY), Tsunyi, *A. N. Steward et al.* 248 (A), Tungtze [Tongzhi], *Y. Tsiang* 5171 (A, NY, PE), Tuyuan, *H. Handel-Mazzetti* 10731 (A, WU), *Y. Tsiang* 5871 (A, NAS, NY), Without location, *S. S. Sin* 52114 (IBSC), Xingren, *Guizhou Exped.* 7807 (KUN, PE), Xishui, *P. C. Tsoong* 294 (PE), Yinjiang, 1986 *Sino-Amer. Guizhou Exped.* 1529 (A), *T. P. Zhu & Z. F. Liu* 354 (KUN), Yinkiang [Yinjiang], *Y. Tsiang* 7613 (A, NAS, NY, SZ), 7699 (A, NY), Zhunyi, *Sichuan-Guizhou Exped.* 1092 (PE), 1571 (PE 2 sheets), 1601 (PE 2 sheets), 1618 (PE); HUBEI: Changyang, *E. H. Wilson* 1204 (A 2 sheets, NY, P), Chienshih [Jianshi], *H. C. Chow* 1528 (A, E, NY), Enshi, *H. C. Chow* 1814 (A, NY), 1874 (E), Hefeng, *H. J. Li* 6364 (KUN, PE), 8029 (KUN, PE), 8159 (KUN, PE), 8651 (PE), Ichang [Yichang], *A. Henry* 3315b (GH 2 sheets, P), Laifeng, *H. J. Li* 4945 (KUN, PE), 7103 (KUN, PE), 7514 (PE), 7368 (PE), Lichuan, *G. X. Fu & Z. S. Zhang* 1728 (KUN, PE), *C. T. Hwa* 144 (A, PE), Metasequoia Area, *W. C. Cheng & C. T. Hwa* 948 (A, PE), Patung [Badong], *E. H. Wilson* 1414 (A, E, NY, P, US), Xingshan, *Q. L. Chen et al.* 2260 (KUN, PE 2 sheets), *C. M. Hu* 174 (NAS), *H. J. Li* 953 (KUN, PE), without location, *A. Henry* 3221 (BM, P), 7300 (GH), *E. H. Wilson* 3119 (BM, E, MO), Xianfeng, *W. J. Lin* 620 (KUN); HUNAN: Huaihua, *Z. Y. Li* 1899 (MO), Jianghua, *B. G. Li et al.* 5412 (PE 2 sheets), Sangzhi, *T. R. Cao* 90129 (KUN), 90262 (KUN), *L. H. Liu* 9172 (PE), 9298 (PE),

Yuanling, *N. Liu et al.* 41 (A), Yizhang, *S. K. Lau* 29518 (MO), Zili, *X. R. Xi et al.* 259 (PE), 260 (PE), 585 (PE), *West Hunan Exped.* 116 (PE), 364 (PE), 615 (PE); JIANGXI: Longnan, 236 Group 993 (PE), Suichuan, 236 Group 733 (PE 2 sheets), 795 (PE 2 sheets); SICHUAN: Dujiangyan, *D. E. Boufford & B. Bartholomew* 24157 (A, BM, MO, NY), Ebian, *Z. X. Zhao* 314 (PE), 706 (KUN, PE), *C. W. Yao* 2844 (PE), Emei, *J. H. Xiong & Z. L. Zhou* 91974 (KUN), 92862 (KUN, PE), 92973 (KUN, PE), *J. H. Xiong et al.* 31025 (PE), 31026 (NAS, PE), Eshan, *K. H. Yang* 55578 (KUN), Fengjie, *H. F. Chow* 26472 (PE, SZ), *M. Y. Fang* 24759 (KUN, PE), 25631 (KUN), *T. Y. Chang* 25878 (PE), Guanxian, *W. P. Fang* 2156 (A, NY, E), Hongya, *C. W. Yao* 2179 (PE), 2488 (PE), 3719 (PE), Leibo, *Sichuan Economic Pl. Exped.* (59) 279 (PE), 485 (KUN, PE), 519 (KUN), 533 (KUN), *T. T. Yu* 3249 (PE 2 sheets), Mabian, *West Chinese Academy of Sciences* 5620 (PE), Nanchuan, *W. P. Fang* 1240 (A, PE), 5665 (E, NY, PE 2 sheets), *Y. Y. Ho* 4405 (NAS), 4416 (NAS), 5191 (NAS), 5219 (NAS), 5284 (NAS), 5325 (NAS), 5418 (NAS), *K. F. Li* 61864 (KUN, PE, SZ), 62979 (KUN, NAS, SZ), 63718 (KUN 2 sheets, NAS), 64140 (KUN, PE), 64960 (KUN, PE, SZ), 64987 (KUN 2 sheets, PE), *F. T. Wang* 10931 (PE), *J. H. Xiong & Z. L. Zhou* 91715 (PE, SZ), 91974 (PE), Omeishan [Emeishan], *W. P. Fang* 3662 (KUN), 12729 (BM, PE), 15117 (A, KUN, PE 3 sheets), 15223 (A, KUN, PE), 15441 (A, KUN), *S. L. Sun* 561 (KUN), 719 (KUN), 742 (KUN), 2035 (KUN), *F. T. Wang* 23273 (A, PE 3 sheets), Pingshan, *Sichuan Economic Pl. Exped.* (59) 670 (PE), 746 (KUN), 769 (KUN, PE 2 sheets), 1133 (KUN), 1152 (KUN), 1175 (PE), *T. T. Yu* 3005 (PE 2 sheets), Rongjing, *C. W. Yao* 3566 (E) Tianquan, *Sichuan Economic Pl. Exped.* (59) 670 (KUN), 718 (KUN), 730 (KUN), 731 (KUN), *Z. L. Wu* 12438 (PE), Without location, *W. P. Fang* 8520 (NAS), 8635 (NAS), 8654 (NAS), 8731 (NAS), Wuqi, *K. H. Yang* 59207 (KUN, PE), Yaan, *K. C. Kuan & W. T. Wang* 2478 (PE), 4114 (PE); YUNNAN: Chengshiung [Zhengxiang], *H. T. Tsai* 52309 (A, KUN 2 sheets, NAS, PE, SZ), 52326 (KUN 2 sheets, PE), Daguang, *B. X. Sun et al.* 422 (PE), 625 (KUN, PE), Fooning [Funing], *C. W. Wang* 87119 (KUN 2 sheets), 87120 (KUN 2 sheets, PE), 87135 (KUN, PE), 88322 (KUN, PE), Pingpian [Pingbian], *C. W. Wang* 88017 (KUN, PE), 82680 (KUN 2 sheets, PE), Weixin, *S. Y. Bao* 269 (KUN 2 sheets), Wenshan, *H. T. Tsai* 58128 (KUN 2 sheets), without locality, *E. E. Maire s.n.* (BM), Yiliang, *K. M. Feng et al.* 73-352 (KUN), Zhaotong, *K. M. Feng et al.* 73-232 (KUN), Zhenxiang, *X. W. Li* 128 (KUN 2 sheets), *P. H. Yu* 1182 (KUN 2 sheets, PE).

This species is very similar to *E. hainanensis*, but leaves are usually ciliate and glabrous, and the capsule lobes are bent backward, while the geographical range of the latter species is confined to the island of Hainan. There is no available specimen to confirm the distribution in Henan, China by the record of *Flora of Henan* 2: 524. 1988.

38. *Euonymus disticha* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 261. 1914. SYNTYPES: CHINA. Kouy-Tcheou, Environs de Kouy-Yang, 27 Juill. 1898, *E. Bodinier* 2455 (E!, merotype A!), 3499 (E!). [Fig. 30]

Deciduous shrub, 1-2 m tall; young branches and twigs 4-angled, green or brown when dry. Leaves papyraceous, ovate or ovate-elliptic, 3.5-5 x 1.8-2.5 cm, apex acute or acuminate, base cuneate or subround, margin crenulate, lateral veins c. 5 pairs, invisible, disappearing before reaching the margin; petiole sessile or very short, 1-3 mm long. Flowers solitary, axillary. pedicel slender, less

than 1 cm long. Flower 4-merous, medium sized, 8-9 mm in diam. Sepals round. Petals light yellow or greenish-yellow, orbicular, base nearly attenuate. Capsule reddish-brown when fresh, brown or gray when dry, 4-lobed, c. 1 cm in diam., sometimes only 3 lobes developed, each lobe ovoid when open at maturity; seeds with bright red aril.

Phenology. Flowering: May to July; Fruiting: August to November.

Distribution: China (Guizhou, Hunan, Sichuan); alt. c. 1,000 m, in bushes and forests; rare.

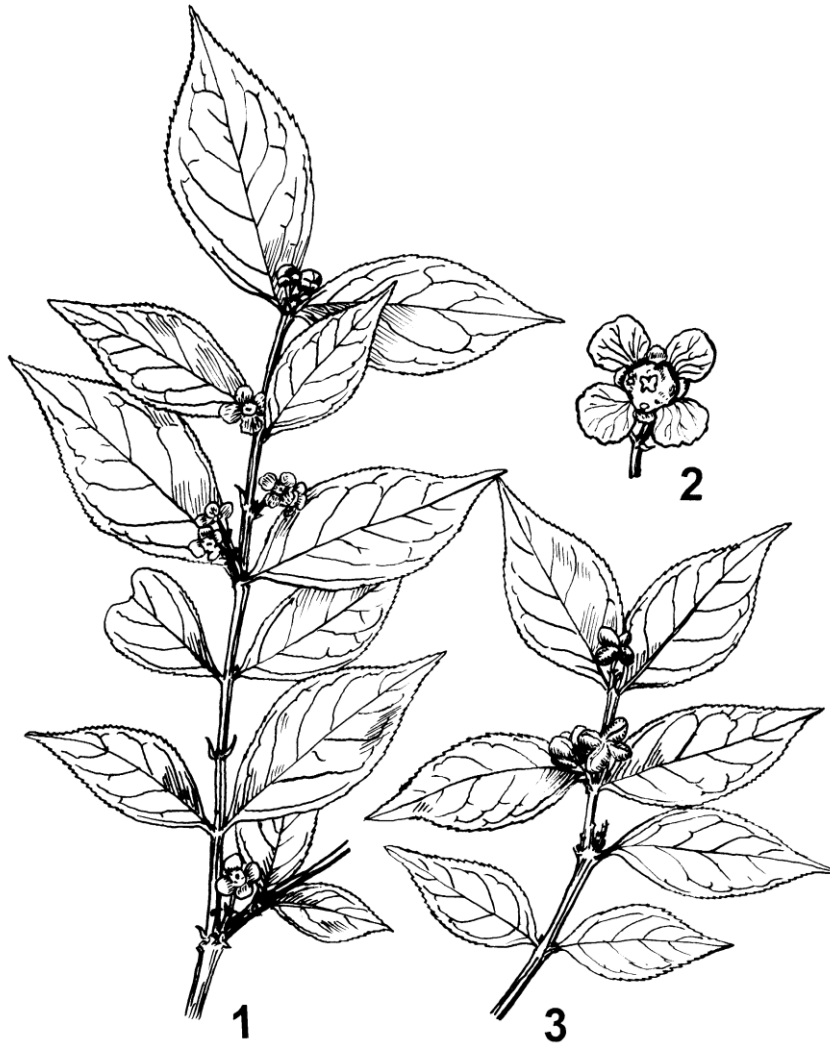


Fig. 30. *Euonymus disticha* H. LEV. – 1. flower branch; 2. flower; 3. fruit branch.

SPECIMENS EXAMINED: **CHINA:** GUIZHOU: Guiyang, Y. Tsiang 8488 (A, IBSC, NY, PE), Huanggongshi, no collector 1091 (KUN), Tungshui, C. C. Wu 350 (SZ), Zunyi, Sichuan-Guizhou Exped. 1531 (KUN, PE); HUNAN: Xinning, Zhiyunshan Exped. 473 (KUN); SICHUAN: Yaan, C. Y. Chiao 1236 (A), West Sichuan Exped. 2482 (KUN).

This is a very unusual species in the section, which is very similar to *E. alata*, but differs from the latter mainly by the small leaves, twigs without cork, and nearly rotund capsule. The species was reported from Guangdong (Flora of Sichuan 4: 258, 1988), but the record cannot be verified by the present work.

39. *Euonymus euscaphis* HAND.-MAZZ., Anz. Akad. Wiss. Wien. Math.-Nat. 58: 148. 1921. TYPE: CHINA. Hunan: Wald der str. bei Lianglitang se von Dsingdschou, alt. 450 m, *H. Handel-Mazzetti* 11031 (A! WU!). [Fig. 31]

= *E. euscaphis* HAND.-MAZZ. var. *gracilipes* REHDER, J. Arnold Arbor. 8: 158. 1927. SYNTYPES: CHINA. Anhui: Changgonshan, Wuyuan, R. C. Ching 3249 (A! PE!), 4298 (E!).

= *E. tsoi* MERR. ssp. *brevipes* P. S. HSU, Acta Phytotax. Sin. 11(2): 195, pl. 25. 1966. TYPE: CHINA. Fujian: Shanghang, Sept. 8, 1958, *FUS Exped. s.n.* (not seen).

Deciduous shrub, 1-2 m tall; branches terete, twigs 4-angled, green or brown when dry. Leaves thickly papyraceous, broadly linear, or belt-lanceolate, 8-12 x 1.8-2.2 cm, apex acute or acuminate, base cuneate to round, margin crenulate, lateral veins 10-12 pairs, obscure, curving forward, netting and disappearing before reaching the margin; petiole short, c. 3 mm long. Peduncle slender, 1-2 cm long, usually with 1-2 dichotomous branches and 3 flowers, rarely more flowers; pedicel slender, 5-7 mm long. Flower 4-merous, medium sized, 6-8 mm in diam. Sepals subround. Petals green or greenish-yellow, rotund, base subround. Capsule reddish-brown when fresh, dark brown or gray when dry, 4-lobed, 1.1-1.3 cm in diam., sometimes only 2-3 lobes developed, each lobe ovoid when open at maturity; seeds with bright red aril.

Phenology. Flowering: April to June; Fruiting: July to October.

Distribution: China (Anhui, Fujian, Hubei, Hunan, Jiangxi, Zhejiang); alt. 450-1,000 m, in bushes, woodland, and forest; rare.

SPECIMENS EXAMINED: **CHINA:** FUJIAN: Changle, *Longxishan Exped. 3148* (PE), Huanggangshan, C. P. Tsiang et al. 400864 (PE); HUBEI: Hefeng, H. J. Li 6870 (KUN, PE); HUNAN: Changning, C. S. Fan & Y. Y. Li 311 (A), Xuefengshan, Z. T. Li 1878 (PE), 2677 (PE 2 sheets), 2835 (PE), J. G. Xiao & C. Q. Qi 3181 (PE); JIANGXI: Anfu, S. K. Lai et al. 1885 (KUN, PE), Pingxiang, *Jiangxi Exped. 69* (PE), Shangrao, *Jiangxi Exped. 328* (PE), no collector (70)446 (PE 2 sheets), Wugongshan, *Jiangxi Exped. 1299* (PE),

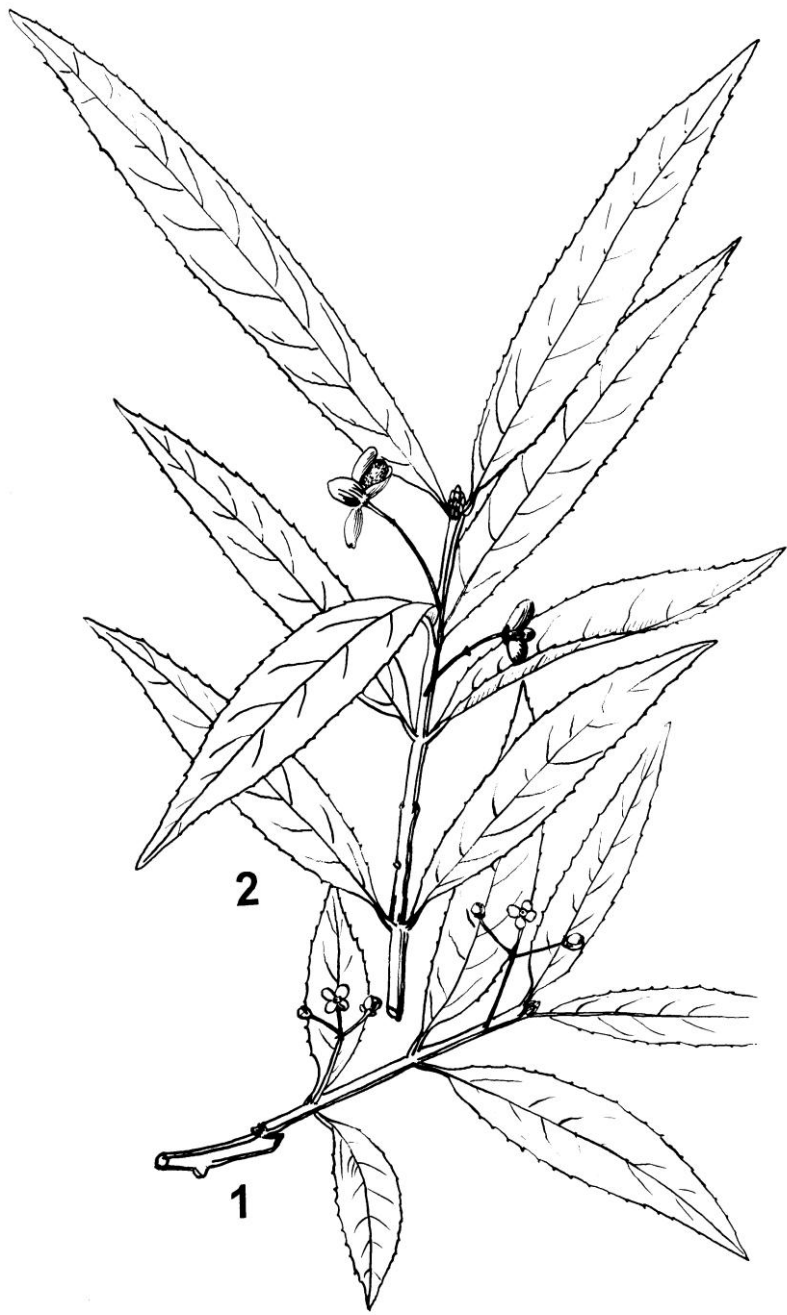


Fig. 31. *Euonymus euscaphis* HAND.-MAZZ. – 1. flower branch; 2. fruit branch.

Yifeng, Y. K. *Hsiung* 6405 (A, PE 2 sheets); ZHEJIANG: Lishui, S. Y. *Chang* 6090 (PE), 6304 (KUN, PE), Tiantai, G. R. *Chen* 2377 (PE), Y. X. *He* 26211 (SZ), 28211 (PE), *Zhejiang Exped.* 28278 (PE 2 sheets), 28449 (PE), without location, S. Y. *Chang* 3959 (PE).

40. *Euonymus hainanensis* W. Y. CHUN & F. C. HOW, *Acta Phytotax. Sin.* 7(1): 47, pl. 16. 1958. TYPE: CHINA. Hainan: Yai Hsien, Oct.-Nov. 1933, C. *Wang* 34384 (A! MO! 2 sheets). [Fig. 32]

– *E. pallidilimba* MERR. & METCALF, in herb., nom. inval. SYNTYPES: CHINA. Hainan: Poting, F. C. *How* 73516 (A! MO!), 73557 (A!).

Evergreen shrub, 3-4-m tall; branches terete, twigs with striations, green or brown when dry. Leaves thickly coriaceous, elliptic, 9-11.5 x 3-4.5 cm, apex acute, acuminate, base cuneate or attenuate, sometimes with white powder on upper surface, margin entire, revolute, or obscurely crenulate, lateral veins 8-10 pairs, impressed above and prominent beneath, sometimes obscure, curving forward, netting and disappearing before reaching the margin; petiole sturdy, short, less than 6 mm long. Peduncle short, less than 1 cm long, usually with 1 dichotomous branch and only 1-3 flowers; pedicel short, less than 2 mm long. Flower 4-merous, medium sized, 7-8 mm in diam. Sepals subround. Petals white. Capsule reddish-brown when fresh, dark brown or gray when dry, 4-lobed, usually only 1-2 lobes developed, less than 1 cm in diam., each lobe ovoid when open at maturity; seed usually only 1, dark brown with red aril.

Phenology. Flowering: April to June; Fruiting: August to November.

Distribution: China (Hainan); alt. 700-1,000 m, in forest; rare.

SPECIMENS EXAMINED: **CHINA:** HAINAN: Dingan, C. *Wang* 36141 (A, MO), Poting [Baoting], *Diaoluoshan Exped.* 2406 (PE), 2705 (PE), 3147 (PE); Tongshi, *Sino-Germany Exped.* 1951 (MO), Wanning, Z. X. *Li et al.* 4935 (MO), without locality, N. K. *Chun & C. L. Tso* 44311 (A, B, MO, PE), Z. X. *Li et al.* 4244 (MO), C. *Wang* 34600 (A), Yah-hsien [Yaxian], S. K. *Lau* 6293 (A, IBSC).

This species is very distinct and the only one on the island of Hainan with a lobed capsule, and it is similar to *E. dielsiana*, but the capsule is ovoid and leaves eciliate, which are totally different characters from the latter, in addition to the isolated distribution.

41. *Euonymus hukuangensis* C. Y. CHENG ex J. S. MA, *Harvard Pap. Bot.* 10: 94, fig. 5. 1997. TYPE: CHINA. Kuangdong: Ruyuen, S. P. *Ko* 52914 (A! 2 sheets). [Fig. 33]

Evergreen shrub to small tree, to 6 m tall; branches terete, twigs with striations, green or brown when dry. Leaves coriaceous, elliptic, ovate-elliptic or



Fig. 32. *Euonymus hainanensis* W. Y. CHUN & F. C. HOW – 1. fruit branch; 2 – 3. fruit; 4. seed.

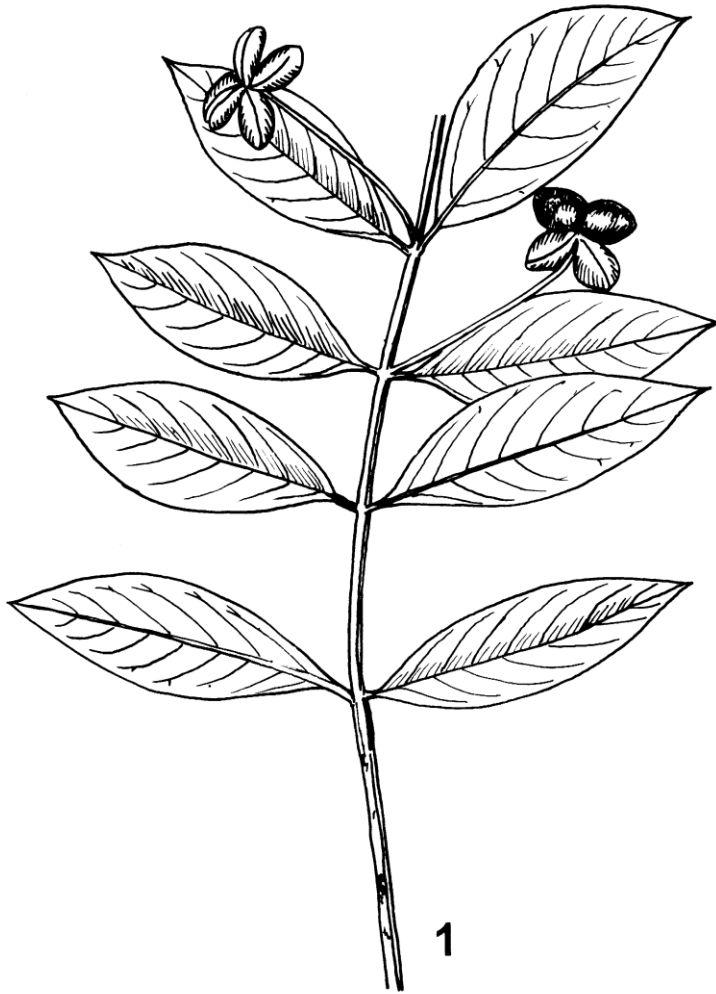


Fig. 33. *Euonymus hukuangensis* J. S. MA – 1. fruit branch.

obovate-elliptic, 6-9 x 2.5-4 cm, apex acute, acuminate, sometimes shortly apiculate, base cuneate or attenuate, margin entire, lateral veins 7-8 pairs, obscure or invisible, disappearing before reaching the margin; petiole sturdy, short, 5-9 mm long. Peduncle c. 9 mm long, usually with 1-2 dichotomous branches and several flowers; pedicel short, less than 3 mm long. Flower 4-merous, medium sized, c. 10 mm in diam. Sepals subround. Petals white, subround. Capsule reddish-brown when fresh, dark brown or gray when dry, 1-1.5 cm in diam., 4-lobed, each lobe ovoid when open at maturity; seeds 2 in each locule, brown with red aril.

Phenology. Flowering: April to June; Fruiting: August to November.

Distribution: China (Guangdong, Guangxi, Hunan); alt. 500-1,200 m, in forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Ruyuan, *L. Deng 5538* (IBSC, MO, PE), Yangshan, *X. G. Li 201209* (IBSC, PE), Yuyuang [Ruyuan], *S. P. Ko 53571* (IBSC, MO, NAS, PE), *W. Y. Chun 11030* (IBSC, MO); GUANGXI: Yaoshan, *S. S. Sin 624* (PE); HUNAN: Mangshan, *M. X. Huang 111407* (MO), *111823* (IBSC, MO), Yizhang, *S. H. Chun 2843* (IBSC, MO 2 sheets), *P. H. Liang 85338* (IBSC, MO).

This species is very similar to *E. hainanensis*, but differs from it by the entire leaves being glabrous on both surfaces, and in the obscure lateral veins. The name is the abbreviation of the distribution: "hu": from Hunan, "guang": from Guangdong and Guangxi.

42. *Euonymus lucida* D. DON, Prodr. Fl. Nepal. 191. 1825. TYPE: NEPAL. *N. Wallich Cat. s.n.* (not seen). [Fig. 34]

- = *E. japonica* WALL. in ROXB., Fl. Ind. 2: 406. 1824, non L. fil. 1781 nec. THUNB. 1780, nom. illegit. superfl.
- *E. pendula* WALL. in. ROXB., Fl. Ind. 2: 406. 1824, obs., nom. inval. SYNTYPES: NEPAL. *N. Wallich Cat. 4280* (BM! E! K!), *4280a* (BM! E! 2 sheets), *4280b* (BM!).

Evergreen shrub to small tree, 4-12 m tall; branches terete, twigs with striations or sometimes 4-angled, green or brown in dry. Leaves thickly coriaceous or coriaceous, elliptic or oblong-elliptic, 10-11.5 x c. 3 (4.5) cm, apex acute, acuminate, base cuneate or attenuate, sometimes with white powder on upper surface, margin long-ciliate, lateral veins invisible, or sometimes in c. 10 pairs, slightly curving forward, netting and disappearing before reaching the margin; petiole sturdy, less than 1 cm long. Cymes many, axillary or clustered; peduncle to 4 cm long, usually with 1-3 dichotomous branches and many flowers; pedicel short, less than 5 mm long. Flower mostly 5-merous, sometimes combined with 4-merous, medium size, 7-8 mm in diam.. Sepals subround. Petals white. Capsule reddish-brown when fresh, dark brown or gray when dry, 4- or 5-lobed, 1.5-1.6 cm in diam., lobes wide and thin, wing to 7 x 5 mm, ovoid when open at maturity; seed usually 1, dark brown with red aril.

Phenology. Flowering: April to May; Fruiting: August to November.

Distribution: Bhutan, China (Xizang), India, Myanmar, Nepal, Pakistan; alt. 1,600-3,200 m, in woodland and forest; common.

SPECIMENS EXAMINED: **CHINA:** XIZANG: Dinggye, *Qinghai-Xizang Exped. 5539* (KUN, PE), *Qinghai-Xizang Vegetation Exped. 3724* (PE), Nyalam, *1990 Sino-Japan. Exped. T404* (PE). **HIMALAYAS:** United Province, *R. R. Stewart 16047* (A, US), *D. Brandis 894* (A), without locality, *M. P. Edgeworth s.n.* (K), *J. D. Hooker & Thomson s.n.* (BM), *R. R. Stewart 12361* (A). **INDIA:** Assam, *F. K. Ward 12452* (BM), Bhampela, *H. Raj s.n.* (E), Chamba, *J. H. Lace 1403* (E 2 sheets) *1966* (E), Darjeeling, *H. Kanai et al. 163*

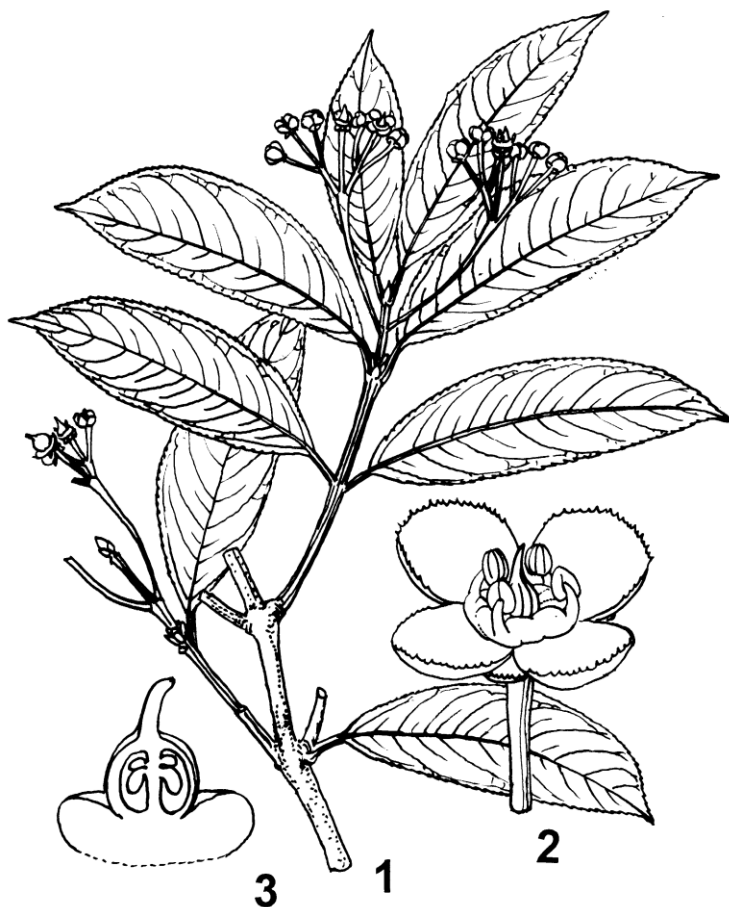


Fig. 34. *Euonymus lucida* D. DON – 1. flowering branch; 2. flower in large; 3. ovary and disc.

(BM), 6591 (BM), Dehra Dum, W. S. Fernandes 20 (A), R. M. Fleming 413 (A), U. Kanjilal 996 (K), Gurhwal, Falconer 362 (GH, K), Jaunsar, J. S. Gamble 23784 (K), K. Nand 177 (E), N. K. Tripathi 27 (E), Kumaon, R. Blinkworth s.n. (BM), T. Thomson 640 (BM), R. Strachey & J. E. Winterbottom 2 (GH, K), Mussoorie, A. Anderson s.n. (E), J. Masteu s.n. (BM); NW India, Hb. Royle s.n. (K), Punjab, R. Baksh 2017 (E), J. R. Drummond 21565 (K), J. A. Sprague 96 (K), Simla, G. Watt 8331 (E), 9502 (E). **MYANMAR:** Kyaukpya, N. Wallich Cat. a05b (BM). **NEPAL:** Betara, B. Ram 446 (A), Bheri Valley, J. D. A. Stainton 6298 (BM), Chaiupurs, J. B. Shrestha 4118 (US), Dodh Kosi, J. D. A. Stainton 6572 (BM), Godavari, H. Hara et al. s.n. (BM), Kathmandu, H. Kanai et al. 1057 (A), s.n. (BM), Lamjung Himal, J. D. A. Stainton 6277 (BM), Mayangdi Khola, G. Miede 146 (BM), Porakya Lagna, J. D. A. Stainton 4884 (BM), Mewa Khola, J. D. A. Stainton 7033 (BM). **PAKISTAN:** Azad Kashmir, R. R. Stewart & E. Nasir 25492 (BM), 25493 (BM, GH).

The flower of this species is usually 5-merous, but combined with 4-merous, as are the lobes of the capsule, which is the only case in the section; also distinctive in its alpine habitat. The species is not distributed in Yunnan (Index Plants Yunnanensis 1: 756. 1984), wherein the record actually refers to *E. theifolia*; see specimen citations under the latter).

43. *Euonymus lutchuensis* T. ITO, J. Coll. Sci. Imp. Univ. Tokyo 12: 372. 1900. SYNTYPES: JAPAN. Insula Uchina: *Matsumura s.n.* (not seen); Archipelago Yema, Toshiro, *K. Ito 1274* (not seen), *Aragatchi 1346* (not seen), *T. Tanaka 332* (not seen).

Evergreen shrub, 2-3 m tall; young branches and twigs 4-angled, green or light green when dry. Leaves papyraceous, ovate-lanceolate, 5-7 x 2-2.5 cm, apex long-caudate, base attenuate, margin remotely and obtusely serrate, lateral veins 5-6 pairs, invisible or curving forward and disappearing before reaching the margin; petiole 2-4 mm long. Peduncle slender, 3-3.5 cm long, usually with 1 dichotomous branch and 3 flowers, rarely 2 branches and more flowers; pedicel slender, 4-6 mm long. Flower 4-merous, small, c. 6 mm in diam. Sepals subround. Petals green, ovate, base attenuate. Capsule 4-lobed, usually 1-3 lobes developed, each lobe long-ovoid when open at maturity; seed with bright red aril.

Phenology. Flowering: April to June; Fruiting: August to October.

Distribution: Japan (Liukiu); alt. 0-520 m, in forest; rare.

SPECIMENS EXAMINED: **JAPAN:** Liukiu, *T. Amono 6371* (A), *F. R. Fosberg 37355* (US), *N. Fukuoka 11585* (A), *M. Furuse 319* (NA), *491* (NA), *1208* (NA), *2034* (NA), *2338* (NA), *2420* (NA), *2549* (NA), *3173* (NA), *4169* (NA), *5287* (NA), *J. L. Gressitt 597* (A, NY), *S. Hatusima 18679* (US), *22962* (US), *24541* (US), *R. Kanehira 3316* (NY), *H. Okada et al. 351* (A), *S. Sonohara 10* (A, US), *E. H. Walker et al. 6149* (US), *6645* (NY), *6887* (A, US), *E. H. Wilson 8108* (A, US 2 sheets).

The species is characterized by ovate-lanceolate leaves with remotely and obtusely serrate margin, and only 1-3 of the 4 lobes of the capsule opening at maturity. The fruit resembles that of *E. alata*, but the latter is much different in characters of the leaves and veins, as well as the corky young branches and isolated geographical distribution.

44. *Euonymus tashiroi* MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 31: 23. 1887. TYPE: JAPAN. Liukiu: 1882, *Z. Tashiro 9* (not seen, merotype A!, photo A!). [Fig. 35]

= *E. acutorhombifolia* HAYATA, Icon. Pl. Formosan. 3: 56. 1913. TYPE: CHINA. Taiwan: *Y. Furukawa s.n.* (not seen, photo A!).

= *E. matsudai* HAYATA, Icon. Pl. Formosan. 9: 15, pl. 9. 1920. TYPE: CHINA. Taiwan: *S. Matsuda s.n.* (not seen, photo A!).

= *Glyptopetalum matsudai* (HAYATA) NAKAI, J. Jap. Bot. 17: 619. 1941.

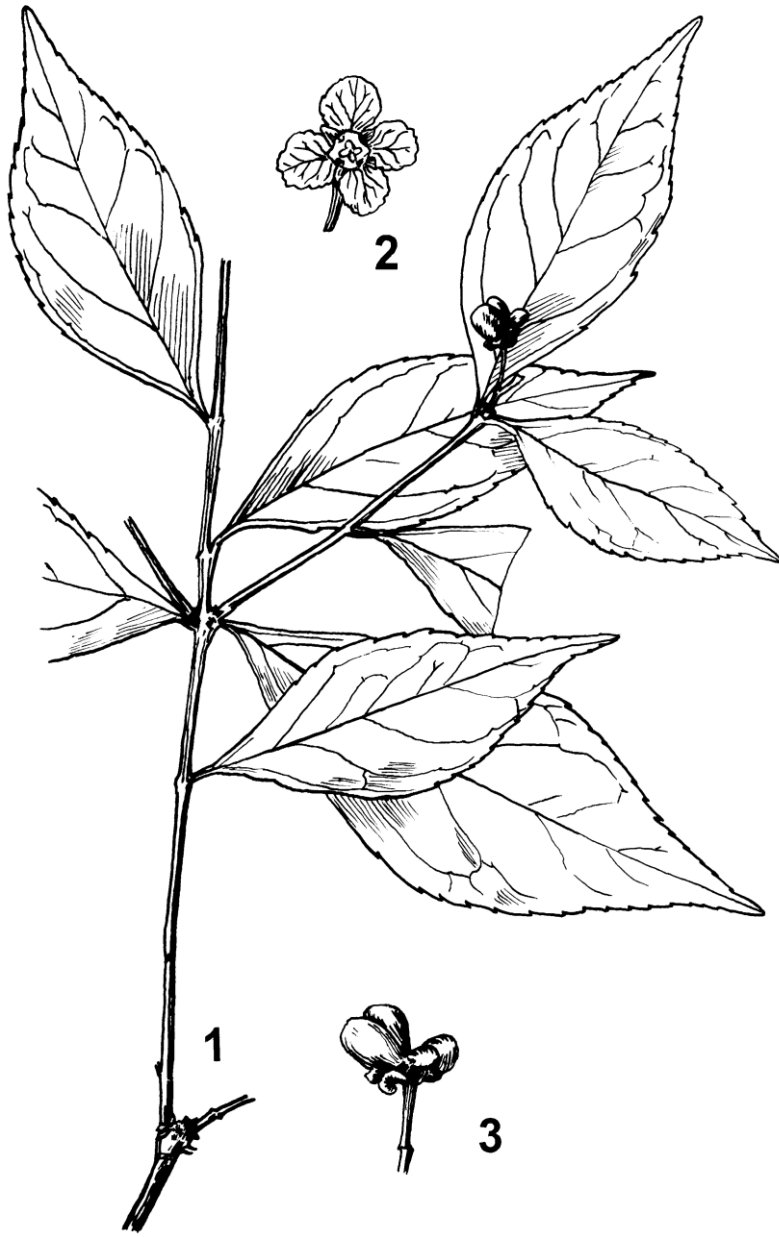


Fig. 35. *Euonymus tashiroi* MAXIM. – 1. fruit branch; 2. flower; 3. fruit.

Evergreen shrub, 1.5-2 m tall; young branches and twigs 4-angled, green when dry. Leaves thinly papyraceous, elliptic or ovate-elliptic, sometimes oblong-elliptic, 4-5 (7) x 2.2-3.5 (5) cm, apex acute, acuminate or shortly caudate, base cuneate or attenuate, margin remotely and obtusely serrate, lateral veins c. 5 pairs, sometimes invisible, curving forward and disappearing before reaching the margin; petiole absent or very short, 2-4 mm long. Flower 1, usually axillary, rarely 2 or more; pedicel slender, c. 5 mm long. Flower 4-merous, medium size, c. 1 cm in diam. Sepals subround. Petals green, light yellow or greenish-yellow, ovate, base attenuate. Capsule dark brown when fresh, brown or gray when dry, 4-lobed, 1-1.3 cm in diam., sometimes only 1-3 lobes developed, each lobe ovoid when open at maturity; seed with bright red aril.

Phenology. Flowering: April to December; Fruiting: May to December.

Distribution: China (Taiwan), Japan (Liukiu); alt. 100-1,400 m, in bushes, woodland, and forest; occasional.

SPECIMENS EXAMINED: **CHINA:** TAIWAN: Bankinsing, A. Henry 893 (A), Hualien, C. H. Chen et al. 352 (A), H. Y. Shen 633 (A), Hsingchu, C. C. Liao 813 (MO), Nantow, M. T. Kao 4025 (NA, 2 sheets), Pingtung, C. C. Liao 191 (A, MO), T. C. Huang 10221 (A 2 sheets), Rimpan, T. Suzuki 19695 (US), Taitung, H. Keng & K. T. Kao 2607 (A), without location, S. Gunso 19444 (PE). **JAPAN:** Liukiu, J. C. Elliott 1181 (US), M. Furuse 2410 (NA 2 sheets), 5063 (NA), 5198 (NA), S. Hatusima 18249 (US), 18997 (US), T. Kanashira 821 (A), 1624 (US), 3233 (NY), 3272 (NY), S. Kawagoe s.n. (US), S. Kurata & T. Nakaike 1407 (A, US), E. H. Walker et al. 6166 (A, US), 8240 (US), E. H. Wilson 8075 (A).

The species maybe related to *E. disticha* since both share some characters such as braches and twigs without cork, and similar size and shape of flower and fruit. However, this species is distinct due to its geographical range and evergreen leaves.

45. *Euonymus verrucosoides* LOES., Bot. Jahrb. Syst. 30: 462. 1902. SYNTYPES: CHINA. Shensi: septentr. in montibus Si-ku-tzui-san et Tui-kio-san, G. Girdaldi 211 (not seen), 229 (not seen), et in monte Ki-san, G. Girdaldi 1481 (not seen). [Fig. 36]

- = *E. verrucosoides* LOES. var. *viridiflora* LOES. & REHDER in Sarg., Pl. Wilson. 1: 493. 1913. TYPE: CHINA. Western Szechuan: Panlanshan, west of Kuan Hsien, alt. 2300-2800 m, June 1908, E. H. Wilson 3113 (A! MO! US!).
- *E. alata* (THUNB.) SIEBOLD var. *aperta* LOES. in SARG., Pl. Wilson. 1: 494. 1913, nom. inval. SYNTYPES: CHINA. Szechuan: Tachienlu, alt. 2300-2600 m, Oct. 1910, E. H. Wilson 4178 (A!), l.c., alt. 1600-2500 m, Sept. 1908, E. H. Wilson 3102 (A! US!), Sungpan, alt. 2600 m, Oct. 1910, E. H. Wilson 4152 (A!).

Deciduous shrub, 1-3 m tall; young branches and twigs 4-angled, with evident nodes, green or brown when dry. Leaves papyraceous, ovate-elliptic to obovate-elliptic, sometimes oblong-elliptic, 3.5-4 (9) x 1.5-2 (3.5) cm, apex acute, acuminate or long-acuminate, base cuneate or attenuate, sometimes narrowly attenuate, margin finely and sharply serrulate, lateral veins 7-10 pairs, curving forward and disappearing before reaching the margin; petiole absent or very short, 2-4 mm long. Peduncle slender and short, 1.5-3 (8) cm long, usually with 1 dichotomous branch and 3 flowers, rarely 2 branches and more flowers; pedicel slender, 5-7 mm long. Flower 4-merous, medium size, 7-8 mm in diam. Sepals triangular. Petals greenish-pink to pinkish-red, oblong, apex subround, base attenuate. Ovary with long, persistent style. Capsule reddish-brown when fresh, brown, gray or dark when dry, 4-lobed, 1.3-1.5 (2.0) cm in diam., sometimes only 1-3 lobes developed, each lobe ellipsoid when open at maturity; seed with bright red aril.

Phenology. Flowering: May to July; Fruiting: August to October.

Distribution: China (Gansu, Henan, Hubei, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan); alt. 1,400-3,700 m, in bushes, woodland, and forest; common.

SPECIMENS EXAMINED: **CHINA:** GANSU: Guyuan, *T. P. Wang* 17203 (PE), Huicheng, *T. Y. Chang* 649 (KUN), Huining, *Yellow River Exped.* 5900 (PE), Liangtang, *F. G. Meyer* 1948 (NA), Longde, *T. P. Wang* 13356 (PE), Lungsi [Longxi], *J. Hers* 2421 (A), Lower Tebbu, *J. F. Rock* 14978 (A), Pingliang, *T. P. Wang* 13244 (PE), 17495 (PE), *Z. L. Wu* 20350 (PE), Tianshui, *W. Y. Hsia* 5755 (PE), 5609 (PE), *K. M. Liu* 10154 (PE), 11047 (PE), 10361 (PE), *Z. L. Wu* 20192 (PE), Wushan, *Yellow River Exped.* 4293 (PE), 4543 (PE), Xigu, *W. Y. Hsia* 5069 (PE), 6522 (PE), 6742 (PE 2 sheets), *T. P. Wang* 2022 (PE), 14565 (PE), Xinglongshan, *Y. Q. He* 5710 (PE); HENAN: Lingbao, *J. Q. Fu* 137 (KUN), Lushi, *J. Q. Fu* 1659 (KUN 2 sheets), 1957 (KUN), *J. Hers* 878 (A), 893 (A), 899 (A), 924 (A), 939 (A), 1146 (A); HUBEI: Fangxian, *K. R. Liu* 211 (PE), 242 (PE), Hsingshan [Xingshan], *E. H. Wilson* 3124 (A, GH, MO, US), Shengnongjia, 1980 *Sino-Amer. Exped.* 398 (A, KUN, NY), 1527 (A, KUN, MO, NA, NY), West Hubei, *W. C. Cheng* 3905 (A), Xingshan, *T. P. Wang* 11906 (KUN); SHAANXI: Baoji, *K. M. Liu* 10999 (PE), Fuping, *K. T. Fu* 4594 (PE), 5061 (PE), *B. Z. Guo* 1618 (PE), *P. C. Tsoong* 3158 (PE), 3268 (PE), Gaoxian, *T. P. Wang* 16176 (KUN), Huashan, *K. S. Hao* 3878 (PE), *T. N. Liou* 10885 (PE), *T. P. Wang* 11714 (PE), Huoxian, *B. Z. Guo* 345 (PE), Lantian, *G. X. Su* 307 (KUN), Liuba, *C. L. Tang* 764 (KUN), Mien Hsien [Mianxian], *K. T. Fu* 2086 (PE), Ningshan, *H. W. Kung* 3017 (PE), Shangnan, *B. Z. Guo* 4016 (KUN), Shanganning, *Y. W. Tsui* 10243 (PE), 10249 (PE 2 sheets), Shanyang, *T. P. Wang* 889 (PE), Taibaishan, *P. C. Tsoong* 2417 (PE), *C. L. Wang* 782 (PE), Weinan, *T. P. Wang* 15739 (MO, PE), 15865 (PE), Without location, *X. M. Zhang* 87 (NAS), Xunyi, *C. L. Xiao* 784 (KUN), Yijun, *C. L. Xiao* 236 (KUN 2 sheets); SHANXI: Ruicheng, *S. Y. Bao* 814 (PE 2 sheets), *C. G. Li* 52 (MO), Xiyang, *Y. Liou* 13511 (MO); SICHUAN: Barkam, *X. Li* 72308 (KUN, PE), 72334 (KUN, PE), 72511 (KUN), 72710 (PE), *Z. L. Wu* 33322 (PE), *T. Y. Chang & H. F. Chow* 22694 (KUN, PE), 22905 (KUN, PE), 22946 (KUN, PE), 23411 (KUN, PE), Chenchiangkou, *H. Smith* 2228 (A, MO), Chengkou, *T. L. Dai* 102569 (PE), 103363 (PE), 104806 (PE), 104832 (PE), 104924 (PE), 105589 (PE), Dajin, *X. Li* 75359 (PE), 75984 (KUN, PE), 77415 (PE), 77491 (PE), 77587 (PE), 78657 (PE), Daowu, *Nanshuibeidiao Exped.* 2360 (KUN), Emeishan, *Y. Y. Ho* 6425 (NAS), Fengjie, *T. Y. Chang* 25335

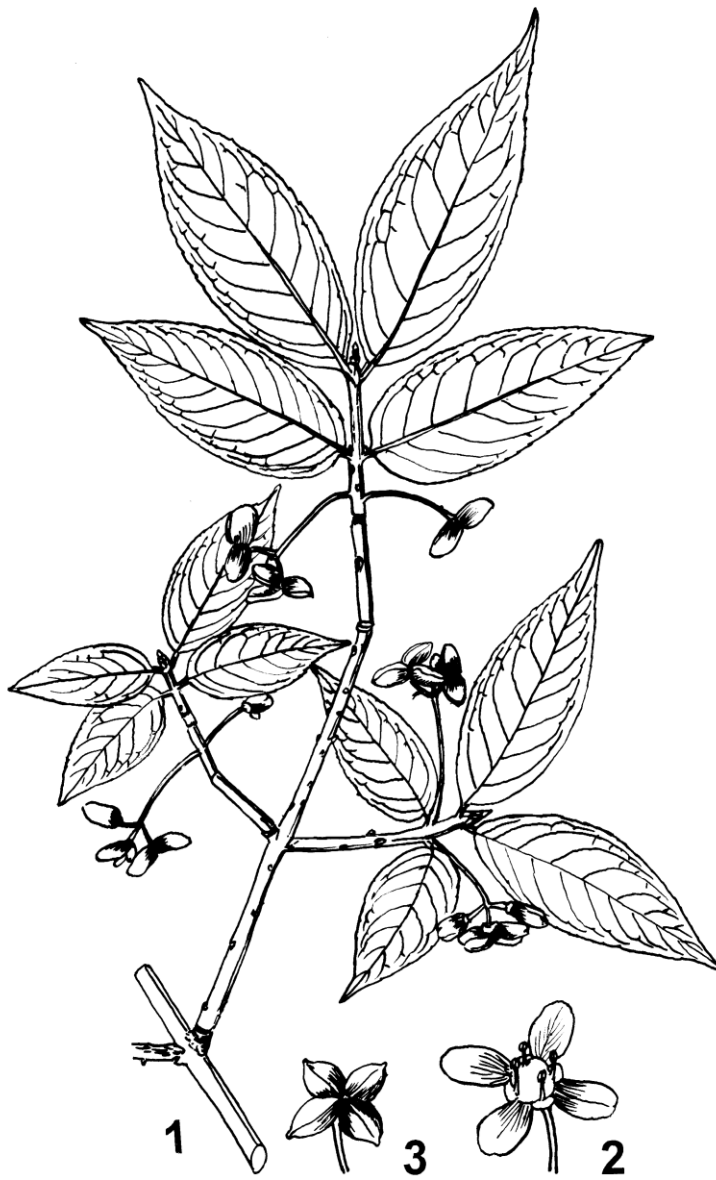


Fig. 36. *Euonymus verrucosoides* LOES. – 1. fruit branch; 2. flower; 3. fruit.

(KUN), Hanyuan, *T. P. Wang* 9630 (PE), Heishui, *Heishui Exped.* 1166 (KUN, PE), *X. Li* 73547 (KUN, PE), 73609 (PE), 73794 (KUN, PE), 73855 (KUN, PE), Jinfoshan, *K. F. Li* 62598 (A), Kangding, *W. P. Fang* 3518 (A, PE), *W. K. Hu* 37092 (PE), *W. K. Hu* 11272 (PE), 11371 (PE), *Z. P. Huang et al.* 1306 (PE), *X. G. Jiang* 37027 (PE), *C. S. Liu* 729 (PE), Kiangyu [Jiangyou], *F. T. Wang* 22266 (A, KUN), Lifan [Lixian], *S. Y. Hu* 2005 (A), *F. T. Wang* 21617 (A, KUN, NAS, PE 2 sheets), Lixian, *T. He & Z. L. Zhou* 12463 (PE), 12698 (PE), 12961 (PE), 13321 (PE), Maowen, *Maowen Exped.* 5234 (A), Maoxian, *F. T. Wang* 22008 (KUN, NAS, PE 2 sheets), Nanchuan, *J. H. Xiong & Z. L. Zhou* 92144 (PE), 93467 (PE), Nanping, *C. Y. Wu et al.* 188 (KUN), 903 (KUN 2 sheets), 86-1024 (KUN), Shimian, *C. J. Xie* 40142 (PE, SZ), 40244 (SZ), Songfan, *C. Y. Wu et al.* 533 (KUN), Sungpan [Songfan], *W. P. Fang* 4356 (A, PE), *T. P. Wang* 4356 (A), *T. T. Yu* 2606 (PE), Tahsiangling [Daxiangling], *C. Y. Chiao* 1602 (A), Tatsienlou [Kangding], *J. A. Soulie* 215 (P), West Sichuan, *E. H. Wilson* 3127 (A, GH, MO), 3129 (A, GH, MO), without location, *W. P. Fang* 9032 (NAS), *A. Henry* 7168 (A), Wuqi, *Wanxian Traditional Chinese Medicine Exped.* 73W-278 (PE), *K. H. Yang* 65459 (PE), Xiaojin, *X. S. Zhang & Y. X. Ren* 7008 (PE), Xikang, *C. Y. Yang* 3564 (PE 2 sheets), Yajiang, *K. Huang et al.* 547 (PE), Youyang, *S. X. Tan* 312 (PE); XIZANG: Tsarung, *G. Forrest* 18880 (A), *J. F. Rock* 23195 (A, US), Zogang, *Qinghai-Xizang Exped.* 11007 (KUN, PE 2 sheets); YUNNAN: Degen, *Nanshuibeidiao Exped.* 9377 (KUN), *Qinghai-Xizang Exped.* 2999 (KUN, PE 2 sheets), Mekong-Salween divide, *G. Forrest* 16646 (A), Salween-Irrawadi watershed, *J. F. Rock* 10298 (A, US), 11649 (A, US).

This species is very similar to *E. alata* in many respects, but they are quite different by having the stem without corky wings and the style long and persistent in the latter, in addition to its occurrence in dry environments within its distribution in NW China and surrounding area. However, the species has much diversity: very large leaves and plant as well as the much larger fruit are found in the lower elevations below alt. 1,900 m, especially in the east corner, Henan province, of the distribution; and smaller leaves and plant as well as smaller fruit occur in the upper elevations above alt. 2,000 m, especially in the southwest high mountains; more importantly there are no clear differences between the two sides. The previously described var. *viridiflora* is only an extreme example, and there is no reason to maintain it here. The species was reported from Guizhou (*Flora of Sichuan* 4: 256. 1988 and *Vascular Plants of the Mt. Hengduan* 1: 1100. 1993), but those records cannot be verified in the present work. CHEN & WANG (1954) reported this species from Jiangxi, but the specimens cited in that publication are *E. alata*; for more information, see treatment under the latter.

Sect. 4. *Ilicifolia* NAKAI, *J. Jap. Bot.* 17: 618. 1941.

Shrubs, shrublike, scandent, ascending, prostrate, or climbing on the other vegetation, occasionally small tree to several meters tall, mostly evergreen, few deciduous. Flower usually 4-merous, occasionally 5-merous. Fruit globose or ball-like, without spines or wings, 4-lobed when open at maturity, occasionally 5-lobed.

20 species total, 1 in SE Asia, 2 in Himalayas, 3 in C America, 8 in S Asia, 17 in E Asia, 1 cultivated in Australia, Europe and Americas and escaped in N. America. Type: *Euonymus japonica* THUNB.

Key to Species

- 1. Deciduous
 - 2. Shrub; leaves lanceolate or ovate-lanceolate, veins never curved, capsule 8- 10 mm in diameter. E Asia 65. *E. yakushimensis*
 - 2. Shrub to small tree, leaves belt-shaped or elliptic, veins and veinlets curved or bent; capsule 6-8 mm in diameter. E Asia..... 64. *E. venosa*
- 1. Evergreen
 - 3. Capsule white-spotted at maturity
 - 4. Leaves sessile or with very short petiole less than 3 mm long, base round or cordate, impressed above and prominent beneath; capsule without light colored grooves at maturity. E & S Asia 47. *E. bockii*
 - 4. Leaves with short petiole 4-9 mm long, base cuneate, neither impressed above nor prominent beneath, capsule with light colored grooves at maturity. E & S Asia.....58. *E. pseudovagans*
 - 3. Capsule without white spots at maturity
 - 5. Leaves small, 3-5 cm long
 - 6. Leaves triangular- or elliptic-lanceolate, sparsely and sharply denticulate; capsule c. 6 mm in diameter. E Asia 54. *E. jinyangensis*
 - 6. Leaves mainly ovate, sometimes combined with elliptic or obovate
 - 7. Subshrub, ascending or procumbent on ground or other vegetation; leaves acute or obtuse at apex, petiole 2-9 mm, sometimes absent. E & S Asia, N America (cult.), Europe (cult.) 51. *E. hederacea*
 - 7. Shrub to ascending shrublike; leaves round at apex, or combined with shortly acute
 - 8. Peduncle 7-8 cm long, usually with more than 20 flowers; capsule 8-10 mm in diameter. E & S Asia ... 61. *E. tonkinensis*
 - 8. Peduncle 1-5 cm long, usually with less than 7 flowers
 - 9. Leaves 4-6 cm long, veins usually impressed above; peduncle 1-2 cm long. E. & S Asia, Himalayas..... 63. *E. vagans*
 - 9. Leaves 3-4 cm long,veins not impressed above; peduncle 4-5 cm long. E Asia.....48. *E. boninensis*
 - 5. Leaves large, 5-20 cm long
 - 10.Capsule coriaceous, partly 4-lobed when open at maturity, less than 7 mm in diameter. C America50. *E. enantiophylla*
 - 10.Capsule coriaceous, completely 4- or 5-lobed when open at maturity
 - 11.Flower and fruit 5-merous; leaves lanceolate. E Asia 56. *E. lanceolata*
 - 11.Flower and fruit 4-merous only
 - 12.Peduncle more than 7 cm long, usually with many flowers

- 13. Leaves chartaceous or papyraceous, 8-12 x 3-5 cm, veins c. 4 pairs, E Asia 55. *E. kengmaensis*
- 13. Leaves coriaceous or thinly coriaceous, veins 7 pairs
 - 14. Leaves ovate to elliptic, densely arranged on branches or twigs, petiole 3-10 mm long. E, S & SE Asia, Australia (cult.), Africa (cult.), N. & S America (cult.), Europe (cult.) 52. *E. japonica*
 - 14. Leaves obovate to ovate-elliptic, sparsely arranged on branches or twigs, petiole 2-4 cm long. E Asia 53. *E. hupehensis*
- 12. Peduncle less than 4 cm long, usually with few or several flowers
 - 15. Capsule 10-12 mm in diameter; flower 9-10 mm in diameter. C America 46. *E. benthamii*
 - 15. Capsule less than 10 mm in diameter; flower less than 8 mm in diameter
 - 16. Capsule purple when fresh, dark red when dry, usually clustered at top of branches; leaves thickly coriaceous. E Asia 62. *E. vaganoides*
 - 16. Capsule pink to red when fresh, brown to red-brown when dry, axillary only
 - 17. Flower c. 5 mm in diameter; capsule c. 8 mm in diameter
 - 18. Leaves entire, revolute. E. Asia. 57. *E. pallidifolia*
 - 18. Leaves crenulate to serrate. E & S Asia, Himalayas 60. *E. theifolia*
 - 17. Flower c. 6 mm in diameter; capsule 5-9 mm in diameter
 - 19. Leaves rugose, veins impressed above and prominent beneath. E & S Asia 59. *E. theacola*
 - 19. Leaves smooth, veins neither impressed nor prominent. C America 49. *E. costaricensis*

46. *Euonymus benthamii* LUNDELL, *Wrightia* 4(5): 157. 1971. TYPE: MEXICO. Vaxaca Llano Verde: *T. Hartweg 452* (not seen, photo GH!).

= *E. acuminata* BENTH., *Pl. Hartw.* 59. 1840, non RAF. 1838, nom. illegit. superfl. TYPE: MEXICO. Vaxaca Llano Verde: *T. Hartweg 452* (not seen, photo GH! LL!).

Evergreen shrub, to 3 m tall; branches and twigs round with 4 edges when old, usually brown-green. Leaves ovate-elliptic, 8-10 x 3-4 cm, apex acute or acuminate, base round or subtruncate, lateral veins invisible, veinlets straight into margin; petiole very short, less than 4 mm long. Peduncle 3-4 cm long, slender, usually with few flowers (less than 5); pedicel 5-8 mm long. Flower 4-

merous. Sepals round. Petals obovate, 9-10 mm in diam., greenish-white. Capsule brown or green-brown, 1.0-1.2 cm in diam., open at maturity; seeds with red aril.

Phenology. Flowering: March; Fruiting: October.

Distribution: Guatemala, Mexico; alt. 1,750-2,700 m, mainly in forests or bushes; occasional.

SPECIMENS EXAMINED: **GUATEMALA**, A. F. Skutch 327 (A, US), 631 (A), 637 (GH, LL, US 2 sheets). **MEXICO**: Escaso, F. Ventura 8060 (GH), Veracruz, R. Hernandez 1570 (GH), F. Ventura 5130 (US).

The type is only a specimen of a flower, which the species was redescribed by LUNDELL (1971). From this enlarged description as well as the photo of the type at GH, some specimens have been identified in this work. However, our observations from the materials available are still little different from the description recorded as "ovary tuberculate" by LUNDELL, but smooth when in flower. The premature capsules are nearly glabrous and smooth in this species and up to c. 1.1 cm in diam with partly opened.

47. *Euonymus bockii* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 439, t. 4, fig. H-K. 1900. SYNTYPES: CHINA. Sichuan: Nanchuan, C. Bock & A. Rosthorn 187 (A!), 192 (A!), 915, 1240 (not seen). [Fig. 37]

- = *E. subsessilis* SPRAGUE var. *latifolia* LOES. in SARG., Pl. Wilson. 1: 489. 1913. TYPE: CHINA. Western Szechuan: Washan, alt. 1600-2300 m, Oct. 1908, E. H. Wilson 1216 (A! K!).
- = *E. orgyalis* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 13: 161. 1921. SYNTYPES: CHINA. Yunnan: Feng Chen Len south of Red River, alt. 7,000 ft, A. Henry 10661 (A! E!, K! MO! US!); Mengtze, SE Forests, alt. 5,000 ft, A. Henry 11403 (A! K! US!).
- = *E. vagans* WALL. subsp. *macrophylla* KANJILAL, Fl. Assam. 1(2): 264. 1936.
- = *E. petelotii* MERR., J. Arnold Arbor. 19: 41. 1938. TYPE: VIETNAM. Tonkin: A. Petelot 5942 (A! US!).
- *E. amplexicaulis* C. Y. WU, in herb., nom. inval.
- *E. bockii* LOES. ex DIELS var. *rotundata* C. Y. CHENG, ms., nom. inval. TYPE: CHINA. Guangxi: Napo.

Evergreen shrub or ascending shrublike, up to 6-8 m; branches and twigs round, with lenticels when old, usually brown or dark brown. Leaves elliptic or ovate-elliptic, 8-16 x 4-8 cm, apex acute, base round to cordate, lateral veins 6-9 pairs, prominent beneath; petiole absent or less than 3 mm long. Peduncle 3-4 cm long, slender, usually with several flowers, sometimes more than 5; pedicel usually less than 9 mm long. Flower 4-merous. Sepals semiround. Petals nearly round, c. 6 mm in diam. when open, greenish. Capsule brown or green-brown, densely white-spotted, sometimes with white scales, less than 8 mm in diam.; seeds with red aril.

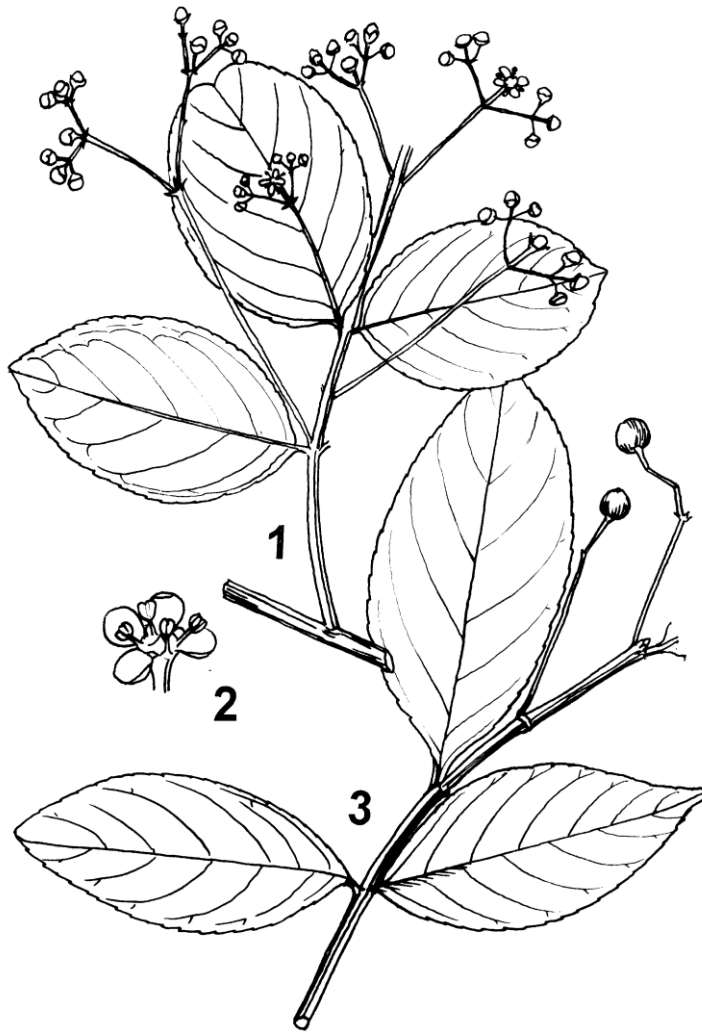


Fig. 37. *Euonymus bockii* DIELS – 1. flower branch; 2. flower; 3. fruit branch.

Phenology. Flowering: April to June; Fruiting: August to December.

Distribution: China (Guangxi, Guzhou, Sichuan, Yunnan), India, Vietnam; alt. 1,030-2,300 m, mainly in mixed forests, or bushes; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Daxin, Z. D. He 2-480 (PE), Longjin, S. H. Chun 13488 (IBSC, MO), 13914 (MO), Napo, D. Fang et al. 22372 (PE), 22374 (PE); GUIZHOU: Bijie, P. H. Yu 707 (PE), 852 (PE); SICHUAN: Dahsiangling [Daxiangling], H. Smith 10078 (MO), Leipo [Leibo], Z. T. Guan 8355 (PE), Nanchuan, Z. Y. Liu 5224 (PE),

S. X. Tan 98 (PE), J. H. Xiong & Z. L. Zhou 91399 (IBSC, PE, SZ), Omeishan [Emeishan], C. L. Sun 484 (A), Xuyong, M. F. Zhong & Z. C. Zhao 606 (PE); YUNNAN: between Kambaiti and Tengyueh, via Kuyung, J. F. Rock 7547 (A), Jinping, Y. C. Xu 262 (KUN), Sino-USSR Exped. 756 (KUN, PE), 971 (KUN, PE), 3181 (KUN, PE), Marlipo [Malipo], K. M. Feng 13067 (A, KUN, PE), Q. A. Wu 9905 (KUN), Nanchiao [Jinghong], C. W. Wang 75299 (A, KUN, PE), Pingpien [Pingbian], Sino-USSR Exped. 3032 (KUN), 3627 (KUN), H. T. Tsai 55328 (A, KUN, PE, SZ), 55345 (A, KUN, NAS), 60197 (A, KUN, PE), 60967 (A, KUN, PE), 61020 (A, KUN, NAS), 61395 (A, KUN, PE), 61744 (A, KUN, NAS, PE), 61788 (A, KUN, PE), 62466 (A, NAS, SZ), Sichou [Xichou], K. M. Feng 12044 (A, IBSC, KUN, PE), 12502 (A, KUN), C. W. Wang 85681 (IBSC, KUN, PE), Q. A. Wu 7884 (IBSC, KUN), Wenshan, K. M. Feng 11058 (A, KUN 2 sheets), 22252 (KUN, PE), Q. A. Wu 7718 (KUN), Without location, P. J. M. Delavay 5128 (P), G. Forrest 8012 (A).
VIETNAM: Tokin, A. Petelot 3798 (A 2 sheets), 6370 (A, US).

This is an easily recognized species in the section due to the large sessile leaves which vary in size and are round to cordate at the base, the lateral veins impressed above and prominent beneath, and the medium size fruit which is densely white-spotted at maturity. And for the variation in the leaves, the species has been divided into several varieties on that basis, even several "small species". However, in this revision the variations represent no more than one species.

48. *Euonymus boninensis* KOIDZ., Bot. Mag. (Tokyo) 32: 250. 1918. SYNTYPES: JAPAN. Bonin: *Nishimura 21* (not seen), 332 (not seen).

Evergreen shrub, 1-2 m tall, braches and twigs black or greenish-black, with 4 edges. Leaves ovate, thinly coriaceous, 3-4 x 2-3 cm, lateral veins nearly invisible, usually 6 pairs, apex round, base nearly round or cuneate, margin crenulate; petiole 5-9 mm long. Peduncle to 4-5 cm long, usually with 7 flowers; pedicel short, less than 5 mm long. Flower 4-merous. Sepals semiround. Petals ovate. Capsule c. 6 mm in diam., dark brown, with 4 lines; seed ovoid, 5 x 3 mm, brown.

Phenology. Flowering: April to May; Fruiting: October to December.

Distribution: Japan (Bonin Island); alt. 0-400 m, in bushes; rare.

SPECIMENS EXAMINED: **JAPAN:** Bonin [Ogasawara], N. Fujita & Y. Shimizu 146 (A 2 sheets), M. Furuse 5733 (NA), 5765 (NA), 5865 (NA), 7628 (NA), 7645 (NA), 7666 (NA), 7724 (NA), 7783 (NA), G. Murata et al. 630 (A), M. Ono & S. Kobayashi 123494 (NA), Y. Shimizu 77-167 (A), E. H. Wilson 8303 (A, US).

The species is very similar to *E. japonica* in many characters, but its leaves are much smaller than the latter, thinly coriaceous, and weaker than the latter, and the species is isolated on the Island Bonin from the others.

49. *Euonymus costaricensis* STANDLEY, Publ. Field Mus. Nat. Hist. Bot. ser. 18: 631. 1937. TYPE: COSTA RICA. Alanjuela: alt. 1,500-1,700 m, P. C. Standley & A. M. Torres 47503 (US! photo A!).

Evergreen shrub to small tree, to 3-4 m tall; branches and twigs slender, round, usually green or greenish-brown. Leaves elliptic or ovate-elliptic, 5.5-8 x 2.5-3.5 cm, apex acute or acuminate, base cuneate or attenuate, lateral veins 4-6 pairs, curved forward, disappearing before reaching margin; petiole short, c. 3 mm long. Peduncle less than 1 cm long, slender, usually with few flowers; pedicel slender, usually less than 5 mm long. Flower 4-merous. Sepals semiround. Petals nearly round, c. 6 mm in diam., greenish. Capsule brown or red-brown, sometimes partly open at maturity, 8-9 mm in diam.; seeds with orange aril.

Phenology. Flowering: November to March; Fruiting: February to May.

Distribution: Costa Rica, Nicaragua; alt. 1,100-1,860 m, mainly in mixed forests or bushes; rare.

SPECIMENS EXAMINED: **COSTA RICA**, *W. A. Haber & E. Bello 6480* (GH), *A. Smith 254* (US), *647* (A, GH), *1902* (GH), *1926* (GH), *A. F. Skutch 3588* (A, NY, US), *P. C. Standley 35546* (US), *42921* (US), *42941* (US), *47524* (US). **NICARAGUA**: *M. R. Antonio 20341* (GH), *20552* (US), *L. O. Williams & M. R. Antonio 24758* (US), *42597* (NY, US), *L. O. Williams, M. R. Antonio & T. P. Williams 23451* (NY).

This is another species in the section from tropical Central America, and it is very similar to *E. benthamii* in the fruit and leaves, but the flower is much smaller, c. 6 mm in diam. and thus about half the size of the latter, and also there is a disconnection in the distribution.

50. *Euonymus enantiophylla* (DONN. SM.) LUNDELL, *Lloydia* 2: 100. 1939 (Type: see below).

Bas.: *Maytenus enantiophyllus* DONN. SM., *Bot. Gaz. (Crawfordsville)* 55: 432. 1913. TYPE: GUATEMALA. *Heyde & Lux 3087* (US!, photo A!).

Evergreen shrub, up to 3 m tall; branches and twigs 4-angled, usually green or greenish-brown. Leaves elliptic or ovate-elliptic, 6-8 x 2.4-3 cm, apex acute or acuminate, base subround, lateral veins 6-9 pairs, not evident; petiole short, less than 3 mm long. Peduncle 2-4 cm long, slender, usually with several flowers; pedicel usually less than 6 mm long. Flower 4-merous, c. 1 cm in diam. Capsule brown, less than 7 mm in diam., 4-lobed when partly open at maturity; seeds ovoid, with red aril.

Phenology. Flowering: Unknown; Fruiting: January to February.

Distribution: Guatemala; alt. 2,100-2,700 m, mainly in bushes or forest; rare.

SPECIMENS EXAMINED: **GUATEMALA**: Baja Verapaz, *F. W. Hunnewell 17165* (GH), *A. J. Sharp 45239* (GH 2 sheets). Chimaltenango, *P. C. Standley 80178* (LL). El Progreso, *J. A. Steyermark 43495* (LL), *43589* (LL). Sibaja, *P. C. Standley 62276* (LL). Solola, *J. A. Steyermark 47225* (LL). Volcan Santa Clara, *J. A. Steyermark 46729* (LL), *46758* (LL).

The capsule of this species has a thick coriaceous skin, and remains rugose when open, which has never been found in other species of the genus, but only from Central American plants with globose fruit. Another feature is the rotund, smooth capsule 6-7 mm in diameter, partially opening into 4 sections when mature. Due to this manner of opening, the species was described under *Maytenus* (*Celastraceae*), but was transferred into *Euonymus* on the basis of its opposite leaves and the cymes. The species was also said by LUNDELL to be close to *E. benthamii* due to its smooth fruit, though, as mentioned above, it is very different since the surface is rugose.

51. *Euonymus hederacea* CHAMP. ex BENTH. in HOOKER's J. Bot. Kew Gard. Misc. 3: 333. 1851. TYPE: CHINA. Hongkong: *J. G. Champion s.n.* (not seen). [Fig. 38]

- = *E. japonica* L. fil., Suppl. Pl. 154. 1781, non Thunb. 1780., nom. illegit. superfl.
- = *Elaeodendron fortunei* TURCZ., Bull. Soc. Imp. Nat. Moscou 36(1): 603. 1863. TYPE: CHINA. China Borealis: 1845, *R. Fortune 46a* (MO!).
 - ≡ *Euonymus fortunei* (TURCZ.) HAND.-MAZZ., Symb. Sin. 7: 660. 1933.
- = *E. gracilis* SIEBOLD, Cat. Rais. 33. 1863.
- = *E. radicans* MIQ., Ann. Mus. Bot. Lugduno-Batavum. 1: 86. 1865.
- = *E. japonica* L. var. *radicans* MIQ., Ann. Mus. Bot. Lugduno-Batavum. 2: 86. 1865.
 - ≡ *E. radicans* (MIQ.) SIEBOLD, Ann. Mus. Bot. Lugduno-Batavum. 3: 202. 1867.
- = *E. kiautschovica* LOES., Bot. Jahrb. Syst. 30: 453. 1902. TYPE: CHINA. Shantung: apud Tsingtau in clivis et ad vias inter muros et lapides atque etiam in vico Huitshieu, *C. W. Nageli s.n.* (not seen, merotype A!, photo A!).
- = *E. patens* REHDER in SARG., Trees & Shrubs 1: 127, t. 64. 1903.
 - ≡ *E. kiautschovica* LOES. var. *patens* (REHDER) LOES. in SARG., Pl. Wilson. 1: 486. 1913.
 - ≡ *E. fortunei* (TURCZ.) HAND.-MAZZ. var. *patens* (REHDER) HAND.-MAZZ., Symb. Sin. 7: 660. 1933.
- = *E. japonica* THUNB. var. *chinensis* PAMP., Nuovo. Giorn. Bot. Ital. 17: 419. 1910. SYNTYPES: CHINA. Hupeh: Jen-kia-kou, *A. Silvestri 1349* (not seen); Fan-sien, *A. Silvestri 1350* (not seen).
- = *E. japonica* THUNB. var. *acuta* REHDER in SARG., Pl. Wilson. 1: 485. 1913. SYNTYPES: CHINA. Western Hupeh: north and south of Ichang, *E. H. Wilson 562* (A! GH! MO!), Fang Hsien, *E. H. Wilson 562a* (A!, MO!), South Wushan, *E. H. Wilson 478* (A!), Changyang, *E. H. Wilson 505* (A! MO!), without precise locality, *E. H. Wilson (Veitch Exped.) 1227* (A! P!).
- = *E. yoshinagae* MAKINO, J. Jap. Bot. 3: 3. 1913.
- = *E. radicans* (MIQ.) SIEBOLD var. *alticola* HAND.-MAZZ., Symb. Sin. 7: 660. 1933. TYPE: CHINA. Yunnan: Sidian am Wege von Yunnanfu nach Schilungba, alt. 1800-1950 m, Feb. 1914, *H. Handel-Mazzettii 178* (not seen).



Fig. 38. *Euonymus hederacea* BENTH. – 1. plant; 2. flower; 3. fruit branch.

= *E. fortunei* (TURCZ.) HAND.-MAZZ. var. *acuminata* F. H. CHEN & M. C. WANG, Acta Phytotax. Sin. 3(2): 238. 1954. TYPE: CHINA. Jiangsi: Yifeng, Huanggangshan, Oct. 15, 1947, Y. K. Hsiung 6330 (LBG!).

= *E. austro-liukuensis* HATUS., Sci. Bull. Agric. Div. Univ. Ryukyus. Okinawa no 3, 20. 1956. TYPE: JAPAN. Ryukyu: alt. 500 m, July 15, 1955, S. Hatusima 19001 (not seen).

- = *E. wensiensis* J. W. REN & D. S. YAO, Bull. Bot. Res., Harbin 16(4): 420. 1996. TYPE: CHINA. Gansu: Wen Xian, *J. W. Ren 9310* (not seen).
- *E. guidingensis* C. Y. CHENG, ms., nom. inval. TYPE: CHINA. Guizhou: Guiding, Pinfa, *Y. Tsiang 5353* (A! NAS!).
- *E. hederacioides* C. Y. CHENG, in herb., nom. inval.

Evergreen subshrub, ascending or procumbent on the ground or rocks, or sometimes dwarf trees to 10 m long; branches and twigs round, sometimes with striations, usually brown or green-brown. Leaves usually ovate or ovate-elliptic with much variability, 2-5.5 x 2-3.5 cm, apex obtuse to acute, base usually truncate, sometimes combined with cuneate, margin crenulate to serrate; petiole 2-9 mm long, sometimes absent, glabrous and densely arranged, lateral veins 4-6 pairs, invisible. Peduncle usually with few flowers; pedicel usually less than 5 mm long. Flower 4-merous. Sepals semiround. Petals nearly round, c. 5 mm in diam., greenish or whitish. Capsule brown to red-brown, 5-6 mm in diam.; seeds with red aril.

Phenology. Flowering: April to July; Fruiting: September to December.

Distribution: China (Anhui, Beijing, Fujian, Hebei, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Qinghai, Shaanxi, Shanxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang), India, Indonesia, Japan, Korea, Laos, Myanmar, Parkistan (cult.?), Philippines, Thailand, Vietnam; Africa (cult.), N America (cult. & escaped), S America (cult.), Europe (cult.), Oceania (cult.); sea level to more than 3,400 m, mainly in woodlands, bushes or forests; common in the field and much cultivated in gardens.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Ching yang [Qingyang], *A. N. Steward 5475* (A), Chiu Hwa Shan [Jiuhuashan], *C. S. Fan & Y. Y. Li 229* (A), Chu hwa shan [Jiuhuashan], *R. C. Ching 2832* (A), Huangshan, *East China Station 6411* (KUN), *6532* (IBSC), Qianshan, *B. A. Shen 488* (PE), Whang Shan [Huangshan], *R. C. Ching 2980* (A), *4093* (US), *W. C. Cheng 4592* (US), Wuyuan, *K. Sing 7848* (A); FUJIAN: Changding, *M. C. Wang et al. 2616* (KUN), Congan, *P. C. Tsiang et al. 400675* (PE), Guangzhe, *no collector 3697* (KUN), Kuliang, *H. H. Chung 6671* (A), Kushan, *H. H. Chung 3723* (A), Nanping, *M. C. Wang et al. 1491* (NAS), Sacheng, *Y. Lin 646* (PE), Taining, *G. D. Ye 2218* (MO), Wuyishan, *Wuyishan Team 80-0186* (MO), *80-0361* (MO), Yenping [Nanping], *H. H. Chung 3287* (A); GUANGDONG: Dabu, *L. Deng 5360* (KUN), *5468* (KUN), Dinghu, *K. C. Ting & G. L. Shi 786* (MO), Heping, *G. C. Zhang 312* (MO), Hongkong, *S. Y. Hu 11312* (US), Hongkong, *Y. W. Taam 1878* (A, US), *C. Wright 93* (US), Lianxian, *Liang Guang Exped. 466* (PE 2 sheets), *P. X. Tan 58994* (KUN), Lianyung, *S. Z. Wu 70136* (MO, 2 sheets), Lin District, *C. O. Levine 3464* (A 2 sheets), Loh Chang [Lechang], *W. T. Tsang 20921* (A, NA), Loh Fau Shan [Luofoshan], Lung Tau Mt. *K. Peng et al. 12598* (US), *C. O. Levine 561* (GH, NA, US), Renhua, *L. Deng 7179* (KUN), Ruyuan, *L. Deng 5726* (PE), *S. P. Ko 5516* (KUN), *5726* (KUN), *5762* (KUN), *53455* (KUN, MO 2 sheets, SZ), *53490* (KUN, MO, NAS, SZ), *54680* (KUN, NAS), Sinfung [Xinfeng], *Y. W. Taam 153* (A), Taimoshan [Damoshan], *S. Y. Hu 7608* (A), *S. H. Chun 15110* (KUN), *15120* (KUN, MO), *16960* (KUN 2 sheets, MO, PE), Tsengshing [Cengcheng], *W. T. Tsang 20348* (A, KUN, NA), Tsunghwa, *W. T. Tsang 25233* (A), Xinfeng, *L. Deng 8274* (KUN, MO), Xinyi, *S. P. Ko 51321* (NAS), *C. Wang 38101* (PE),

Wungyuen (Wengyuan), S. K. Lau 2599 (A), 25203 (KUN); GUANGXI: Baise, H. H. Su 67588 (MO), Daimiaoshan, S. H. Chun 14256 (MO), Lingui, Y. Chen 10275 (IBSC), Longlin, C. C. Chang 10710 (IBSC, KUN), K. F. Shen 2404 (MO), Longsheng, *Guangfu Forest Exped.* 209658 (IBSC), Nonggang, *Nonggang Exped.* 11940 (MO), Rongxian, S. H. Chun 9592 (KUN), Shangsze [Shangsi], W. T. Tsang 24466 (A, US), Waitsap, W. T. Tsang 22782 (A), Xingan, *Xingan Exped.* 313 (IBSC), Yaoshan, C. Wang 40065 (A); GUIZHOU: Anshun, *Anshun Exped.* 1982 (KUN, PE 2 sheets), Bijie, P. H. Yu 479 (KUN 2 sheets), 636 (IBSC), Dejiang, T. P. Zhu & Z. F. Liu 1737 (KUN), 2766 (KUN), Jiangkou, 1986 *Sino-Amer. Guizhou Exped.* 1106 (A, NA), Kali, *South Guizhou Exped.* 1699 (KUN), 1823 (KUN), Nayong, *Bijie Exped.* 450 (KUN), 746 (KUN, PE 2 sheets), Panxian, *Anshun Exped.* 1246 (KUN, PE 2 sheets), Pingba, *Anshun Exped.* 1513 (KUN, PE 2 sheets), 1993 (KUN), Songtao, 1986 *Sino-Amer. Guizhou Exped.* 1921 (A), 2008 (A), 2250 (A), T. P. Zhu & Z. F. Liu 1411 (KUN), Wengan, *Libo Exped.* 1801 (KUN, PE 2 sheets), 1813 (KUN, PE 2 sheets), 2273 (KUN), Xingren, *Guizhou Exped.* 7782 (PE), 8786 (PE), Xingyi, *Guizhou Exped.* 6469 (PE), 6809 (PE); HAINAN: Boting [Baoting], S. K. Lau 28091 (A, KUN), Fan Yah [Sanya], N. K. Chun & C. L. Tso 44215 (A, MO, US), without location, Z. X. Li et al. 3956 (MO); HENAN: without location, J. Q. Fu 2531 (KUN 2 sheets); HUBEI: Badong, M. Z. Qian 1693 (PE), Hefeng, H. J. Li 6324 (KUN), Hsingshan [Xingshan], E. H. Wilson 396 (A, GH, US), Lichuan, C. T. Hwa 102 (A), 1980 *Sino-Amer. Exped.* 1337 (A, KUN, NA), 2075 (A, KUN, NA), Patung [Badong], H. C. Chow 925 (A), without location, K. R. Liu 734 (PE), E. H. Wilson 5848 (US), 7746 (US), Wu Toh Ho, W. C. Cheng 3998 (US), Wudang, 1987 *SAYTBET* 45102 (NA), 45103 (NA); HUNAN: Dongkou, L. H. Liu & G. Z. He 16671 (KUN, PE), Hengshan, H. L. Zhang 187152 (IBSC), Liancheng, Y. Ling 4144 (PE), Longshan, L. H. Liu 9351 (KUN), Shangzhi, T. R. Cao 90188 (KUN), Sinning [Xinning], C. S. Fan & Y. Y. Li 673 (A), Wugang, L. H. Liu & G. Z. He 16006 (KUN), Xinning, Z. Y. Li 1762 (MO, US), Yizhang, S. H. Chun 2888 (A), L. H. Liu 10331 (PE); JIANGSU: I-hsing [Yixing], K. Long 12305 (GH), Jiangpu, M. B. Deng et al. 3783 (KUN), Jurong, X. Q. Wang et al. 72 (NA), Liyang, F. X. Liu et al. 2814 (KUN), Nanjing, Y. L. Keng 1711 (A), Yixing, W. Z. Fang et al. 149 (KUN), 243 (KUN), S. H. Mao et al. 166 (KUN), F. G. Meyer 1435 (NA); JIANGXI: Dayu, M. X. Nie et al. 9484 (KUN), Dexing, M. X. Nie & S. K. Lai 5526 (KUN), Fengxin, S. L. Liu et al. 1298 (KUN), Hwanglungshan [Huanglongshan], Y. K. Hsiung 5578 (A), Jinggangshan, S. K. Lai et al. 4362 (KUN), Kuixi, M. X. Nie & S. K. Lai 3662 (KUN), 3954 (KUN 2 sheets), Lichuan, S. K. Lai et al. 418 (LBG), M. X. Nie & S. K. Lai 2871 (KUN 2 sheets), J. S. Yao et al. 4543 (KUN), Lushan, H. C. Cheo 101 (US), H. H. Chung & S. C. Sun 365 (A), M. X. Nie 6701 (LBG), M. X. Nie et al. 7932 (KUN), Y. K. Hsiung 6761 (NAS), Nafeng, M. X. Nie & S. K. Lai 2462 (KUN), Ruijin, C. M. Hu 3778 (KUN 2 sheets), Shicheng, M. X. Nie & S. K. Lai 4569 (KUN), W. H. Wan & Z. R. Yu 1935 (PE), Shuichuan, S. K. Lai et al. 4543 (PE), Tonggu, S. K. Lai 3734 (KUN, PE), Wukongshan, *Jiangxi Exped.* 1328 (PE), Xiushui, S. K. Lai 2311 (KUN), 2934 (KUN), 2945 (KUN), 3399 (KUN), Xunyan, J. S. Yao et al. 1981 (KUN 2 sheets, PE), 2069 (KUN), Yichun, J. S. Yao et al. 3359 (KUN); SHAANXI: Chengku [Chenggu], T. N. Liou 11271 (PE), T. Z. Liu & P. C. Tsoong 4132 (PE), Huashan, J. Hers 3034 (A), Lintong, T. N. Liou 11221 (PE), Mienxian [Mianxian], K. T. Fu 3809 (KUN 4 sheets), Pingli, K. T. Fu 11978 (KUN), C. L. Tang 1300 (KUN), Yanxian, K. T. Fu 5614 (KUN, MO), 5622 (KUN), T. N. Liou & P. C. Tsoong 3851 (KUN 2 sheets); SHANDONG: Chifu [Qufu], N. H. Cowdry 589 (A), Mengshan, T. Y. Cheo et al. 209 (A), Tatung, R. C. Ching 2471 (A), Tsingtao [Qingdao], C. Y. Chiao 2477 (A, US); SICHUAN: Austro-occid., H. Handel-Mazzetti 2609 (WU), Beijiagang, W. C. Cheng 9763 (MO), Chengkou, T. L. Dai 100910 (MO), 103319 (PE), Ebian, Z. X. Zhao 899 (KUN), Emeishan, *Sichuan Exped.* 2676 (PE 2 sheets), S. A. Sponberg et al. 223 (A), Fengjie,

H. F. Chow 26403 (KUN, SZ), 109669 (PE), *M. Y. Fang* 24972 (KUN), 25712 (KUN), *Jinfoshan*, *J. H. Xiong & Z. L. Zhou* 92638 (PE), 93723 (SZ), *Julian*, *no collector* 160 (SZ), *Nanchuan*, *K. F. Li* 62289 (KUN), 62572 (KUN, SZ), 64451 (KUN), *Nanchuan Exped.* 1982 (PE), *Sichuan Exped.* 1399 (MO), *J. H. Xiong & Z. L. Zhou* 91370 (KUN), 92740 (KUN), 92858 (KUN, SZ), *Opien [Ebian]*, *T. T. Yu* 682 (A), *Wushan*, *K. H. Yang* 65581 (KUN), *Wuqi*, *K. H. Yang* 58267 (MO), 58500 (PE), 59556 (KUN), *Wanxian Traditional Chinese Medicine Exped.* 73W-393 (PE), 73W-545 (PE); XIZANG: *Gyirong*, *Qinghai-Xizang Exped.* 6841 (KUN 2 sheets), *Medog*, *P. S. Li & S. Z. Cheng* 1833 (PE 2 sheets), 2253 (PE 2 sheets), 2734 (PE), *Tongmai*, *P. C. Tsoong* 6210 (KUN, PE); YUNNAN: *Atungtze [Deqen]*, *T. T. Yu* 16142 (KUN 2 sheets, PE), *Baoshan*, *C. Chen* 918 (KUN 2 sheets), *Bijiang*, *Qinghai-Xizang Exped.* 328 (KUN 2 sheets), *S. K. Wu* 8610 (KUN 2 sheets), *Chenkang*, *C. W. Wang* 72343 (A, KUN), 72565 (IBSC, PE), *Dali*, *T. N. Liou* 16578 (KUN 4 sheets), 21830 (IBSC, KUN), *H. C. Wang* 2475 (KUN), 4764 (PE), *Dengchuan*, *R. C. Ching* 24822 (KUN 2 sheets), *Eshan*, *Eshan Team* 88-119 (KUN), 88-154 (KUN 2 sheets), 88-263 (KUN), *Fugong*, *Qinghai-Xizang Exped.* 7215 (KUN 2 sheets, PE 2 sheets), *Fohai (Jinghong)*, *C. W. Wang* 74329 (A), *Fooning [Funing]*, *C. W. Wang* 88652 (KUN 2 sheets), 88670 (KUN 2 sheets), 88732 (KUN 2 sheets), *Fumin*, *P. Y. Chiu* 57829 (KUN), 596401 (A, KUN), *Funing*, *Seeds Collection Team* 189 (KUN), *Gongshan*, *K. M. Feng* 6944 (KUN, PE), 7268 (KUN 2 sheets, PE), 7287 (KUN), 7426 (KUN, PE), 8581 (PE), 8722 (KUN), 9269 (KUN), *Qinghai-Xizang Exped.* 8053 (KUN 2 sheets, PE 4 sheets), *Guangnan*, *Q. A. Wu* 9831 (KUN), *Jingdong*, *P. Y. Chiu* 53374 (A, PE), 58998 (KUN 2 sheets), *M. K. Li* 633 (KUN 2 sheets), 2670 (KUN), *S. G. Xu* 4489 (KUN 2 sheets), *P. Y. Chiu* 51566 (KUN 2 sheets, SZ), 51634 (KUN 2 sheets), 51848 (SZ), 57861 (KUN), *K. H. Liang* 111 (KUN 4 sheets), *Y. Tsiang* 13014 (N), *F. T. Wang* 1319 (KUN), *Kunming*, *T. N. Liou* 18284 (IBSC, PE), *Kwangnan [Guangnan]*, *C. W. Wang* 87414 (KUN 2 sheets), 87585 (KUN 2 sheets), 87587 (KUN 2 sheets), 87839 (KUN), *Longchuan*, *G. D. Tao* 13544 (KUN), *Lunan*, 1984 *Sino-Amer. Exped.* 1571 (A, KUN), *Luquan*, *P. I. Mao* 796 (KUN), 1644 (KUN), 1886 (KUN 2 sheets), 1952 (KUN 2 sheets), *Marlipo [Malipo]*, *C. W. Wang* 83973 (KUN), *Menghai*, *P. Y. Chiu* 57170 (KUN), *Sino-USSR Exped.* 7099 (KUN), *S. K. Wu* 838 (KUN 2 sheets), *Mengzhi*, *Y. Y. Hu & S. K. Wen* 280627 (KUN), *Mongtze [Mengzhi]*, *C. W. Wang* 83378 (KUN, PE), *Pianma*, *S. K. Wu* 8179 (KUN 2 sheets), *Pingchuan [Binchuan]*, *T. N. Liou* 21777 (PE), *Pingpian [Pingbian]*, *H. T. Tsai* 62102 (A, KUN, NAS, PE, SZ), 62208 (A, NAS, SZ), *Puer*, *Y. Tsiang* 12951 (N), *Shiping*, *S. K. Wu* 908 (KUN 2 sheets, PE), *Shunning [Fengqing]*, *T. T. Yu* 16687 (A, KUN 2 sheets, PE), *Shweli-Salwin Divide*, *G. Forrest* 12086 (PE), *Sichour [Xichou]*, *K. M. Feng* 11927 (A, KUN 2 sheets), 12603 (A, KUN 2 sheets), 22337 (KUN 2 sheets), *H. T. Tsai* 58-8621 (KUN 2 sheets), *Songming*, *Y. P. Chang* 54 (IBSC, KUN, PE), 202 (KUN), *P. Y. Chiu* 50412 (KUN 4 sheets), 51296 (KUN 3 sheets), 51865 (KUN 3 sheets), 54163 (KUN 2 sheets), 55351 (KUN 2 sheets), *P. H. Yu* 142 (IBSC), *Tali [Dali]*, *T. N. Liou* 14705 (KUN 2 sheets), *Tonghai*, *X. F. Deng* 79-2 (KUN), *Weisi [Weixi]*, *C. W. Wang* 70421 (A, N, PE), *Weixi*, *K. M. Feng* 3575 (KUN 2 sheets), 3752 (PE), 3753 (PE), 3869 (KUN 2 sheets), 4080 (KUN 2 sheets, PE 2 sheets), 4360 (KUN 2 sheets, PE 2 sheets), 4397 (PE 2 sheets), 8702 (KUN 2 sheets), *Weixin*, *P. Ju* 1033 (KUN 2 sheets), *Wenshan*, *K. M. Feng* 11051 (A, KUN 2 sheets, PE), 22168 (KUN), 22589 (KUN 2 sheets), *Seeds Collection Team* 82 (KUN), *H. T. Tsai* 58-8376 (KUN 2 sheets), *Without location*, *H. Handel-Mazzetti* 6180 (US), *Xichou*, *S. Z. Wang* 535 (KUN 2 sheets), *Xundian*, *H. Y. Yu & H. B. Shi* 81-117 (A), *Yangbi*, *no collector* 2950 (PE), *Yanshan*, *C. W. Wang* 83574 (KUN), 89120 (KUN 2 sheets), *Yingjiang*, *G. D. Tao* 13354 (KUN), *Yiliang*, *Northeast Yunnan Exped* 780 (KUN 2 sheets), *Yujiang*, *Y. H. Li* 6009 (KUN), *Zhengxiang*, *P. H. Yu* 1173 (KUN 2 sheets, PE); ZHEJIANG: *Changhua (Zhanghua)*, *Y.*

L. Keng 578 (A), Fengyang, *H. Y. Zou* 694 (A), Hangzhou, *Fang & Cheng* 18 (MO), *F. G. Meyer* 1461 (A), Longquan, *S. Y. Chang* 4106 (PE), Zhejiang Natural Museum 3398 (KUN), Moganshan, *C. P. Tsien et al.* 61294 (PE), Ningbo, *C. M. Tan* 92271 (MO), Pingyang, *R. C. Ching* 1923 (US), Putuoshan, no collector 129 (PE), Tianmushan, *T. Hong & P. C. Keng* 229 (KUN), Tiantai, *G. R. Chen* 2318 (KUN), Tien-mu [Tianmushan], *H. H. Hu* 1656 (A), Tien-tai Shan [Tiantaishan], *R. C. Ching* 1497 (NA, US), *Y. L. Keng* 1088 (A). **INDIA:** Khasia, *J. D. Hooker & T. Thompson s.n.* (GH), Ukhral, *F. K. Ward* 17020 (A). **INDONESIA:** Timor, *C. G. G. J. Steenis* 18264 (A), Voogd 2289 (A). **JAPAN:** Aomori, *H. Muroi* 4562 (A), 4596 (A), Ashinoko, *H. Yamanouchi & M. Togasi* 395 (US), Awa, *M. Furuse* 19993 (A), Chiba, *W. T. Gillis* 4656 (A), Gifu, *H. Muroi* 3728 (A), Mt. Hakone, no collector *s.n.* (WU), Hokkaido, *H. Takahashi et al.* 5657 (NA), Hondo, *E. H. Wilson* 6942 (A), Hyogo, *H. Muroi* 6110 (A), 6122 (A), Iwate, *H. Muroi* 5021 (A), 5756 (A), Kagawa, *M. Takahashi* 1036 (NA), Kagoshima, *M. Furuse s.n.* (A), Kawachi, *G. Murata* 27126 (US), Kyushu, *E. H. Wilson s.n.* (US), Liukiu, *M. Furuse* 4594 (NA), 5998 (NA), Yokohama Nursery *s.n.* (A), *E. H. Wilson* 8112 (A), *C. Wright s.n.* (GH), Mino, *K. Shiota* 141 (A), 5854 (A), 6792 (A), Miyagi, *H. Muroi* 4746 (A), Nagasaki, *M. Hotta & M. Ito* 59 (A), Nagano, *M. Furuse s.n.* (A), Nakagami, *T. Amano* 5926 (US), Nikko, *J. G. Jack s.n.* (A), Okinawa, *K. Inoue* 1474 (A, KUN), *S. Kurata & T. Nakaïke* 1608 (A), Osaka, *H. Muroi* 1588 (A), Ryukyu, *F. R. Fosberg* 37571 (US), 38294 (US), *M. Furuse* 196 (NA), *B. A. Jones* 12 (NA), Saitama, *H. Ohashi et al.* 1615 (A), Shinano, *M. Furuse* 18571 (A), Shizuoka, *F. Konta* 11575 (A), Tanegashima, *E. H. Wilson* 6116 (A), Tokyo, *J. Matsumura s.n.* (US), *K. Miyabe s.n.* (A), without location, *C. S. Sargent s.n.* (A), Wakayama, *H. Muroi* 6859 (A), Yakushima, *E. H. Wilson* 6109 (A), Yamanashi, *F. Konta* 778 (A), *M. Togashi* 478 (WU), 715 (WU). **KOREA:** Cholla Namdo, *Y. S. Kim s.n.* (A), *B. R. Yinger et al.* 3132 (NA), 3274 (NA), 3440 (NA), Chungchong Namdo, *B. R. Yinger et al.* 2495 (A), 2497 (NA), Dagelt Island, *E. H. Wilson* 8585 (A), Kyong Gi Do, *B. R. Yinger et al.* 2492 (A), 2494 (NA), Kyong-sang-buk-do, *J. Murata* 109 (A), Oo Ryong Too, *E. H. Wilson* 8498 (A), Quelpaut Island, *E. H. Wilson* 8552 (US), 9390 (A), 9397 (US), 9434 (A), 9447 (A, US), 9539 (A, US), without location, *U. Faurie* 518 (A), 1619 (A), 6136 (A), 61795 (NA), *L. Taquet* 634 (A), 636 (A), 639 (A), *E. H. Wilson* 6200 (A). **LAOS:** Pakson, *E. Poilane* 28993 (US). **MYANMAR:** Adung valley, *F. K. Ward* 9468 (A, 2 sheets). **PHILIPPINES:** Benguet, *A. Loher* 5132 (US), 5133 (US), *M. Ramos* 5779 (US). **THAILAND:** Chiangmai, *R. Geesink et al.* 7954 (P), Kanchanaburi, *R. Geesink et al.* 6133 (P), *J.E. Vidal* 4585 (P), Lopburi, *J. Murata et al.* 50950 (A), Saraburi, *T. Smitinand* 10878 (P). **USA:** MARYLAND: Calvert (Cultivated), *S. R. Hill* 17457 (GH); MISSOURI (escaped): Jefferson, *C. E. Darigo et al.* 3048 (MO), 3050 (MO), Oregon, *B. & D. Summers* 7285 (MO), Pulaski, *B. Summers & J. Ryan* 4389 (MO), St. Charles, *C. E. Darigo et al.* 2647 (MO), St. Louis, *C. E. Darigo et al.* 2928 (MO), 2975 (MO), 3051 (MO), Wayne, *B. Summers* 5314 (MO); WEST VIRGINIA (escaped): Kanawha, about 15 miles...Charleston, about 1/2-1 mile N of Nitro-St. Albans Bridge, *G. C. Tucker* 3314 (GH). **EUROPE:** Silesia, *C. Baenitz* 1234 (GH), 1392(GH).

This is the most confused species so far either in the literatures or in herbaria. The most important factor is that the species is very diversified, especially in the cultivated condition as well as in material upon which the most work has been based. The typical confusion is with *E. japonica*, and the major difference between them are evident. This is also one of the most disputed species in the section, especially focused on subdivisions under the species *E. japonica*, as well as the relationship between them. However, work on the available materials

was mainly focused on cultivated or horticultural specimens (see BLAKELOCK 1951), and they should be treated as cultivated taxa (see LANCASTER 1981 and VICKERY 1997).

This is also most common and widespread species in the genus. It varies in morphological states as well as in other characters, geographical distribution, and in cultivation. And for these reasons, the species has been re-divided and re-named again and again, and its synonyms has been accumulating for several decades. The species is likely to be the most complex and polymorphological *Euonymus* native to E, S and SE Asia. As for the other taxa under this name in cultivation (BLAKELOCK 1951, LANCASTER 1981 and VICKERY 1997), they are only ornamental taxa which will be discussed under the Cultivated Code.

The leaves of this species vary from the smallest, which is only several mm long, to the largest around 10 cm long, and from coriaceous to chartaceous or papyraceous in texture, but it is very difficult to find differences in the flower and fruit, and there is no evidence for separating the variations as different species. In fact, the species is very similar to *E. theifolia* which has small leaves narrowed at both ends, occurring mainly as shrub or shrublike plants in alpine habitats; and it is also similar to *E. vagans*, which has shorter leaves than it, lateral veins impressed above but not nearly as prominent beneath, smaller fruit less than 6 mm in diameter, and is widely spread into the Himalayan areas from high mountains of SW China.

52. *Euonymus japonica* THUNB., Nova Acta Regiae Soc. Sci. Upsal. 3: 208. 1780. TYPE: JAPAN. *E. Kaempfer* s.n. (not seen, photo. A!). [Fig. 39]

– *E. sinensis* CARRIERE, Rev. Hort. (Paris) 1883: 37-38. 1883, in obs., nom. inval.

Evergreen shrub or small tree, straight, to several meters tall, sometimes also dwarfed; branches gray-green to gray-brown, terete, glabrous, sturdy, twigs green to light green, glabrous, sometimes with striations, but not so evident, especially when fresh. Leaves coriaceous or thickly coriaceous, ovate, obovate, orbiculate-ovate, long-ovate, (3) 5-10 (12) x (2) 3-5 (5.5) cm, apex orbiculate or semiorbiculate, base orbiculate or semiorbiculate, margin crenulate above middle and nearly entire below, lateral veins 6-8 pairs, slightly invisible or unclear, especially when dry; petiole 3-10 mm long. Cymes usually axillary, sometimes terminal, many branched and many flowered; peduncle to 8 cm long, subbranches 2-4 cm long; pedicel 4-7 mm long. Flower 4-merous. Sepals semiorbiculate. Petals green or yellowish-green, sometimes cream, nearly round, 5-6 mm in diam. when fully open. Capsule globose or subglobose, brown or yellow-brown to red-brown, 6-9 (12) mm in diam., opening into 4 lobes at maturity; seeds 2 in each locule, dark brown, globose, covered by orange-red aril.

Phenology. Flowering: April to August; Fruiting: August to January.



Fig. 39. *Euonymus japonica* THUNB. – 1. flower branch; 2. flower; 3. fruit branch; 4. fruit.

Distribution: Cambodia, China (Anhui, Beijing, Fujian, Hebei, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Qinghai, Shaanxi, Shanxi, Shandong, Sichuan, Taiwan (Lanyu Island), Xinjiang, Yunnan, Zhejiang), India, Indonesia, Japan, Korea, Laos, Myanmar, Pakistan, Philippines, Thailand, Vietnam; Africa, N America, S America, Europe, Oceania (all cult. except from Japan); alt. from sea level to high mountains up to 1,400 m elevation, common.

Histories of the Species: The name of the species was first published by THUNBERG (1780) from Japan, and it was from there the cultivated form has been introduced into the world. The species, especially under cultivation, is very similar to *E. hederacea*, which is different from this one by its climbing or ascending habit in E, S and SE Asia. Within its widespread distribution, the species varies in characters according to the collection location as well as the collection time. D. HOU used the name of *E. japonica* (Flora Malesiana 1(6): 252. 1963) to represent the species in South and Southeast Asia. However, it is *E. hederacea* which is native to this area, and the former is only native to Japan, and cultivated in the above region.

SPECIMENS EXAMINED: **CHINA:** BEIJING: Urban District, X. W. Chen 15702 (BNU), S. Y. He et al. 15830 (BNU), 15561 (BNU), Y. C. Jiang 75454 (BNU), Y. Li 15624 (BNU), T. N. Liou 7163 (PE), 7164 (PE), H. P. Tsui 30 (PE). GUIZHOU: without location, P. C. Tsoong 1113 (PE). HAINAN: Wenchang, H. Fung 20447 (NAS, NA, PE). Henan: Zhangde, T. Kanasino 3078 (PE). HUBEI: Wuhan, K. C. Kuan 75062 (PE). HUNAN: Chansha, Y. Liu 53 (PE), Hengshan, K. C. Kuan 189 (PE), B. G. Li 367 (PE), West Hunan Exped. 794 (PE), Qianyang, Anjiang Agriculture College Team 622 (PE), C. T. Lee 778 (PE), 2305 (PE), Qingyang, Z. B. Niu s.n. (PE). JIANGSU: Haichow, Chang & Chen 796 (NAS), Jintan, M. B. Deng 3648 (PE), Nanjing, M. Chen 541 (PE), K. C. Kuan 243 (PE), Nantong, East China Station 1609 (PE); JIANGXI: Dayushan, Z. J. Xu 1997 (PE), Guixi, M. X. Nie 3953 (PE), 4048 (KUN, PE), Shuichuan, S. K. Lai et al. 5362 (KUN), Renwudui 1394 (PE); LIAONING: Lushun, Z. Wang et al. 1012 (PE), 1015 (PE). SHAANXI: Wugong, T. N. Liou 11597 (PE), 11598 (PE), Qin, Tian, Duan & Wang 108 (PE). SHANDONG: Qingdao, Sino-Germany Exped. 584 (PE), F. H. Sha 368 (PE), Qufu, L. Kong 11 (PE). SICHUAN: Beipei, Y. Z. Sun 1725 (PE), Tianquan, W. K. Hu 11896 (PE). YUNNAN: Kunming, Oil Plants Group 6 (KUN), 7 (KUN), T. N. Liou 13820 (PE), B. Y. Qiu 54688 (KUN, PE). ZHEJIANG: Changhua, Y. Y. Ho 26020 (PE), Hangzhou, Zhejiang Natural Museum 3798 (KUN), Leqing, S. Y. Zhang 5440 (PE), Tiantai, Y. Y. Ho 28085 (PE), Yanyanshan, M. C. Wang et al. 1251 (NAS), Zhoushan, G. R. Chen 2202 (KUN). **JAPAN:** Tsushima, H. Ohashi et al. 10690 (KUN).

53. *Euonymus hupehensis* (LOES.) LOES., Bot. Jahrb. Syst. 30: 454. 1902
(Type: see below).

Bas.: *E. chinensis* LINDL. var. *hupehensis* LOES., Bot. Jahrb. Syst. 29: 436. 1900.
SYNTYPES: CHINA. Hupeh: A. Henry 7764 (A!); Tshekiang: Ningpo, E. Faber s.n. (not seen).

- = *E. hupehensis* LOES. var. *brevipedunculata* LOES., Bot. Jahrb. Syst. 30: 454. 1902, p.p. SYNTYPES: CHINA. Yunnan: apud Mengtze et Szemao, alt. 1600-2000 m, A. Henry 9106b (A! MO!), 10514 (A! MO! NY! US!), 10514a (A! MO! US!). 13017 (A! MO!).
- = *E. hupehensis* LOES. var. *longipedunculata* LOES., Bot. Jahrb. Syst. 30: 454. 1902. TYPE: not given.
- = *E. hupehensis* LOES. var. *maculata* LOES., Bot. Jahrb. Syst. 30: 454. 1902. TYPE: CHINA. Yunnan: apud Szemao, A. Henry 12446b (A! MO! NY! US!).

Evergreen shrub, ascending shrublike; branches gray-green to gray-brown, terete, glabrous, twigs green to light green, glabrous. Leaves thinly coriaceous, obovate, elliptic, ovate-elliptic, 6-10 x 3-5 cm, apex acute, base cuneate or attenuate, margin crenulate, lateral veins 7 pairs; petiole 2-4 cm long. Peduncle to 8 cm long, with several flowers; pedicel 4-7 mm long. Flower 4-merous. Sepals semiround. Petals green or yellowish-green, nearly round, about 6 mm in diam. when open. Capsule globose or subglobose, brown or yellow-brown to red-brown, 6-9 mm in diam., opening by 4 lobes at maturity; seeds dark brown, covered by orange-red aril.

Phenology. Flowering: April to July; Fruiting: August to December.

Distribution: China (Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan); alt. 1,000-3,000 m, in forests or woodlands and thickets; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Wengyuan, S. K. Lau 24536 (MO), Xiping, L. Deng 7991 (KUN, MO), Yangshan, P. C. Tam 60378 (IBSC, KUN, MO); GUANGXI: Dayaoshan, Q. H. Lu 4341 (KUN); GUIZHOU: without locality, M. Esquirol 6361 (P); HUBEI: Ichang [Yichang], A. Henry 3690 (P), Metasequoia Area, W. C. Cheng & C. T. Hwa 1121 (A); HUNAN: Yizhang, S. H. Chun 2854 (A, MO 2 sheets); SICHUAN: Chengkou, P. G. Farges s.n. (P); YUNNAN: Dongchuan or vicinity, E. E. Maire s.n. (P 3 sheets), Mentze [Mengzhi], A. Henry 10514b (A), 10514c (A), Salween-Irrawadi watershed, J. F. Rock 11652 (A, US), Shweli-Salwin divide, G. Forrest 24025 (PE), 25214 (K, PE).

This species differs from *E. hederacea* by its petiole 2-4 cm long, leaves with cuneate base, sparse arrangement of branches and twigs, and scattered distribution area.

54. *Euonymus jinyangensis* C. Y. CHANG, Bull. Bot. Res., Harbin 5(1): 85, photo 1. 1985. TYPE: CHINA. Sichuan: Jinyang, alt. 2,700 m, Aug. 21, 1976, *Sichuan Exped.* 14634 (Holotype: SZ, not seen; Isotype: PE!).

– *E. tsangshanensis* C. Y. CHENG, in herb., nom. inval. TYPE: CHINA. Yunnan: Lijiang, Xue Shan, Shan Ma Huang Ba, alt. 3,500-4,000 m, on rock, Aug. 13, 1942, K. M. Feng 8986 (Holotype: PE!, Isotype: KUN).

Evergreen small subshrub, climbing on alpine rocks or vegetation, to 1 m tall, branches and twigs mainly black or dark brown when dry. Leaves triangular- or

elliptic-lanceolate, 4-5 x 1.2-1.5 cm, lateral veins unclear, attenuated at both ends, sparsely and sharply denticulate; petiole c. 3 mm long. Cymes axillary, with 3-5 (7) flowers. Flower 4-merous, small, c. 6 mm in diam. when fully open. Sepals round. Petals pale green, ovate or round, nearly entire. Ovary smooth. Capsule globose, c.6 mm in diam. when fully mature, opening into 4 lobes.

Phenology. Flowering and Fruiting: June to October.

Distribution: China (Sichuan, Xizang, Yunnan); alt. 1,600 - 2,900 m, in mountain forests; occasional.

SPECIMENS EXAMINED: **CHINA:** SICHUAN: Dukou, *Qinghai-Xizang Exped.* 11507 (KUN), Hongxi, Z. T. Guan 6964 (PE), Luding, *Vegetation Exped.* 32051 (CDBI), Meigu, *Sichuan Economic Pl. Exped.* (59) 1902 (KUN, PE 2 sheets), Ningyuan [Xichang], C. Schneider 1015 (A); XIZANG: Tsarung, J. F. Rock 20867 (A), 22613 (A); YUNNAN: Dali, T. N. Liou 21341 (PE), Dali et Li-djiang [Lijiang], H. Handel-Mazzetti 6450 (WU), Dengchuan, R. C. Ching 24908 (KUN), Gongshan, *Nanshuibeidiao Exped.* 9687 (KUN), Likiang [Lijiang], R. C. Ching 20464 (A, KUN), K. M. Feng 22765 (KUN 3 sheets, PE), P. I. Mao 119 (KUN, PE), *Qinghai-Xizang Exped.* 255 (KUN), J. F. Rock 4710 (A), G. D. Tao et al. 85460 (KUN), Luchuan [Luquan], Y. P. Chang 632 (IBSC, PE), Mengtze [Mengzhi], A. Henry 11336 (NY), Salween-Irrawadi watershed, J. F. Rock 11626 (A, US 2 sheets), Weisi [Weixi], K. M. Feng 4887 (KUN), *Qinghai-Xizang Exped.* 6752 (KUN), 6818 (KUN), without location, E. E. Maire 3313 (NY), J. F. Rock 9610 (A, US), S. Ten 546 (A), Yangbi, Y. H. Yang 101862 (PE), Zhongdian, K. M. Feng 3228 (A, KUN), *Qinghai-Xizang Exped.* 1007 (KUN).

This species is similar to *E. theifolia*, but is typically a small alpine shrub with triangular- or elliptic-lanceolate leaves, the margin sparsely and sharply denticulate, and capsule up to 6 mm in diameter.

55. *Euonymus kengmaensis* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 10: 93, fig. 1. 1997. TYPE: CHINA. Yunnan: Kengma, C. W. Wang 72900 (Holotype; A!, Isotypes: KUN! NAS! PE! 2 sheets).

- *E. malipoensis* C. Y. CHENG, in herb., nom. inval. TYPE: CHINA. Yunnan: Marlipo, K. M. Feng 13075 (KUN! 2 sheets, PE!).
- *E. virens* C. Y. WU var. *erectus* C. Y. WU, in herb., nom. inval.

Evergreen shrub (scandent) to small tree, to 8 m tall, branches gray-green to gray-brown, terete, glabrous, twigs green to light green. Leaves chartaceous or papyraceous, ovate to elliptic, 8-12 x 3-5 cm, acuminate or acute at both ends, margin crenulate, lateral veins 4 pairs, slightly curved upward, disappearing before reaching margin; petiole c. 4 mm long. Peduncle terminal or axillary, with many flowers, to 8 cm long and 6 cm in diameter. Flower 4-merous, c. 7 mm in diam.. Petals greenish-yellow or yellowish-green, nearly rotund. Capsule globose or subglobose, brown or yellow-brown, opening by 4 lobes at maturity; seeds dark brown, covered by orange aril.

Phenology. Flowering: March to June; Fruiting: July to November.

Distribution: China (Yunnan); alt. 1,300 - 2,900 m., in dense forests and thickets; rare.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Chengkang, *C. W. Wang* 72535 (A, KUN, PE 2 sheets), Jingdong, *K. M. Li* 3338 (KUN 2 sheets), 3390 (KUN 2 sheets), Kengma, *C. W. Wang* 72914 (A, KUN), 72919 (A, IBSC, KUN, NAS, PE 2 sheets), Longchuan, *S. K. Wen* 580602 (KUN 2 sheets), Longling, *J. Chen* 683 (KUN 2 sheets), Lungling [Longling], *H. T. Tsai* 55652 (A, IBSC, PE, SZ), Tsangyuan [Cangyuan], *C. W. Wang* 73224 (A, KUN, NAS, PE 2 sheets), Lantsang [Lancang], *C. W. Wang* 76836 (A, IBSC, KUN).

This species is characterized by large ovate leaves with long petiole, sparse arrangement of the leaves, gray or brown twigs on young and old plants, sparse cymes at apex of branches, smooth fruit, and the particular distribution in the section.

56. *Euonymus lanceolata* YATABE, Bot. Mag. (Tokyo) 6: 179. 1892. TYPE: JAPAN. Echizen (not seen). [Fig. 40]

Evergreen shrub, creeping, sparsely branched, glabrous; branches and twigs round, usually brown or yellow-gray. Leaves elliptic-lanceolate, 10-14 x 2.5-4.5 cm, apex acute or acuminate, base cuneate, lateral veins 6-9 pairs, margin finely crenulate; petiole 3-5 mm long. Peduncle 3-4 cm long, usually with less than 7 flowers; pedicel 5-8 mm long. Flower 5-merous. Sepals semiround. Petals nearly round, c. 6 mm in diam. when open, purplish. Capsule globose, with shallow grooves, c. 8 mm in diam.; seeds ovoid, with red aril.

Phenology. Flowering: June to July; Fruiting: September to November.

Distribution: Japan; mainly in mountain forests or woodland; rare.

SPECIMENS EXAMINED: **JAPAN:** Bizin, *G. Masamune* s.n. (NY), Daisen Hoki, *M. Kume* s.n. (A), Hyogo, *H. Muroi* 5419 (A), 5697 (A), Mino, *K. Shiota* 3073 (A), Nagono, *K. Uno* s.n. (A), Tottori, *F. G. Meyer et al.* 16901 (NA), *H. Muroi* 5482 (A).

This species has elliptic-lanceolate leaves, and a capsule to 8 mm in diameter with a smooth surface and shallow grooves, characters which are not found in other species of this section.

57. *Euonymus pallidifolia* HAYATA, Icon. Pl. Formosan. 3: 57. 1913. TYPE: CHINA. Taiwan: *Nishigaki* s.n. (not seen, photo A!).

Evergreen shrub; branches and twigs round, sturdy, usually green or yellow. Leaves elliptic or elliptic-ovate, 6-8 x 3-4 cm, apex acute, base attenuate, lateral veins and veinlets invisible, margin entire and revolute; petiole 4-6 mm long. Peduncle 2-3 cm long, usually with less than 3 flowers; pedicel about 3 mm long.

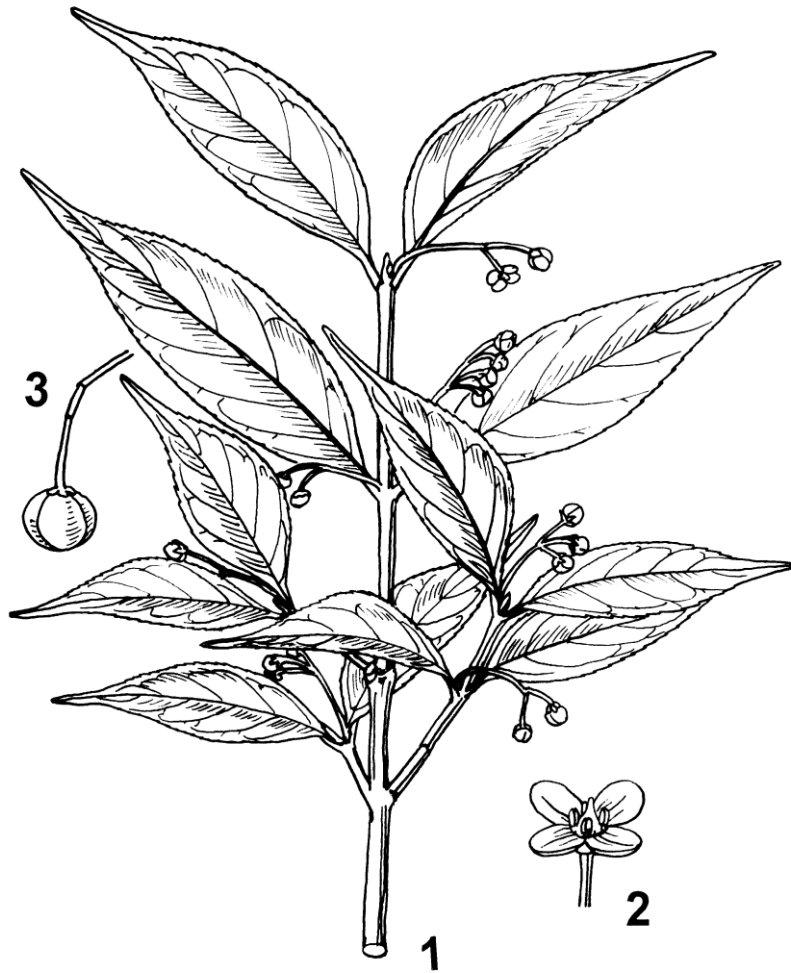


Fig. 40. *Euonymus lanceolata* YATABE – 1. flower branch; 2. flower; 3. fruit.

Flower 4-merous. Sepals semiround. Petals nearly round, c. 5 mm in diam. when open, greenish or whitish. Capsule brown or brown-yellow, sometimes with shallow grooves, c. 8 mm in diam.; seeds with red aril.

Phenology. Flowering: March to June; Fruiting: August to November.

Distribution: China (Taiwan), alt. 0-200 m, mainly in bushes of beach or near sea level; rare.

SPECIMENS EXAMINED: **CHINA:** TAIWAN: Hengchun, Kenting National Park, S. M. Liu 280 (A).

This species is very similar to *E. tonkinensis* in habit, but it is much different from it due to the entire, revolute leaves, and the fruit which is much larger than the latter. The relationship among these species still needs clarification, and very little material was available for this revision.

58. *Euonymus pseudovagans* PITARD in LECOMTE, Fl. Indo-Chine 1: 871. 1912. TYPE: VIETNAM. Tonkin: environs de Ninh-binh, *E. Poilane 17287* (A! US!).

Evergreen shrub, or shrublike, but ascending, to 3 m tall; branches and twigs brown and green, usually 4-angled. Leaves elliptic or ovate-elliptic, 7-14 x 3-6 cm, apex acute, base cuneate, margin serrate to crenulate, lateral veins 5-7 pairs; petiole 4-9 mm long. Peduncle 3-4 cm long, usually with several flowers, sometimes more than 5; pedicel usually less than 1 cm long. Flower not seen. Capsule brown or yellow-brown, densely white-spotted, with 4 bright yellow or yellow-brown grooves on sides of angles, to 1 cm in diam.; seeds with red aril.

Phenology. Flowering: Not known; Fruiting: October to January.

Distribution : China (Guangxi, Guizhou, Yunnan), Vietnam; alt. 300-2,400 m; usually in mixed forests, or bushes; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Debao, C. C. Chang 14223 (IBSC, MO), Jingxi, Z. D. Li 602714 (IBSC), Longjin, S. H. Chun 13346 (MO, KUN), P. C. Tam 57422 (IBSC, MO), H. Q. Li 40115 (KUN), 40129 (KUN), without locality, H. Y. Liang 69979 (A); GUIZHOU: without locality, Y. Tsiang 12414 (SZ); YUNNAN: Funing, Wenshan 615 Group 185 (KUN), Luchun, D. D. Tao 962 (KUN 4 sheets), 1059 (KUN 2 sheets), Lungzung, T. T. Yu 19455 (A), without locality, *Sino-USSR Exped. 775* (A).

This species is similar to *E. bockii*, but the fruit is densely white-spotted when mature, and the leaves are attenuated at both ends, which is much different from the latter species.

59. *Euonymus theacola* C. Y. CHENG ex T. L. XU & Q. H. CHEN, Bull. Bot. Res., Harbin 14(4): 349, f. 1. 1994. TYPE: CHINA. Guizhou: Cehang, alt. 1,200 m, May 19, 1960, *Guizhou Exped. 2563* (not seen). [Fig. 41]

- *E. ilicioides* C. Y. CHENG, in herb., nom. inval. TYPE: CHINA. Yunnan: Marlipo, alt. 1,300-1,600 m, in the mixed forests on rock mountain, Nov. 11, 1947, *K. M. Feng 13200* (Holotype: A!, Isotypes: KUN! PE!).
- *E. coriaceifolia* C. Y. WU, in herb., nom. inval.
- *E. omeishanensis* C. Y. CHENG, Icon. Cormophyt. Sin. Suppl. 2: 221, in clavis. 1983, nom. nud.

Everygreen shrub or shrublike, 2-4 m tall, sometimes climbing. Leaves ovate to long elliptic, 6-12 x 2-3 cm, apex acuminate or acute, sometimes caudate, base subround, cuneate or attenuate, margin obscurely subentire, crenulate, or

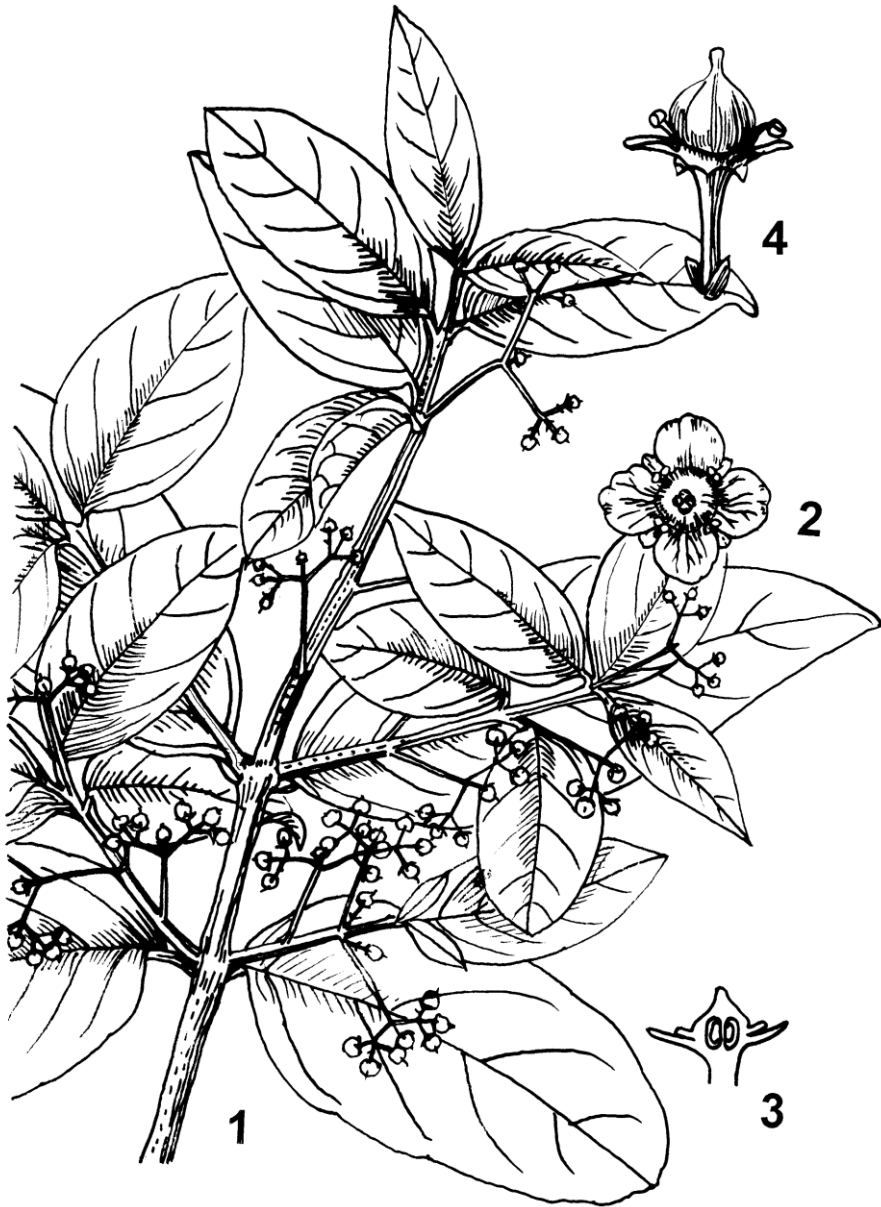


Fig. 41. *Euonymus theacola* T. L. XU & Q. H. CHEN – 1. flower branch; 2. flower; 3. ovary; 4. young fruit.

sparsely crenate with large teeth, lateral veins 5-7 pairs, apparently rugose on the surface, impressed above and prominent beneath, curved forward, netting and disappearing before reaching margin; petiole sturdy, less than 1 cm long. Peduncle 2-3 cm long, sturdy, with several flowers. Flower 4-merous. Sepals semiorbicular, small. Petals orbicular, c. 6 mm in diam., from light pink (early state) to yellow-green (mature state from record), nearly rotund. Ovary verruculose. Capsule globose, 5-6 mm in diam., lavender-white when fresh (from record) and brown or yellow when dry, 4-lobed when open at maturity; seeds covered by orange aril.

Phenology. Flowering: March to June; Fruiting: July to November.

Distribution: China (Guizhou, Sichuan, Yunnan), Bangladesh, India (Assam), Myanmar, Thailand; alt. 1,300 - 2,900 m, occasional.

SPECIMENS EXAMINED: **BANGLADESH:** *W. Griffith* 217 (GH), 1958 (GH), 1960 (GH). **CHINA:** SICHUAN: Emei, *J. H. Xiong & S. S. Zhang* 31074 (IBK, IBSC, PE 2 sheets, SZ), 32800 (IBK, IBSC), *L. Z. Hu & P. J. Duan* 57-69 (SZ), *E. H. Wilson* 4789 (A, PE), *S. Z. Yu* 49639 (SZ); YUNNAN: Anning, *C. Y. Wu et al.* 205 (KUN), Dali, *T. N. Liou* 16568 (KUN, PE), Fohai [Menghai], *H. T. Tsai* 59-10545 (KUN), *C. W. Wang* 73927 (A, IBSC, NAS); Fumin, *P. Y. Chiu* 59268 (KUN), Jingdong, *P. Y. Chiu* 52986 (KUN), *S. G. Xu* 4574 (KUN 2 sheets), Jinping, *X. W. Li* 459 (KUN), *Sino-USSR Exped.* 1548 (KUN), Kunming, *K. M. Feng* 147 (A), *P. Y. Chiu* 54387 (KUN), 57818 (KUN), *K. M. Feng* 172 (KUN), Kwangnan [Guangnan], *C. W. Wang* 87584 (IBSC, KUN 2 sheets), Lichiang [Lijiang], *H. D. McLaren* 78a (BM), Mengtse [Mengzhi], *T. N. Liou* 18562 (PE), 18707 (PE), 18708 (PE), Pingpien [Pingbian], *H. T. Tsai* 62504 (A, IBSC, KUN, NAS, PE), Red River [Honghe], *A. Henry* 9631 (A, MO, NY), Shweli-Salween divide, *G. Forrest* 17488 (A), Shunning [Fengqing], *T. T. Yu* 16601 (KUN, PE), 16331 (A, KUN, PE); Shuangpo, *W. Q. Yin* 558 (KUN), Semao [Simao], *A. Henry* 12023 (A, NY), 13043 (A, MO), Sichou [Xichou], *C. P. Tsien et al.* 757 (PE), Songming, *P. Y. Chiu* 128 (KUN), Wenshan, *K. M. Feng* 11215 (A, KUN 3 sheets, PE), without location, *G. Forrest* 24288 (PE), 29594 (PE), 26080 (PE), 30379 (PE), 30405 (PE), *E. E. Maire* 2423 (BM), *Q. A. Wu* 9382 (KUN), Yangbi, *H. D. McLaren* 160 (BM), 166 (A). **INDIA:** Assam, *F. K. Ward* 11525 (BM), 13636 (BM), without location, *J. O. Voigt* 235 (A), *E. Drake* 157 (P). **MYANMAR:** North Triangle, *F. K. Ward* 20611 (A), without location, *W. Griffith* 1977 (GH). **THAILAND:** Krabi, *K. Larsen et al.* 43322 (P).

This species is similar to *E. theifolia*, but the leaves are large, long-elliptic, veins impressed above and prominent beneath, branches and twigs with striations, and capsule large, to 5-6 mm in diameter, brown or nearly yellow when mature, not dark or black such as in the latter. In the original description the mature fruit is not described, but specimens examined in this study reveal that it is globose.

60. *Euonymus theifolia* WALL. ex LAWSON in J. D. HOOK., Fl. Brit. India 1: 612. 1875. TYPE: INDIA. *N. Wallich* Cat. 4293 (not seen). [Fig. 42]

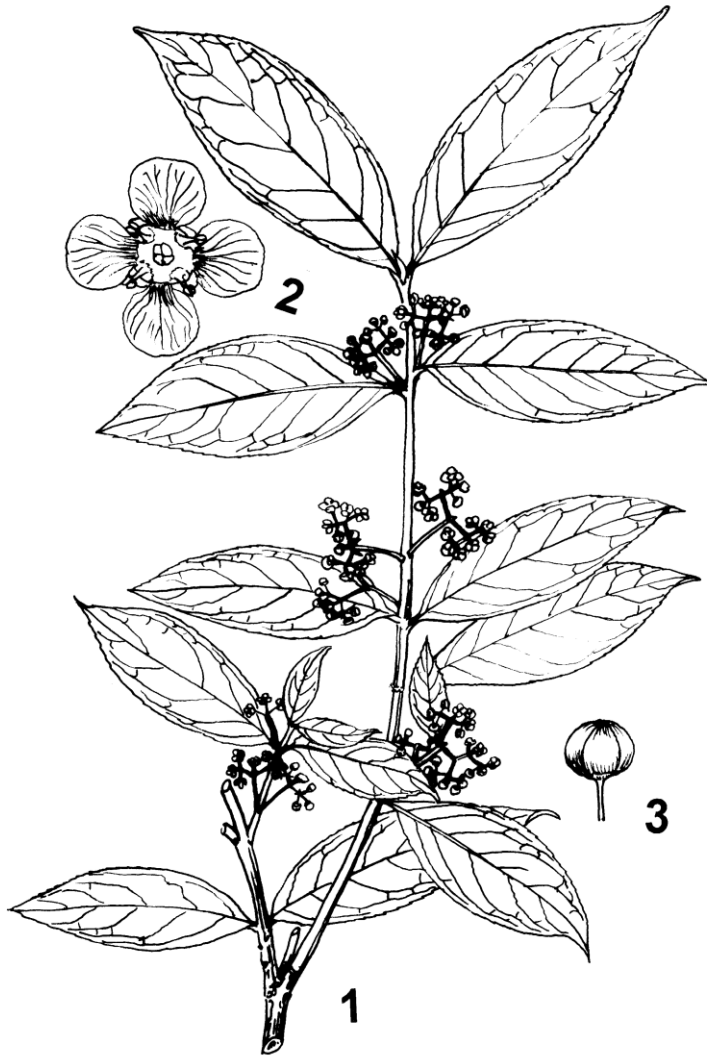


Fig. 42. *Euonymus theifolia* LAWSON – 1. flower branch; 2. flower; 3. fruit.

- = *E. paravagans* Z. M. GU & C. Y. CHENG, Bull. Bot. Res., Harbin 11(3): 19, f. 1-5. 1991. TYPE: CHINA. Yunnan: Tengchong, Apr. 21, 1984, Z. M. Gu 84048 (not seen).
- *E. yangbiensis* C. Y. CHENG, in herb., nom. inval. TYPE: CHINA. Yunnan: Yangbi, R. C. Ching 22522 (PE!).

Evergreen shrub or ascending subshrub, to 2-3 tall; branches and twigs round, usually brown or yellow. Leaves elliptic or elliptic-lanceolate, 5-10 x 2.5-5 cm, apex acute or acuminate, base cuneate, lateral veins 5-8 pairs, margin crenulate to serrate; petiole 3-5 mm long. Peduncle 2-3 cm long, slender, usually with more than 7 flowers, sometimes only 5; pedicel c. 5 mm long. Flower 4-merous. Sepals semiround. Petals nearly round, c. 5 mm in diam., greenish or whitish. Capsule brown or brown-yellow, c. 8 mm in diam.; seeds with red aril.

Phenology. Flowering: March to June; Fruiting: August to December.

Distribution: Bangladesh, Bhutan, China (Xizang, Yunnan), India, Myanmar, Nepal, Sikkim, Thailand; alt. 1,550-3,400 m, mainly in forests, bushes or woodland; common.

SPECIMENS EXAMINED: **BHUTAN:** Chukka, A. J. C. Grierson & D. J. Long 3244 (A), Punakha, A. J. C. Grierson & D. J. Long 4671 (A), Rinchu, H. Hara et al. 13992 (A), Ritang, H. Kanai et al. 9212 (A, NA), Tashiling, H. Kanai et al. 5197 (A), Tinlegang, H. Hara et al. 11304 (A), Tonga, B. Bartholomew 1662 (A, GH). **CHINA:** XIZANG: Medog, P. S. Li & S. Z. Cheng 3490 (PE), 4220 (PE 2 sheets), Pome, T. Naito et al. 797 (PE), 1014 (PE 2 sheets), F. Ludlow et al. 13034 (A), Salwin and Irrawady Divide, J. F. Rock 22076 (A), Tsarong, G. Forrest 21621 (A, US); YUNNAN: Che-tse-lo (Bijiang), H. T. Tsai 58375 (A, KUN, NAS), 58559 (A), Lungling [Longling], H. T. Tsai 56476 (A, KUN, PE 2 sheets, SZ), 55016 (A, KUN, PE, SZ), Luse [Luxi], H. T. Tsai 56329 (A, KUN, LBG, SZ), Lotueshan, J. F. Rock 9535 (A, NY, US), Mekong valley, J. F. Rock 8953 (A, US), Mekon-Salwin divide, T. T. Yu 23132 (A, KUN 2 sheets), Mianning, T. T. Tu 17953 (A, KUN 2 sheets, PE), N'Maikha-Salween divide, G. Forrest 17890 (A), Pingpien [Pingbian], H. T. Tsai 62281 (A, N, SZ), Shangpa [Fugong], H. T. Tsai 58699 (A), 58765 (A), Shweli-Salween divide, G. Forrest 17584 (A), Shunning [Fengqing], T. T. Yu 16392 (A, KUN 2 sheets), Tali, H. D. McLaren 116 (A), Wuding, J. S. Xin 70 (KUN 2 sheets), Yangbi, R. C. Ching 22522 (KUN 2 sheets, PE), 22548 (KUN 2 sheets), 25332 (KUN 2 sheets, PE), 1984 Sino-Amer. Exped. 703 (A, KUN), without location, F. Duclous 3187 (P), G. Forrest 14584 (A), H. T. Tsai 57005 (A, LBG), 57023 (A, KUN, LBG, NAS, PE), 57337 (A). **INDIA:** Khasi Hills, F. K. Ward 16037 (BM), Sirhoi, F. K. Ward 17523 (A, BM), Ukhrol, F. K. Ward 17135 (A, BM), Upper Shillong, L. F. Ruse 53 (A). **E. HIMALAYAS:** Lachung, K. Biswas 6941 (A), without location, W. Griffith 1976 (GH). **NW HIMALAYAS:** without location, D. Brandis 891 (A). **MYANMAR:** Northern Burma, F. K. Ward 83 (A), 20747 (A). **NEPAL:** Bagmati, D. H. Nicolson 2914 (US), Eastern Nepal, H. Hara et al. 6302828 (A). **SIKKIM:** without location, J. D. Hooker s.n. (A, GH, US). **THAILAND:** Chiangmai, N. Fukuoka 62288 (A).

This species is similar to *E. bockii*, but differs from the latter by its narrow leaves attenuated at both ends, as well as the capsule without white spots. It is also similar to *E. echinata*, but differs from it by the globose capsule, while it is as well related to *E. japonica*, from which it differs by the large leaves and large fruit of the latter species. From the present understanding, the species is one which relates among *E. bockii*, *E. hederacea*, and *E. tsangshanensis* (i.e. *E. jinyangensis*) in the section, but is still separately delimited from them under the alpine condition. However, there is much diversity within each of the above

species, such as in leaf form and size, caused either by ecological conditions or habitat. The species was reported from Guizhou and Sichuan (Flora of Sichuan 4: 294. 1988) but this record cannot be confirmed in the present study.

61. *Euonymus tonkinensis* (LOES.) LOES., Bot. Jahrb. Syst. 30: 453. 1902. (TYPE: see below). [Fig. 43]

Bas.: *E. chinensis* LINDL. var. *tonkinensis* LOES., Notizbl. Bot. Gart. Berlin 3(24): 77. 1900. TYPE: VIETNAM. Tonkin: in silva Ding-Bang inter Hanoi et Bac Miuh, *B. Balansa* 4983 (not seen).

≡ *E. cochinchinensis* PIERRE var. *tonkinensis* (LOES.) PITARD in LECOMTE, Fl. Indo-Chine 1: 874. 1911.

Evergreen shrub, to 2 m tall; branches and twigs round, usually brown or yellow. Leaves round to ovate, 4-5 x 3-3.5 cm, apex round or subacute, base round to cuneate, lateral veins c. 5 pairs, upper margin crenulate; petiole 3-5 mm long. Peduncle 7-8 cm long, sturdy, usually with several dichotomous branches and 20-30 flowers; pedicel c. 5 mm long. Flower 4-merous. Sepals semiround. Petals nearly round, c. 5 mm in diam. when open, greenish. Capsule brown or brown-yellow, 8-10 mm in diam.; seeds with red aril.

Phenology. Flowering: February to August; Fruiting: July to January.

Distribution: China (Guangdong, Guangxi), Vietnam; alt. 1,550-3,400 m, mainly in forests, bushes or woodland; rare.

SPECIMENS EXAMINED: **CHINA**: GUANGDONG: Gaoyao, *K. C. Ting* 10332 (IBSC); GUANGXI: Baishou, *Y. J. Li* 81 (PE). **VIETNAM**: Tonkin, *R. P. Bon* 3207 (P), *A. Petelot* 6677 (A), 6914 (A), 28593 (A); Van Dien, *Sino-Vietnam Exped.* 2491 (KUN).

This species is very similar with *E. japonica*, but the fruit is much larger, the inflorescence is much longer, and flowers are more numerous than in the latter. However, due to the limited materials this species is still in need of further study.

62. *Euonymus vaganoides* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 10: 93, fig. 2. 1997. TYPE: CHINA. Yunnan: Pingbian, Bai Mu Tan, 29 Nov 1939, 1,250 m, *C. W. Wang* 82863 (KUN! 2 sheets). [Fig. 44]

Evergreen subshrub, climbing; branches terete, twigs sturdy, brown or dark brown. Leaves thickly coriaceous, elliptic-obovate, clustered at apex of branches, 8-10 x 3-5 cm, apex cuspidate or acuminate, base broadly attenuate, margin sparsely crenulate, lateral veins 5-7 pairs, prominent beneath; petiole sturdy, c. 3 mm long. Flower not seen. Capsules few at apex of branches, nearly globose, 7-9 mm in diameter, purple, densely and minutely white-spotted when dry; seeds covered by orange-red aril.

Phenology. Flowering: Not known; Fruiting: September to November.

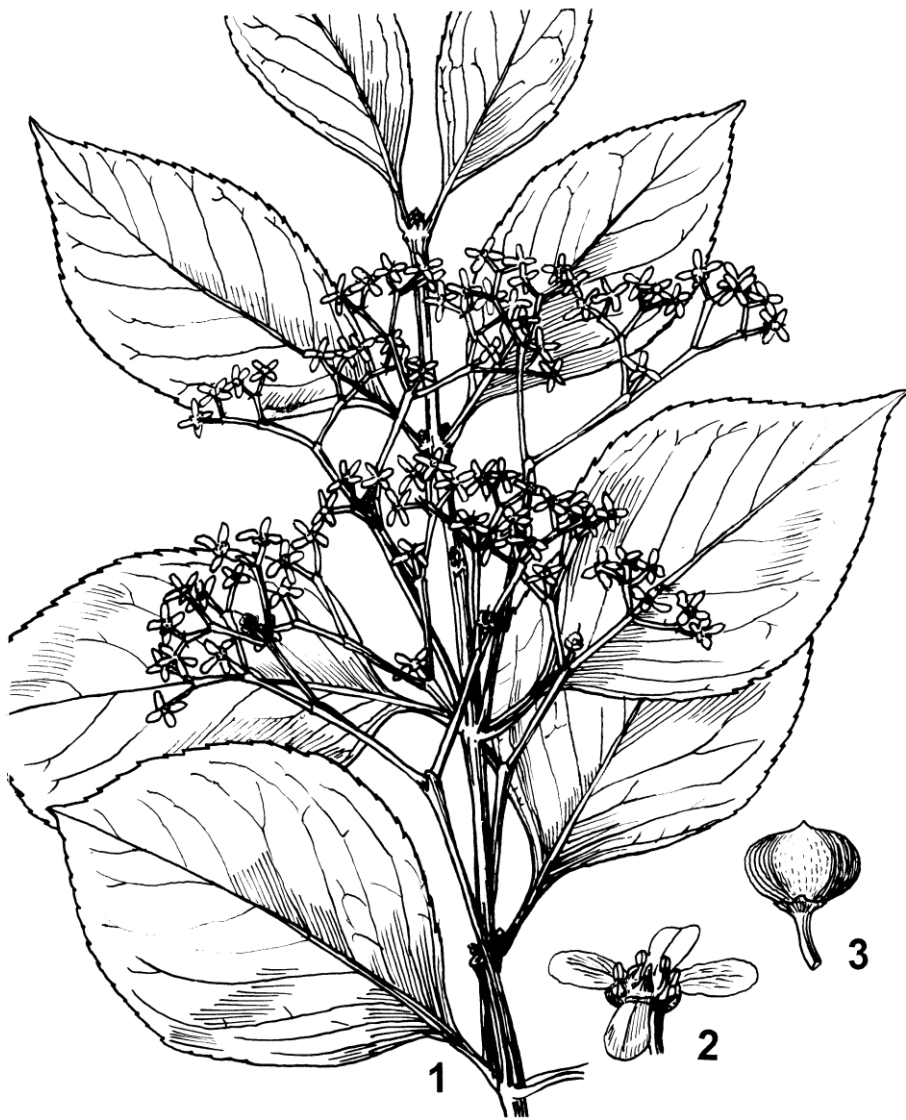


Fig. 43. *Euonymus tonkinensis* (LOES.) LOES. – 1. flower branch; 2. flower; 3. fruit.

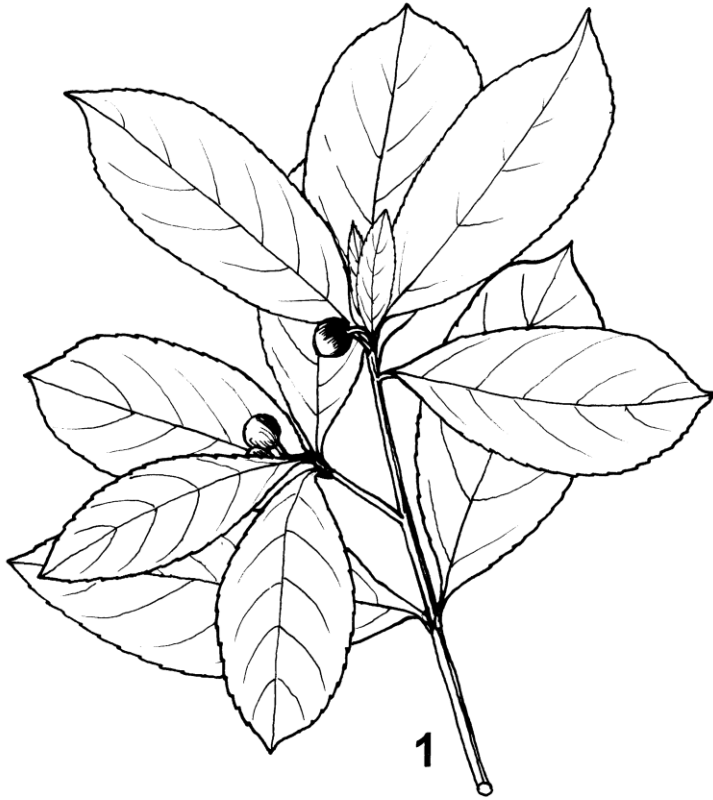


Fig. 44. *Euonymus vaganoides* J. S. MA – 1. fruit branch

Distribution: China (Guangxi, Hunan, Yunnan); alt. 1,100-1,300 m, mainly in forests, bushes or woodland; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Guanyang, Z. Y. Chen 52179 (KUN); HUNAN: Xinning, L. H. Liu 15027 (KUN, PE), 15339 (KUN, PE); YUNNAN: Pingbian [Pingbian], C. W. Wang 82658 (KUN 2 sheets), Yanshan, C. W. Wang 84851 (KUN).

This species is very unusual in the section, with large, coriaceous, obovate leaves; large capsule to 7-9 mm in diameter; flowers and fruits clustered mainly in the center of the upper branches; capsule dark red when fresh or brown or black with small white spots when dry; and the aril orange-red when fresh.

63. *Euonymus vagans* WALL. in ROXB., Fl. Ind. 2: 412. 1824. TYPE: INDIA. *N. Wallich Cat. s.n.* (not seen). [Fig. 45]

- = *E. pseudo-sootepensis* Y. R. LI & S. K. WU, Acta Bot. Yunnan. 3(3): 354, f. 4. 1981. TYPE: CHINA. Xizang, Medog, *Qinghai-Xizang Exped. 74-4959* (PE! fr., 5 sheets).
- = *E. jinggangshanensis* M. X. NIE, Bull. Bot. Res., Harbin 10(4): 25, f. 1-4. 1990. TYPE: CHINA. Jiangxi: Jinggangshan, alt. 1,600 m, June 3, 1989, *M. X. Nie et al. 10072* (not seen).
- = *E. jinfoshanensis* Z. M. GU, Acta Phytotax. Sin. 31(2): 176, f. 1. 1993. TYPE: CHINA. Sichuan: Nanchuan, alt. 1,200 m, July 4, 1984, *Z. M. Gu 84405* (not seen).
- *E. compacticymosa* C. Y. CHENG, in herb., nom. inval. TYPE: CHINA. E. Tibet and SW China: without precise locality, *G. Forrest 26701* (A!).

Evergreen shrub or ascending subshrub, up to 3 m; branches and twigs round, usually brown or dark brown, sometimes gray. Leaves ovate, ovate-elliptic or round-ovate, 4-5 x 2.5-3.5 cm, apex nearly round, base round to truncate, sometimes cuneate, lateral veins c. 5 pairs, usually impressed above; petiole c. 5 mm long. Peduncle 1-2 cm long, usually with several flowers; pedicel usually less than 6 mm long. Flower 4-merous. Sepals semiround. Petals nearly round, c. 6 mm in diam. when fully open, greenish or whitish. Capsule brown or red-brown, less than 6 mm in diam.; seeds with red aril.

Phenology: Flowering: May to July; Fruiting: August to November.

Distribution: Bangladesh, Bhutan, China (Guangxi, Guizhou, Sichuan, Xizang, Yunnan), India, Laos, Myanmar, Nepal, Sikkim; alt. 1,100-3,300 m, mainly in mixed forests, or bushes; occasional.

SPECIMENS EXAMINED: **BHUTAN:** Tongsa, A. J. C. Grierson & D. G. Long 1192 (A). **CHINA:** GUANGXI: Lingchuan, Z. Y. Chen 53708 (KUN), Xiangxian, C. Wang 39438 (PE, SZ); GUIZHOU: Songtao, *North Guizhou Exped. 1848* (KUN); SICHUAN: Nanchuan, K. F. Li 62614 (PE, SZ), J. H. Xiong & Z. L. Zhou 93379 (PE, SZ); XIZANG: Nyingchi, P. S. Li et al. 6484 (PE 2 sheets), Pome, 1975 *Xizang Exped. 81* (PE), Tsarong, G. Forrest 22746 (A), J. F. Rock 22281 (A); YUNAN: Cangshan, 1981 *Sino-Brit. Exped. 928* (A), 1004 (A), Dali, 1984 *Sino-Amer. Exped. 1146* (A, US), Fugong, *Qinghai-Xizang Exped. 7042* (PE, KUN 2 sheets), Funing to Guangyuan, S. Z. Wang 1075 (KUN 2 sheets), Guyong, S. K. Wu 6949 (KUN 2 sheets), Mekong-Salwin divide, G. Forrest 14207 (A), 17234 (A), 19643 (A, US), Shweli-Salween divide, G. Forrest 18104 (A), Yangbi, 1981 *Sino-Brit. Exped. 151* (A). **INDIA:** Sirhoi, F. K. Ward 18256 (A). **LAOS:** Phong Saly, E. Poilane 25974 (A).

In the original publication, this species was described and compared with *E. echinata*, and the treatment was followed by Flora of British India (HOOKER, 1785) and Flora of Assam (KANJILAL et al., 1937). However, the species is characterized by its small ovate leaves and the lateral veins impressed above but

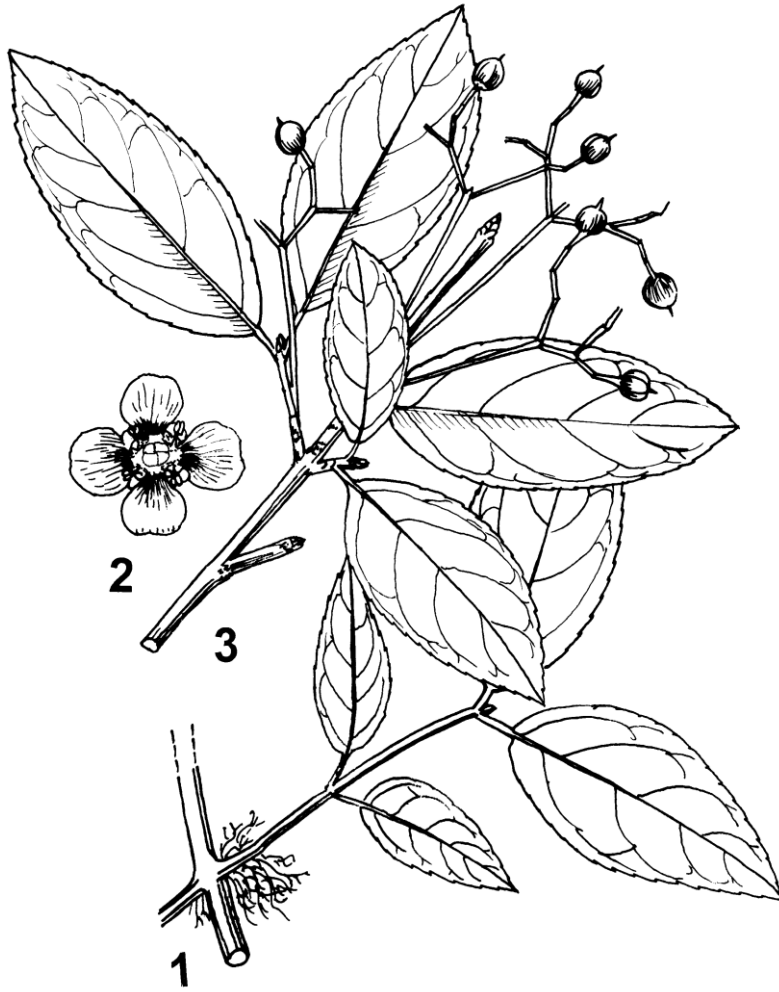


Fig. 45. *Euonymus vagans* WALL. – 1. plant; 2. flower; 3. fruit branch.

not prominent beneath, features that are not found in any other species in the section. In other aspects, the species is very similar to *E. japonica* in fruit shape, but the leaves are totally different from the latter species by their ovate or triangular-ovate shape, as well as the lateral veins impressed above. This species is also similar to *E. echinata* in having an alpine habitat, but the fruit is totally different from it due to being globose and not echinate.

However, in the historical record this species was not treated properly. From the evolutionary aspect, it should be among the groups of *E. hederacea* from E,

S and SE Asia and *E. theifolia* from SW China to the Himalayas. It should also be placed there for reasons that the species has been renamed again and again (see above synonyms for details), or reduced to the others, such as *E. bockii* by BLAKELOCK (1951), but the latter is much larger than it both in the leaves and fruit characteristics. The species was reported in Guangdong, Hubei, Henan and Shanxi by Y. R. LI (Vascular Plants of the Mt. Hengduan 1: 1101. 1993), but those records cannot be substantiated in the present work.

64. *Euonymus venosa* HEMSL., Kew Bull. 1893: 210. 1893. SYNTYPES: CHINA. Szechuan: North and South Wushan, and Hupeh: South Patung, A. Henry 5778 (GH! US!), 7019 (GH!), 7284 (not seen). [Fig. 46]

Deciduous shrub to small tree, 2-6 m tall, branches and twigs sturdy, gray or brown, terete, glabrous. Leaves thinly coriaceous or coriaceous, beltlike-elliptic, 6-12 x 1.5-2 cm, acuminate or acute at both ends, margin from finely crenulate to nearly entire, lateral veins and veinlets curved or bent, sometimes tortuously so (the only species with this character in the genus), prominent on both surfaces; petiole 3-5 mm long. Peduncle 2-4 cm long, with few flowers (rarely 7). Flower 4-merous, 6-8 mm in diam.. Petals pale yellow, nearly rotund. Capsule globose or subglobose, with shallow grooves, 8-10 cm in diam., pink-brown to yellow-brown, opening by 4 lobes at maturity; seed yellow-brown, covered by orange-red aril.

Phenology. Flowering: May to July; Fruiting: August to September.

Distribution: China (Henan, Hubei, Hunan, Shaanxi, Sichuan); alt. 700 - 2,500 m, in forests, bushes, or on rocks; occasional.

SPECIMENS EXAMINED: **China:** HUBEI: Chienshih [Jianshi], *H. C. Chow* 1332 (A, NY), Hefeng, *H. J. Li* 6789 (PE), Hsingshan [Xingshan], *E. H. Wilson* 559 (A, GH, MO), Ichang (Yichang), *A. Henry* 5852 (P), West Hubei, *W. C. Cheng* 3775 (A), *E. H. Wilson* 787 (NY), Xingshan, *H. J. Li* 1574 (PE); HUNAN: Hengyang, *Z. D. Li* 82 (PE); SHAANXI: Changning, *Y. Y. Cao* 113 (KUN), Chenggu, *T. N. Liou* 11550 (PE), Fengxian, *B. P. Vassilkov* 293 (KUN), Liuba, *T. N. Liou* 11591 (PE), *C. L. Tang* 794 (KUN), Meixian, *Team* 723 (KUN), Shanyang, *T. P. Wang* 899 (A), Shiquan, *Y. Y. Cao* 120 (KUN), Taibaishan, *K. T. Fu* 2439 (PE), without location, *G. Giraldi* s.n. (A), Yangxian, *T. N. Liou* & *P. C. Tsoong* 3866 (PE), 3868 (PE), 5836 (KUN); SICHUAN: Baoxing, *K. L. Chu* 3406 (BM, P, PE), 3460 (PE), Chengkou, *T. L. Dai* 104120 (PE), 105108 (PE), 105471 (PE), 106043 (PE), 106527 (KUN, PE), 106557 (KUN, PE), without location, *W. Y. Cheng* 4121 (US).

This is very unusual species in the genus, having curved or bending veins and veinlets which are sometimes tortuously contorted, and usually belt-form leaves which are sometimes also lanceolate or ovate. It can be easily recognized even without fruit or flowers, one of only very few such cases in the genus. The species was reported from Yunnan (Flora of Sichuan 4: 292. 1988), although that record cannot be upheld in the present work. The distribution from Henan is based on the local flora (Flora of Henan 2: 515. 1988).



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

65. *Euonymus yakushimensis* MAKINO, Bot. Mag. (Tokyo) 23: 248. 1909. TYPE: JAPAN. Osumi: *T. Makino s.n.* (Sept. 1909, not seen).

Deciduous shrub, to 2 m tall, branches and twigs green with whitish waxlike surface, terete, glabrous. Leaves membranaceous, lanceolate to ovate-lanceolate, 5-13 x 2-4 cm, acuminate or acute at both ends, margin finely crenulate, lateral veins 5-7 pairs, slightly raised; petiole 3-5 mm long. Peduncle 4-8 cm long, slender, terminal or axillary with few flowers. Flower 4-merous, 8-10 mm in diam. Petals purple, nearly rotund. Capsule globose or subglobose, 8-10 mm in diam., brown or yellow-brown, pendulous, opening by 4 lobes at maturity; seeds yellow-brown, covered by red aril.

Phenology. Flowering. June to July; Fruiting: September to November.

Distribution: Japan; alt. 700 - 1,500 m, in woodland or forests; rare.

SPECIMENS EXAMINED: **JAPAN:** Kagoshima, *H. T. Im & Satoki 2219 (A)*, *G. Murata et al. 201 (A)*, *J. Murata et al. 15595 (A, US)*. Yakushima, *S. Hatushima 14727 (A)*, *T. Motozi 1843 (NY)*, *T. Komeda 22328 (A)*, *T. Yahara & S. Akiyama 877009 (A, NY)*.

This species has long, narrow leaves; fruit is similar to *E. melanantha* but very small.

Sect. 5. *Euonymus*

Shrubs to small trees, sometimes shrublike or rare climbing, evergreen or deciduous. Flower usually 4-merous, occasionally 5-merous. Fruit rugose, without spines, wings, not globose, 4-lobed when open at maturity, occasionally 5-lobed.

The section was once divided into two subsections, i.e. *Multiovulatae* and *Euonymus*, i.e. *Biovulatae*) since LOESENER's work in ENGLER & PRANTL's Nat. Pflanzenfam. (1942) and followed by a few others (such as FRPS 45(3): 36-46. 1999). It is true that some species have more than two ovules per cell. However, the seed number per cell in the same species is usually only two seeds reaching maturity, which is the same as in other species in the section. Evidently, it is difficult to use this character because most of the cases are not recorded from firsthand observations of the number of ovules, so it is not easy to make decisions without proper material, especially since occasionally a few seeds are found even within one "multiovules" species. In fact, some work has been confused already with regard to their placement within subdivisional levels. In the present work, we have kept them as a whole at the level of section, and they can be differentiated based on the following key.

64 species total, 2 in N America, 2 in Australia, 2 in N Asia, 3 in Africa, 3 in Europe, 5 in C Asia, 7 in Himalayas, 10 in SE Asia, 24 in S Asia and 37 in E Asia. Type: *Euonymus europaea* L.

Key to Species

1. Capsule fusiform or subfusiform, more than twice as long as wide
 2. Leaves long elliptic, acuminate at both ends; flower and fruit 4-merous; petals entire; capsule c. 4 cm long. S Asia.....82. *E. fusiformis*
 2. Leaves elliptic, apex rotund to obtuse; flower and fruit 5-merous; petals shortly ciliate; capsule 1.5-2.4 cm long. SE Asia..... 112. *E. recurvans*
1. Capsule obcordate to ovoid, less than twice as long as wide
 3. Flower large, more than 1 cm in diam.; disc large, 7-8 mm in diam; ovules usually 3-12 per cell
 4. Flower and fruit 4-merous
 5. Leaves usually long elliptic to oblong, or oblanceolate. E & S Asia, Himalayas..... 88. *E. grandiflora*
 5. Leaves usually ovate to elliptic, or obovate. E Asia..... 72. *E. carnosa*
 4. Flower and fruit 5-merous
 6. Petal with conspicuous black or purple veins towards margin; leaves elliptic, less than 6 cm long; capsule 1.2-1.6 cm long. E & S Asia, Himalayas.....119. *E. tingens*
 6. Petal without black or purple veins
 7. Leaves linear to lanceolate or obovate; capsule c. 2.5 cm long. E Asia 126. *E. yunnanensis*
 7. Leaves ovate to elliptic
 8. Leaves elliptic-lanceolate; capsule ellipsoid, to 4 x 2 cm, tapering at apex into fine point. Himalayas . 99. *E. macrocarpa*
 8. Leaves ovate to elliptic; capsule coriaceous, globoid with 5 angles, narrowed sharply at base. Australia ...86. *E. globularis*
 3. Flower small, less than 10 mm in diam.; disc small, 2-5 mm in diam., usually 2 ovules per cell
 9. Leaves usually small, less than 5-6 (7) cm long, if larger branches and twigs with tubercles or black warts
 10. Leaves linear, belt-linear, linear-elliptic or linear-lanceolate
 11. Branches and twigs terete; leaves belt-linear, 1.8-2.3 x c. 0.3 cm; flowers pale yellow. E Asia 118. *E. ternifolia*
 11. Branches and twigs with 4 corky wings
 12. Leaves linear, 2-4 x c. 0.2 cm; flowers white-green. E Asia 97. *E. lichiangensis*
 12. Leaves linear-elliptic or linear-lanceolate
 13. Leaves linear-elliptic, 2-4 x 0.3-1.0 cm; flowers white-green or greenish-yellow. E Asia 105. *E. nanoides*
 13. Leaves linear-lanceolate, 2-7 x 0.2-2.0 cm; flowers white-green. E, C & N Asia, E Europe..... 104. *E. nana*
 10. Leaves ovate, oblong, elliptic or lanceolate, usually more than 1 cm wide
 14. Branches and twigs with tubercles or black warts; capsule subglobose, base rounded, with shallow angles or not angled. E, C & N Asia, E Europe..... 121. *E. verrucosa*

- 14. Branches and twigs without tubercles or black warts
 - 15. Leaves thickly coriaceous, rotund-oblong; capsule wider than long. E Asia 109. *E. percoriacea*
 - 15. Leaves papyraceous; capsule longer than wide
 - 16. Leaves mostly entire, sparsely and remotely crenate above; capsule 5-angled. S Asia 123. *E. walkerii*
 - 16. Leaves crenulate or serrulate
 - 17. Capsule pyriform with cuneate base; leaves lanceolate, acute at apex, usually crenulate. E & C Asia 115. *E. semenovii*
 - 17. Capsule subglobose with rounded base; leaves acuminate at apex, serrulate. E Asia 100. *E. melanantha*
- 9. Leaves usually large, more than 7 cm long; branches and twigs smooth, not verrucose or warty
 - 18. Leaves deciduous
 - 19. Flower and fruit 5-merous
 - 20. Leaves ovate to elliptic; capsule prominently 5-angled, not emarginate at apex. N America 107. *E. occidentalis*
 - 20. Leaves elliptic; capsule obscurely 5-angled, with emarginate apex. E Asia 79. *E. dolichopa*
 - 19. Flower and fruit 4-merous
 - 21. Young branches with small corky wing; capsule 4-angled, base cuneate. E Asia 110. *E. phellomana*
 - 21. Young and old branches without corky wing
 - 22. Capsule with obscure angles
 - 23. Capsule with small apiculum at apex; leaves crenate or serrate. E Asia 90. *E. hui*
 - 23. Capsule without apiculate at apex; leaves rounded at apex, crenulate. E & S Asia, Himalayas 122. *E. viburnoides*
 - 22. Capsule with strong angles and grooves
 - 24. Petal dark brown to purple; leaves 8-16 cm long, ovate to elliptic; capsule c. 10 mm in diam. N America 68. *E. atropurpurea*
 - 24. Petal white to green
 - 25. Leaves oblong, long-ovate to long elliptic, rugose on both surfaces
 - 26. Leaves 8-18 cm long, apex acute or acuminate, rugose on both sides. C, E & S Asia, Himalayas.. 89. *E. hamiltoniana*
 - 26. Leaves 6-10 cm long, apex rotund, glabrous on both sides. E Asia 108. *E. parasimilis*
 - 25. Leaves ovate, ovate-elliptic, smooth on both surfaces, 4-8 cm long

- 27. Petiole c. 5 mm long; leaves cuneate at base. C Asia, Europe 81. *E. europaea*
- 27. Petiole 10-15 mm long; leaves rotund at base. E Asia 98. *E. maackii*
- 18. Leaves evergreen
 - 28. Petal usually fimbriate to denticulate on margin
 - 29. Petal pink to red or purple; cymes to 15-20 cm long; leaves lanceolate, to 20 x 2-3 cm. E & S Asia 95. *E. laxicymosa*
 - 29. Petal white to green, fimbriate
 - 30. Cymes with short peduncle, simple, axillary, 1-3-flowered; capsule clavate to broadly obovoid, 1.5-2.5 cm in diam. S & SE Asia 92. *E. indica*
 - 30. Cymes with distinct peduncle to 8 cm long; capsule broadly obovoid, c. 1 cm in diam.
 - 31. Leaves thickly coriaceous, generally ovate or ovate-lanceolate, round or nearly round at base. S & SE Asia 75. *E. cochinchinensis*
 - 31. Leaves thinly coriaceous, generally lanceolate, attenuate or narrowly cuneate at base. E Asia 83. *E. gibber*
 - 28. Petal entire
 - 32. Flower and fruit 5-merous
 - 33. Leaves sessile, or subsessile with petiole less than 3 mm long
 - 34. Leaves bullate; capsule subobovoid; inflorescence to 4.5 cm long; flowers few; leaves elliptic. SE Asia 91. *E. impressa*
 - 34. Leaves smooth; capsule obtriangular-pyramidal; flowers numerous; leaves suborbicular or orbicular. Australia 70. *E. australiana*
 - 33. Leaves with petiole at least more than 5 mm long
 - 35. Leaves dentate with large teeth; capsule subglobose, with shallow grooves; flowers black-purple, c. 1 cm in diam. E Asia 74. *E. chloranthoides*
 - 35. Leaves not dentate with large teeth
 - 36. Leaves membranous; flower purplish red; capsule obcordate or obovoid, distinctly 5-lobed. SE Asia 66. *E. acuminifolia*
 - 36. Leaves chartaceous to coriaceous
 - 37. Leaves thickly coriaceous and rigid, margin entire and revolute; capsule turbinate, 5-angled. S Asia 113. *E. revoluta*
 - 37. Leaves chartaceous to coriaceous, margin never revolute

- 38. Capsule large, 1.5-18 cm in diam., leaves 7-9 cm long, margin entire or nearly so. SE Asia ..
..... 124. *E. wrayi*
- 38. Capsule small, less than 1.4 cm in diam
 - 39. Petals purple
 - 40. Leaves undulate to serrulate, with petiole 5-15 mm long. S Asia
..... 77. *E. crenulata*
 - 40. Leaves entire or crenulate to serrate
 - 41. Leaves serrate. E & S Asia
..... 116. *E. serratifolia*
 - 41. Leaves entire to crenulate or crenate, not serrate
 - 42. Leaves narrowly ovate, finely crenulate, apex long acuminate; capsule nearly turbinate. E & S Asia 96. *E. laxiflora*
 - 42. Leaves ovate to elliptic, entire, apex acute or attenuate; capsule obpyramidal. S Asia
..... 78. *E. dichotoma*
 - 39. Petals white, cream, or greenish white to green
 - 43. Young branches acutely 4-angled or nearly winged; leaves ovate to obovate or oblong, nearly round at base. S Asia 67. *E. angulata*
 - 43. Young branches terete, without angles or wings
 - 44. Leaves long lanceolate, coriaceous, finely and remotely serrate. E Asia ..
..... 120. *E. tsoi*
 - 44. Leaves ovate, elliptic or oblong
 - 45. Leaves crenulate above and entire below; capsule c. 1.0 cm. E, S & SE Asia, Himalayas
..... 84. *E. glaber*
 - 45. Leaves completely entire
 - 46. Disc not evident; capsule c. 1.2 cm in diam. S Asia, Himalayas 69. *E. attenuata*
 - 46. Disc evident
 - 47. Disc cuplike, sometimes 5-lobed; anther without

- spines. Africa
..... 76. *E. congolensis*
- 47. Disc platelike, not lobed;
anther with spines. S Asia
..... 80. *E. eberhardtii*
- 32. Flower and fruit 4-merous
 - 48. Leaves long and very narrow. E Asia 87. *E. gracillima*
 - 48. Leaves not long and narrow
 - 49. Leaf-veins curved or nearly arched; leaves elliptic to ovate
 - 50. Leaf-veins not concave on upper surface and not prominent beneath, blades 5.5-6.5 cm long; capsule c. 5-7 mm long. E Asia 101. *E. microcarpa*
 - 50. Leaf-veins concave on upper surface and prominent beneath, blades 8-13 cm long
 - 51. Leaves usually entire, sometimes slightly serrate towards apex, glabrous and bright on both surfaces. E & S Asia 71. *E. bullata*
 - 51. Leaves not as above
 - 52. Leaves without long, thin serrations, revolute. SE Asia 73. *E. castaneifolia*
 - 52. Leaves with long, thin serrations, not revolute. E Asia 117. *E. tenuiserrata*
 - 49. Leaf-veins pinnate; blades lanceolate to oblong
 - 53. Leaves to 16 cm long or more
 - 54. Leaves sparsely dentate with large teeth, sometimes becoming nearly entire, strongly coriaceous, elliptic to oblong, sometimes oblanceolate; fruit strongly 4-angled. E Asia 103. *E. myriantha*
 - 54. Leaves without sparse, large teeth
 - 55. Leaves chartaceous or thinly coriaceous; fruit without strong angles except at apex. E & S Asia 114. *E. salicifolia*
 - 55. Leaves papyraceous, fruit with strong angles. S Asia 94. *E. lawsonii*
 - 53. Leaves less than 13 cm long
 - 56. Capsule more than 1 cm long and wide; leaves entire. E Asia 125. *E. wui*
 - 56. Capsule less than 1 cm long and wide
 - 57. Leaves thickly coriaceous; capsule less than 13 mm long
 - 58. Leaves long and narrowly lanceolate, acuminate or acute at both ends,

- pubescent on both surfaces. E & S Asia....
111. *E. pittosporoides*
 58. Leaves usually oblong to ovate, cordate or
 nearly so at base, glabrous. E & S Asia.....
106. *E. nitida*
 57. Leaves chartaceous to thinly coriaceous;
 capsule more than 15 mm long
 59. Leaves long elliptic to elliptic-lanceolate,
 dentate, with scattered black dots
 beneath. SE Asia.....85. *E. glandulosa*
 59. Leaves ovate to obovate or oblong, entire
 or remotely serrulate, without black dots
 beneath
 60. Capsule pyriform, strongly 4-angled,
 apex emarginate. E & S Asia.....
93. *E. kachinensis*
 60. Capsule clavate, apex obtuse or
 slightly apiculate. SE Asia.....
102. *E. moluccensis*

66. *Euonymus acuminifolia* BLAKELOCK, Kew Bull. 1951: 253. 1951. TYPE:
 INDONESIA. Sumatra: *H. A. Bunnemeijer 581*(not seen).

= *E. acuminifolia* BLAKELOCK var. *borneensis* BLAKELOCK, Kew Bull. 1951: 253.
 1951. TYPE: INDONESIA. Borneo: *J. & M. S. Clemens 33904* (not seen).

Evergreen shrub, to more than 3 m tall; branches 4-angled or subterete.
 Leaves membranous, sometimes chartaceous (especially at high altitude),
 ovate-oblong to lanceolate, or elliptic to elliptic-oblong, 7.5-10.5 x 2-4 cm,
 apex usually long-acuminate, base cuneate or sometimes obtuse, margin
 crenulate-serrulate or serrulate, lateral veins 4-6 pairs, curving forward,
 netting and disappearing before reaching the margin; petiole 2-6 mm long.
 Peduncle to 4 cm long, with 1-3 dichotomous branches and several flowers.
 Flower 5-merous. Sepals semiorbicular or subreniform. Petals purplish-red,
 nearly suborbicular, c. 8 mm in diam. Capsule obcordate or obovoid,
 distinctly 5-lobed, 1.2-1.8 cm in diam.; seeds covered by orange-red aril
 at base.

Phenology. Unknown.

Distribution: Indonesia (Borneo, Celebes, Sumatra); alt. 700-3200 m,
 in forests; rare.

There are no materials available to this revision, and the above description
 is from Flora Malesiana (HOU 1963).

67. *Euonymus angulata* WIGHT, Icon. t. 1053. 1840. TYPE: INDIA. *R. Wight* 443 (GH! K!).

- = *E. acutangula* WIGHT, Illustr. 1: 178. 1840. TYPE: INDIA. Nilgiris: *L. C. Gough* s.n. (K!).
- = *E. glauca* TURCZ., Bull. Soc. Imp. Naturalistes Moscou 36(1): 599. 1863. TYPE: Unknown.
- = *E. pteroclada* HOHEN. ex LAWSON in J. D. HOOK., Fl. Brit. India 1: 610. 1875. TYPE: INDIA. Nilagiri: *N. Wallich Cat. 1545* (K!).

Shrub to small tree; branches and twigs green to light green, 4-angled. Leaves thinly coriaceous, elliptic or oblong-elliptic, 10-11 x 3.5-4 cm, apex acuminate, base broadly attenuate, margin entire, lateral veins 4-5 pairs, curving forward, nearly invisible, disappearing before reaching the margin; petiole 5-7 mm long. Peduncle 4-5 cm long, with 1-2 dichotomous branches and several flowers; pedicel c. 1 cm long. Flower 5-merous. Sepals semiorbicular. Petals purple or red-purple, nearly obovate, c. 7 mm in diam. Capsule rugose or angular, narrowly obtriangular, acutely 5-angled, opening into 5 lobes at maturity; seeds covered by orange aril.

Phenology. Flowering: December; Fruiting: August to November.

Distribution: India; alt. c. 850 m, in forest; rare.

SPECIMENS EXAMINED: **INDIA**: Karala, *K. U. Kramer & G. B. Nair 6503* (A), Silent valley, *C. E. Ridsdale 253* (K).

This species is similar to *E. attenuata*, but differs in its branches and twigs with 4 angles, and flowers purple or red-purple.

68. *Euonymus atropurpurea* JACQ., Hort. Vindob. 2: 55. 1772. TYPE: NORTH AMERICA. (not seen).

- = *E. carolinensis* MARSH., Arbust. Amer. 43. 1785.
- = *E. latifolia* MARSH., Arbust. Amer. 44. 1785.
- = *E. tristis* SALISB., Prodr. 142. 1796.
- = *E. atropurpurea* JACQ. var. *grandifolia* RAF., New Fl. 3: 60. 1836.
- = *E. atropurpurea* JACQ. var. *latifolia* RAF., New Fl. 3: 60. 1836.
- = *E. atropurpurea* JACQ. var. *oblongifolia* RAF., New Fl. 3: 60. 1836.
- = *E. atropurpurea* JACQ. var. *cheatumi* LUNDELL, Contr. Univ. Michigan Herb. 6: 41. 1941. (ISOTYPE: U. S. A. Texas: *C. L. & A. A. Lundell 8550 LL!*).

Deciduous shrub to small tree, to 7 m tall and 10 cm DBH; branches gray-green to gray-brown, terete, sturdy, twigs green to light green. Leaves chartaceous or papyraceous, elliptic or oblong-elliptic, 9-11 x 3-5.5 cm, apex acute or acuminate, base cuneate or attenuate, margin crenulate, lateral veins 9-10 pairs, curving forward, disappearing before reaching the margin; petiole 10-14

mm long. Peduncle 2-3 cm long, with 1-2 dichotomous branches and several flowers; pedicel 5-7 mm long. Flower 4-merous. Sepals semiround. Petals purple, nearly obovate, 10-12 mm in diam. when fully open. Capsule obovate, 4-lobed with 4 angles and deep grooves, brown or yellow-brown to red-brown, 1.5-1.7 cm in diam., c. 1.2 cm long, opening into 4 lobes at maturity, sometimes only 2-3 locules developed; seeds ellipsoid, dark brown, covered by orange-red aril.

Phenology. Flowering: May to July; Fruiting: August to November.

Distribution: Canada: Ontario. USA: Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Michigan, Minnesota, Missouri, Nebraska, North Carolina, New Jersey, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Virginia, West Virginia, Wisconsin; alt. 10-360 m, in woodlands and forests; common.

SPECIMENS EXAMINED: **CANADA:** ONTARIO: Lincoln, G. C. *Wicalla* 18401 (GH), Waterloo, F. H. *Montgomery* 647 (GH), Windsor, J. *Macoun* 34135 (GH). **USA:** ALABAMA: Clarke, R. M. *Harper* 3373 (GH), Jackson, D. H. *Webb* 4800 (GH); ARKANSAS: Baxter, E. J. *Palmer* 6014 (A), Benton, D. *Demaree* 6712 (GH), Carroll, D. *Demaree* 6777 (GH), Craighead, A. & M. *Jonesboro* 6956 (GH), Faulkner, E. J. *Palmer* 26361 (A), Hempstead, E. J. *Palmer* 24998 (A), Marion, E. J. *Palmer* 14312 (A), Van Buren, E. J. *Palmer* 25179 (A), Washington, H. H. *Illis* 5304 (GH); CONNECTICUT: Easton, E. H. *Eames s.n.* (GH), Milford, E. H. *Eames* 5681 (GH); DELAWARE: New Castle, R. R. *Tatnall* 1859 (GH); FLORIDA: Gadsden, R. K. *Godfrey* 82013 (A); GEORGIA: Early, R. F. *Thorne & W. C. Muenscher* 8566 (GH); ILLINOIS: Alexander, E. J. *Palmer* 14892 (A), Johnson, E. J. *Palmer* 15192 (A), Kane, S. R. *Hill* 26022 (GH), Macon, I. W. *Clokey* 2415 (A), Pope, E. J. *Palmer* 15398 (A), Vermilion, O. E. *Lansing* 3523 (A); INDIANA: Bartholomew, R. E. *Perdue* 2088 (GH), Cass, C. C. *Deam* 17885 (A), Dearborn, C. C. *Deam* 16039 (A), Jefferson, C. C. *Deam* 16214 (A), Gibson, C. C. *Deam* 16917 (A), Harrison, C. C. *Deam* 23311 (A), Johnson, C. C. *Deam* 19075 (A), Lake, C. C. *Deam* 26471 (A), Lawrence, C. C. *Deam* 18476 (A), Madison, H. H. *Smith* 5630 (GH), Martin, C. C. *Deam* 17206 (A), Orange, C. C. *Deam* 17373 (A), Owen, C. C. *Deam* 17541 (A), Perry, C. C. *Deam* 16625 (A), Ripley, C. C. *Deam* 16130 (A), Scott, C. C. *Deam* 18878 (A), Wabash, R. C. *Friesner* 15299 (GH), Wayne, C. C. *Deam* 13557 (A), Wells, C. C. *Deam s.n.* (GH); IOWA: Fayette, B. *Fink* 157 (A), Missouri Valley, L. H. *Pammel* 567 (GH), Red Rock, L. H. *Pammel* 921 (GH), Sidney, L. H. *Pammel* 445 (GH), Van Buren, E. J. *Palmer* 35885 (A); KANSAS: Crawford, E. J. *Palmer* 20814 (A), Douglas, R. L. *McGregor* 12620 (GH), Lawrence, B. L. *Wagenknecht* 3334 (GH), Marion, E. J. *Palmer* 20207 (A), Riley, J. B. *Norton* 61 (GH), Wilson, E. J. *Palmer* 21133 (A); KENTUCKY: Boyd, T. N. *McCoy s.n.* (GH), Fayette, W. A. *Anderson* 328 (GH), Hancock, E. J. *Palmer* 17816 (A); MARYLAND: Montgomery, J. *Creek* 5279 (GH); MICHIGAN: Port Huron, C. K. *Dodge s.n.* (A); MINNESOTA: Dakota, J. N. *Moore* 15757 (A), Rock, P. *Johnson* 417 (GH), Washington, J. W. *Moore & N. L. Huff* 19237 (GH); MISSOURI: Adair, E. J. *Palmer* 25509 (A), Atchison, E. J. *Palmer* 18969 (A), Barry, E. J. *Palmer* 45341 (A), Barton, E. J. *Palmer* 4603 (A), Clark, E. J. *Palmer* 21856 (A), Daviess, E. J. *Palmer* 25481 (A), Douglas, E. J. *Palmer* 34711 (A), Gentry, E. J. *Palmer* 35770 (A), Holt, E. J. *Palmer* 25380 (A), Independence, B. F. *Bush* 134 (A), Iron, E. J. *Palmer* 19511 (GH), Jackson, B. F. *Bush* 174 (A), Jasper, E. J. *Palmer* 25219 (A), Jefferson, P. H. *Raven* 27259 (GH), Johnson, E. J. *Palmer* 36632 (A), Lawrence, E. J. *Palmer* 26959 (A), McDonald, E. J. *Palmer* 4253 (A), Newton, E. J. *Palmer* 22924 (A), Ozark, E. J.

Palmer 33109 (A), Polk, *E. J. Palmer* 29999 (A), Putnam, *E. J. Palmer* 27896 (A), St. Louis, *J. R. Churchill s.n.* (GH), Shannon, *B. F. Bush* 115 (A), Stoddard, *E. J. Palmer* 34920 (A), Stone, *E. J. Palmer* 23890 (A), Sullian, *E. J. Palmer & J. A. Steyermark* 41206 (A), Taney, *E. J. Palmer* 19248 (A), Vernon, *E. J. Palmer & J. A. Steyermark* 42148 (A); NEBRASKA: Elmwood, *T. A. Williams s.n.* (A), Knox, *S. Stephens* 11895 (A), Neligh, *E. S. Bacon s.n.* (A), Seotia, *R. J. M. Bates s.n.* (A), Walei, *R. J. M. Bates s.n.* (A); NORTH CAROLINA: Rockingham, *A. E. Radford* 45400 (GH); NEW JERSEY: Gloucester, *R. Long* 18791 (A), Ocean, *B. Long* 13496 (GH), Salem, *R. Long* 34608 (A); NEW YORK: Erie, *A. E. Perkins* 904 (GH), Genesee, *B. H. Slavin s.n.* (A), Newark, *E. L. Hankenson s.n.* (GH), Niagara Falls, *C. F. Batchlder* 17 (GH), Putnam, *G. C. Tucker* 4530 (GH), Rochester, *B. H. Slavin s.n.* (A), Tompkins, *A. J. Eames & K. M. Wiegand* 10247 (GH); NORTH DAKOTA: Richland, *O. A. Stevens* 427 (GH); OHIO: Adams, *D. Demaree* 11154 (GH), Cedar Point, *L. H. Pammel* 62 (GH), Cincinnati, *C. G. Lloyd s.n.* (GH), Gallia, *R. E. Horsey* 2259 (A), Greene, *D. Demaree* 11434 (A), Jackson, *R. E. Horsey* 1484 (A), Lebanon, *E. B. Harger* 8175 (GH), Warren, *D. Demaree* 11754 (A), Washington, *R. E. Horsey s.n.* (A); OKLAHOMA: Caddo, *E. L. Little* 3939 (GH), Comanche, *J. Clemens* 11679a (GH), Johnston, *H. W. Houghton* 3500 (GH), Kay, *G. W. Stevens* 1826 (A), Mayes, *U. T. Waterfall* 6961 (GH), Murray, *M. Hopkins et al.* 1128 (GH), Oklahoma, *U. T. Waterfall* 2205 (GH), Ottawa, *U. T. Waterfall* 6892 (GH), South Canyon, *E. L. Little* 3999 (A); PENNSYLVANIA: Bedford, *D. Berkheimer* 1726 (GH), Berks, *H. Wilkens* 4722 (GH), Centre, *H. A. Wahl* 726 (GH), Chester, *H. E. Stone s.n.* (GH), Cumberland, *J. W. Adams* 5250 (A), Montg., *E. B. Bartram* 1366 (GH); TENNESSEE: Cheatham, *E. J. Palmer* 35507 (A), Jackson, *V. E. McNeilus* 92-401 (GH), Knoxville, *A. Ruth s.n.* (A), Montgomery, *E. J. Palmer* 17593 (A); TEXAS: Dallas, *C. L. Lundell* 12859 (GH), Delta, *V. L. Cory* 23266 (A), Ellis, *E. S. Nixon* 11939 (GH), Harris, *A. Traverse* 323 (GH); VIRGINIA: Clarke, *J. T. Baldwin* 5178 (GH), Giles, *J. M. Fogg* 14724 (GH), New Kent, *M. L. Fernald & B. Long* 13069 (A), Roanoke, *C. E. Wood* 5241 (GH), Surry, *M. L. Fernald & B. Long* 13972 (A); WEST VIRGINIA: Cabell, *L. Williams* 3713 (GH), Calhoun, *B. Harris s.n.* (GH), Randolph, *A. H. Moore* 2517 (A), Tyler, *E. E. Berkeley s.n.* (GH), Wirt, *E. A. Bartholomew* 1345 (GH); WISCONSIN: Buffalo, *E. J. Palmer* 28522 (A), Dunn, *C. Goessl* 9132 (A), Madison, *J. F. Collins s.n.* (GH), Milwaukee, *B. H. Slavin* 477 (A), Sauk, *A. Leopold s.n.* (GH), Vernon, *H. H. Smith* 7309 (A).

69. *Euonymus attenuata* WALL. ex LAWSON in J. D. HOOK., Fl. Brit. India 1: 610. 1875. SYNTYPES: INDIA. Khasia: *N. Wallich Cat.* 4298 (K! 2 sheets), 4298a (BM! E!).

– *E. garcinioides* KURZ., in herb., nom. inval.

Evergreen shrub, c. 3 m tall; branches and twigs green to light green, terete. Leaves chartaceous, elliptic or oblong-elliptic, 10-11 x 3.5-4.5 cm, apex acuminate, base wide attenuate, margin entire, lateral veins c. 8 pairs, curving forward, nearly invisible, disappearing before reaching the margin; petiole 6-8 mm long. Peduncle c. 5 cm long, with 1-2 dichotomous branches and several flowers; pedicel c. 5 mm long. Flower 5-merous. Sepals semiorbicular. Petals greenish-yellow, nearly ovate, 6-7 mm in diam. Capsule obtriangular, acutely 5-angled, c. 1.2 cm in diam., c. 1.0 cm long, opening into 5 lobes at maturity; seeds covered by orange aril.

Phenology. Flowering: May; Fruiting: August to November.

Distribution: Bangladesh, Bhutan, India, Myanmar, Indonesia (cult.); alt. 200-1700 m, in woodlands and forests; rare.

SPECIMENS EXAMINED: **BANGLADESH:** *W. Griffith 1970* (GH). **Bhutan:** *A. J. C. Grierson & D. G. Long 1519* (A, E, K). **INDIA:** Assam, *G. King 189* (A), Khasia, *C. B. Clarke 19383* (E), cult. in Bog. (no further information) (WU 2 sheets), Cachar, *L. Keenan s.n.* (K), *J. D. Hooker & T. Thomson s.n.* (E, GH), without location, *H. F. Sun 2321* (PE). **INDONESIA:** Bogor (cult.), *C. S. Sargent s.n.* (A).

It is similar to *E. angulata*, but the branches and twigs are terete, and the flower is greenish-yellow. However, there is not much material available and further study is required.

70. *Euonymus australiana* F. MUELL., *Fragm.* 4: 118. 1864. TYPE: AUSTRALIA. Northeast: *J. Dallachy s.n.* (not seen).

Small tree or shrub, to 8 m tall and c. 10 cm in DBH; branches and twigs sturdy, terete. Leaves thinly coriaceous to coriaceous, ovate-orbicular to orbicular, 4-10 x 2-6 cm, apex round, base broadly attenuate to round or obtuse, margin entire, lateral veins 6-8 pairs, curving forward, webbing and disappearing before reaching the margin; petiole sturdy, less than 3 mm long or leaf nearly sessile. Peduncle 3-5 cm long, with 1-2 dichotomous branches and few flowers; pedicel c. 5 mm long. Flower 4- or 5-merous. Sepals semiround. Petals red, nearly ovate, 8-10 mm in diam., margin ciliate. Capsule obtriangular-pyramidal, 4-5 lobed with 4-5 angles and deep grooves, brown or yellow-brown to red-brown, 1.2-1.4 cm in diam., c. 1.2 cm long, opening into 4-5 lobes at maturity; seeds brown, partly covered by orange-red aril.

Phenology. Flowering: December to January; Fruiting: May to July.

Distribution: Australia (Northeast); alt. 900-1,000 m, in rain forests; rare.

SPECIMENS EXAMINED: **AUSTRALIA:** Queensland (lat. 16.17 S, long. 145.05 E), *R. Hyland 3493* (A).

71. *Euonymus bullata* WALL., *Cat.* 4299. 1829 nom. et in *Bot. Cab.* 18: tab. 1749. 1831. TYPE: NEPAL. *N. Wallich Cat. n. 4299* (BM! K!).

Evergreen small tree, to 8 m tall; branches sturdy, terete. Leaves thinly coriaceous to coriaceous, ovate-elliptic to broadly oblong-elliptic, 12-21 x 7-11 cm, apex acute or acuminate, base broadly attenuate, margin entire, lateral veins c. 15 pairs, curving forward, webbing before reaching the margin, impressed and prominent beneath; petiole sturdy, 1-2 cm long. Peduncle 3-5 cm long, with more than 2 dichotomous branches and many flowers; pedicel c. 5 mm long. Flower 4-merous. Sepals semiround. Petals red, nearly obovate, 6-8 mm in diam.. Capsule obovoid, 4-angled and deeply grooved, brown or yellow-brown to red-

brown, c. 1.5 cm in diam., c. 1.2 cm long, opening into 4 lobes at maturity; seeds ellipsoid, brown, covered by orange-red aril.

Phenology. Flowering: April to June; Fruiting: August to November.

Distribution: Bangladesh, China (Yunnan), India, Myanmar, Thailand; alt. 900-3,300 m, in mixed forests; common.

SPECIMENS EXAMINED: **BANGLADESH:** *W. Griffith 1957* (GH), *s.n.* (K). **CHINA:** YUNNAN: Cheli [Jinghong], *C. W. Wang 78244* (A, KUN, LBG, PE 2 sheets); Kengma, *C. W. Wang 72894* (A, PE). **INDIA:** Assam, *K. Biswas 3894* (A), *G. King s.n.* (A), *L. F. Ruse 121* (A), Khasia, *C. B. Clarke 6356* (BM), *14274* (E, K), *4276a* (BM), *14277* (K), *43716a* (BM), *45280a* (BM), *45914c* (US), *W. Griffith 1972* (also noted as *H. F. Hance 21573*, BM, E), *s.n.* (GH), *J. D. Hooker & T. Thomson s.n.* (BM, GH, K), Manipur, *G. Watt s.n.* (E), Lingli, *G. Watt 5019* (E), Sirhoi, *F. K. Ward 17447* (BM), *17525* (BM). **MYANMAR:** S. Shan State, *R. W. MacGregor 200* (E 2 sheets). **THAILAND:** *R. Geesink et al. 5701* (K).

This species has long-petioled, very large leaves to 20 x 5 cm, with the veins evidently impressed above and abruptly raised beneath, as well as bearing numerous flowers and fruits on the long peduncle, making it easily recognizable in the section.

72. *Euonymus carnosa* HEMSL., J. Linn. Soc., Bot. 23: 118. 1886. TYPE: CHINA. Taiwan: Kelung, *C. Ford s.n.* (not seen, photo. A! PE!, merotype A!). [Fig. 47]

- = *E. tanakae* MAXIM., Bull. Acad. Imp. Sci. Saint-Peterbourg 31: 22. 1887. TYPE: JAPAN. *T. Tanaka s.n.* (not seen, photo A!).
- = *E. batakensis* HAYATA, Icon. Pl. Formosan. 9: 11. 1920. TYPE: CHINA. Taiwan: *B. Hayata & S. Sasaki s.n.* (not seen, photo A!).
- = *E. morrisonensis* KANEHIRA & SASAKI in Kanehira, Form. Trees, rev. ed. 389. 1936. SYNTYPES: CHINA. Taiwan: *R. Kanehira 3071* (US!), *T. Tanaka & Suzuki s.n.* (not seen).
- = *E. platycline* OHWI, Acta Phytotax. Geobot. 5: 186. 1936. TYPE: CHINA. Taiwan: *J. Ohwi 2814* (not seen).

Deciduous shrub to small tree, to 8 m tall and c. 10 cm DBH; branches and twigs gray-green to gray-brown, terete, sturdy. Leaves thickly chartaceous to coriaceous, elliptic or oblong-elliptic to ovate or obovate-elliptic, 6-13 x 1.5-7 cm, apex obtuse or mucronulate, base cuneate or attenuate, margin crenulate, lateral veins 8-12 pairs, curving forward, redivided and webbing with veinlets before reaching the margin; petiole 5-20 mm long. Peduncle 2-6 cm long, with 1-3 dichotomous branches and several to many flowers; pedicel 5-10 mm long. Flower 4-merous. Sepals semiround, persistent. Petals yellow or brown-green, orbicular, 10-12 mm in diam. when fully open. Capsule tetraquetrous, with 4 right angles, brown or yellow-brown to red-brown, 1.0-1.2 (1.5) cm in diam., 1.2-1.5 (2.0) cm long, opening into 4 lobes at maturity; seeds 3-6 in each locule, ellipsoid, dark brown.

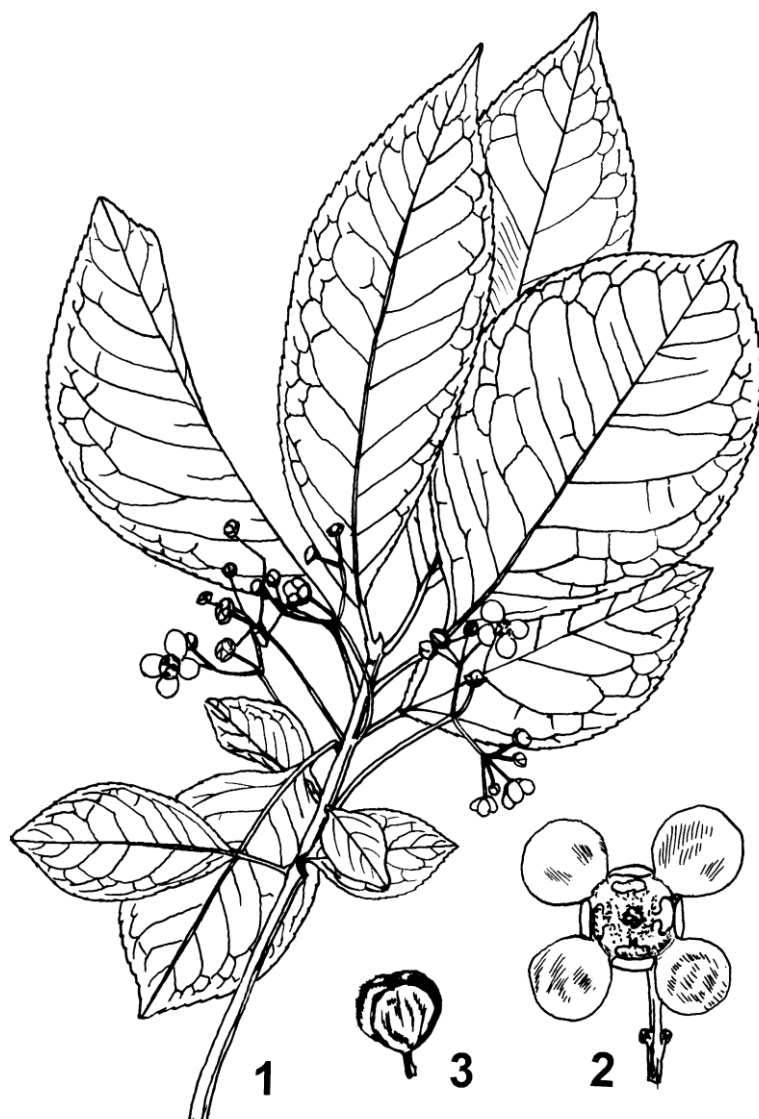


Fig. 47. *Euonymus carnosus* HEMSL. – 1. flower branch; 2. flower; 3. fruit.

Phenology. Flowering: May to August; Fruiting: August to November.

Distribution: China (Anhui, Fujian, Guangdong, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang), Japan; alt. From sea level (Japan) to more than 2,000 m (Taiwan), in woodlands and forests, mostly at 200-900 m elev.; very common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Chienchushan, C. S. Fan & Y. Y. Li 131 (A), 167 (A), 185 (A), Chimen [Qimen], R. C. Ching 3191 (A), Chiuhwashan [Jiuhuashan], R. C. Ching 2751 (A 2 sheets), S. C. Sun 1369 (A, NY), 1407 (A, NY), Huangshan, M. Chen 1076 (PE 2 sheets), 1114 (PE), 1350 (PE), W. C. Cheng 3960 (PE, US), East China Station 6359 (KUN, PE), M. C. Wang 3651 (PE 2 sheets), 3727 (PE, IBSC), Huangshan Exp. 88013 (NA), 88021 (NA), Jiuhuashan, East China Station 5934 (PE), 5859 (PE), Qianshan, B. A. Shen 170 (PE 2 sheets), Sexian, H. Migo s.n. (PE 2 sheets), Shucheng, East China Station 4630 (PE), Whangshan [Huangshan], R. C. Ching 3034 (A), Without location, M. C. Wang 3919 (PE), Wuyuan, R. C. Ching 3313 (A), Xiuning, X. L. Liu 362 (PE 2 sheets), Qimen, M. B. Deng et al. 4861 (NAS, PE), K. Yao 10384 (NY); FUJIAN: Jiande, no collector 29295 (PE), Liancheng, H. B. Chen 732 (PE), Nanping, M. X. Nie 2417 (KUN, PE), Shunchang, M. S. Li & Z. Y. Li 5693 (PE), Wuyishan, W. X. Wang et al. 80-0139 (MO); GUANGDONG: Gaoyao, K. C. Ting 2441 (MO), Ruyuan, L. Deng 5762 (PE); HENAN: Huangposhan, Plant Resource Exped. 1358 (PE), Jigongshan, X. Q. Zhang 20056 (PE), Kikungshan [Jigongshan], A. N. Steward 9798 (GH 2 sheets, US), Sangcheng, Plant Resource Exped. 1351 (PE); HUBEI: Xiaogan, A. R. Li et al. 108 (PE), Xingshan, C. M. Hu 225 (PE); HUNAN: Dongan, Y. X. Liou & Her Father 733 (PE), Hsinhua [Xinhua], S. H. Chun 2417 (IBSC), H. Handel-Mazzetti 11778 (A), Pingjiang, B. G. Li 106 (IBSC); JIANGSU: Ishing [Yixing], R. C. Ching 4885 (A), R. C. Ching 412 (GH), W. Z. Fang 8016 (MO), Y. L. Keng 2676 (A), K. Ling 2286 (GH, PE), F. X. Liu et al. 2318 (PE), Liyang, F. X. Liu et al. 2715 (KUN, PE 2 sheets), Nanjing, M. B. Deng et al. 4458 (PE), Dr. MacKlin 29a (NA), Simingshan, Y. Y. Ho 27555 (NAS), Wuyuan, Q. H. Li & M. Chen 270 (PE); JIANGXI: Dexing, M. X. Nie 5427 (KUN 2 sheets, PE), K. Yao 11584 (A, NA), Duchang, M. C. Wang et al. 1900 (NAS), Fuliang, Q. H. Li & M. Chen 836 (PE), Ganggu, J. Xiong 5171 (LBG), Guangchang, T. S. Yao et al. 2653 (KUN, PE), Guixi, S. K. Lai & M. X. Nie 3822 (KUN 2 sheets), Hsiushui [Xiushui], Y. K. Hsiung 5397 (A), 5537 (A), Jiujiang, C. M. Tan 90040 (MO), Lefeng, Q. H. Li & M. Chen 1203 (PE), Lichuan, M. X. Nie & S. K. Lai 2826 (KUN 3 sheets, PE), M. C. Wang et al. 2241 (PE, NAS), Lushan, W. C. Cheng 93 (MO, US), R. C. Ching 10186 (LBG), H. H. Chung & S. C. Sun 356 (A, NY), 597 (A, NY), Y. Guo 1110 (LBG), H. H. Hu 2407 (A, PE), 2277 (PE), K. C. Kuan 74419 (PE 2 sheets), C. Leu 280 (LBG), B. G. Li 230311 (IBSC), M. X. Nie 92179 (A), M. X. Nie et al. 7931 (KUN), S. J. Shen 396 (PE), 585 (PE), A. N. Steward 2452 (A), 4663 (A, GH, US), P. C. Tsoong 553 (PE 3 sheets), M. C. Wang et al. 646 (LBG), 1317 (NAS 2 sheets), E. H. Wilson 1581 (A 2 sheets, US), J. Xiong 6007 (PE), J. H. Xiong 31142 (PE), B. H. Zhao 67 (IBSC), Nancheng, H. H. Hu 1234 (A), Poyang, Q. H. Li & M. Chen 1063 (PE), Ruichang, Q. H. Li & M. Chen 1955 (PE), Shangrao, S. K. Lai & M. X. Nie 5022 (KUN), Shanyan, H. H. Hu 1351 (A), Tonggu, S. K. Lai 683 (PE), Tongyuan, M. X. Nie 7345 (KUN), Wuning, S. K. Lai 2501 (KUN), Xiushui, S. K. Lai 2192 (KUN), 2982 (KUN, PE), Yanshan, S. K. Lai & M. X. Nie 4057 (KUN 2 sheets), 4354 (KUN 5 sheets), Yungshiu [Yongxiu], Y. Tsiang 10604 (NAS, NY, SYS); TAIWAN: Ilan, C. C. Liao 328 (A), S. W. Tang 1339 (MO), Kilung, C. Ford s.n. (BM), Morrison, J. L. Creech 1498 (NA), Nantou, M. H. Chen 23 (A, MO), H. L. Ho 635 (A, MO), Taichung, C. L. Huang 28 (A), T. Y. Liu 290 (A), C. I. Peng 11079 (A, MO), 11972 (A, MO), Taipei, H. Keng 1171 (A 2 sheets, US), C. C. Liao 286 (A), Taitung, U. J. Faurie 77 (BM, P); ZHEJIANG: Changhua, Y. Y. Ho 26755 (PE), 30476 (PE), 30586 (PE), 30686 (PE), Y. L. Keng 639 (A), F. G. Meyer 1541 (A), Chuchow, H. H. Hu 491 (A), Chunan, Y. Y. Ho 30094 (PE), Fenghua, S. Y. Chang 624 (PE 2 sheets), Fengxin, M. B. Deng et al. 4399 (PE), 4584 (PE), 4785 (PE), S. K. Lai et al. 1187 (PE), Hangzhou, Botanical Garden 2256 (PE), S. Y. Chang 138 (PE), 380 (PE 3 sheets), 684 (PE 2 sheets), 938 (PE), C. T. Cheng 2163 (MO), Y. Y. Fang s.n. (MO), Jiangshan, J. X. Wang 1876 (PE),

Kaihua, Y. Y. *Ho* 29686 (PE), 29952 (PE), Lishui, S. Y. *Chang* 6354 (KUN, PE), Longquan, R. H. *Shan et al.* 5682 (NAS), S. Y. *Chang* 3265 (PE 4 sheets), 3880 (PE), 3887 (PE 2 sheets), 3885 (PE), 3895 (PE), 8913 (PE), 9885 (PE), Moganshan, C. C. *Cheo & E. H. Wilson* 58 (GH), 12704 (NY, PE), Ningpo, D. *MacGregor s.n.* (A, 1908), *No Collector* 9296 (PE), Pingyang, R. C. *Ching* 1922 (A, MO, NY), Putuoshan, S. Y. *Chang* 1459 (PE 3 sheets), Shouchang, Y. Y. *Ho* 29516 (PE), Siachu [Xianju], R. C. *Ching* 1662 (A 2 sheets, NA, US), Y. L. *Keng* 469 (A), Simingshan, Y. Y. *Ho* 27558 (NAS), Sungyang, H. H. *Hu* 404 (A), Tianmushan, M. *Chen* 773 (PE), W. C. *Cheng* 2126 (PE), Y. Y. *Ho* 24651 (PE), 25262 (PE), 29013 (PE), 31005 (PE), 31074 (PE), K. C. *Kuan* 75398 (PE 2 sheets), 75430 (PE 2 sheets), T. N. *Liou* 5 (NY), 271 (NY), 7157 (PE), 7169 (PE), 7175 (PE 2 sheets), H. Q. *Mi* 806 (NAS), *Zhejiang Exped.* 29553 (PE), H. Q. *Zhu* 806 (NAS), Tiantai, G. Y. *Chen* 2416 (KUN, PE 2 sheets), Y. Y. *Ho* 25521 (PE), 28224 (PE), S. Y. *Chang* 223 (PE 3 sheets), 1035 (PE), *Zhejiang Natural Museum* 2950 (KUN), 3758 (KUN), Tienmooshan (Tianmushan), R. C. *Ching* 5078 (A), 5124 (A), Tiantaishan (Tiantaishan), C. Y. *Chiao* 14291 (A, US), R. C. *Ching* 1515 (A, NA), Westlake, H. H. *Hu* 1475 (A), Zhenhai, Y. Y. *Ho* 27343 (KUN). **JAPAN:** Kagoshima, M. *Furuse s.n.* (A), Kiushiu, S. *Hatusima* 496 (A 2 sheets, NY, US), Okinawa, S. *Hatusima* 17776 (US), 17876 (US), R. *Kanehira* 3218 (NY), S. *Sonohara* 99 (GH), K. *Tamayose s.n.* (US), E. H. *Walker et al.* 5822 (A, US), 8327 (US), Ryukyu, J. *Carow* 3c (US), F. R. *Fosberg* 37705 (NY, US), M. *Furuse* 1691 (NA), 2243 (NA), 2487 (NA), 2663 (NA), 2832 (NA), 2857 (NA), 2858 (NA), 3088 (NA), 3165 (NA), 3210 (NA), 3264 (NA), 3289 (NA), 3358 (NA), 5549 (NA), S. *Kawagoe s.n.* (A), S. *Kurata & T. Nakaïke* 764 (A, US), 1600 (A, US), G. *Masamune s.n.* (NY), H. *Okada et al.* 405 (A), E. H. *Walker et al.* 6610 (A, US), E. H. *Wilson* 8128 (A, US), Satuma, S. *Hatusima* 16405 (GH), H. *Koyama et al.* 7047 (NY 2 sheets).

This is a typical East Asian species distributed in the Sino-Japan area, with ovate-oblong leaves that change to fresh red or purple in the late autumn and possess high ornamental value; the fruit with large sepals persistent both in flowering and fruiting; and the capsule splitting into 4 parts when mature. The species is very similar to *E. grandiflora*, but leaves much narrower and flowers are larger in the latter, which is distributed in the Sino-Himalayan region from SW China to the Himalayas. In the local floras the species has been described as evergreen, although that is not true. *E. morrisonensis*, which was doubted by BLAKELOCK (1951) in his synopsis, is from the high mountains of Taiwan and is only an abnormal phase of this species occurring in alpine conditions; it has small, narrow leaves and a small capsule, with sometimes only 3 of the 4 lobes developed. However, this could not be treated as a different species because there are no definite or evident differences between them, and more importantly, the species shows continual variation from lower (below alt. 1,000 m) to high mountain (more than 2,500 m) elevations in Taiwan. Y. R. LI stated (*Vascular Plants of the Mt. Hengduan* 1: 1098. 1993) that the species occurs also in Sichuan and Yunnan, but those ranges refer to *E. grandiflora*.

73. *Euonymus castaneifolia* RIDLEY, Kew Bull. 1931: 36. 1931. TYPE: INDONESIA. Borneo: G. D. Haviland 827 (not seen).

= *E. moultonii* RIDLEY, Kew Bull. 1931: 36. 1931. TYPE: INDONESIA. Borneo: J. L. Moulton 6765 (ut 7675, A!).

Evergreen small tree, to 10 m tall and c. 20 cm DBH; branches and twigs gray-green to gray-brown, 4-angled. Leaves thickly chartaceous to coriaceous, elliptic or oblong-elliptic, 8-11.5 x 3.5-4.5 cm, apex acute or acuminate, base cuneate or attenuate, margin mostly remotely serrate, only subentire at base, lateral veins 4-6 pairs, curving forward, disappearing before reaching the margin, strongly impressed and prominent beneath, rugose; petiole 5-15 mm long. Peduncle 2-6 cm long, with 1-3 dichotomous branches and several flowers; pedicel c. 5 mm long. Flower 4-merous. Sepals semiorbicular. Petals white, orbicular, 4-5 mm in diam. Capsule subobovoid, 4-angled, brown or yellow-brown to red-brown, 1.3-1.5 cm in diam., 8-10 cm long, opening into 4 lobes at maturity; seeds ellipsoid, dark brown, base covered by aril.

Phenology. Flowering: April to December; Fruiting: March to November.

Distribution: Brunei, Indonesia, Malaysia; alt. 50-1,500 m, in woodlands and forests; occasional.

SPECIMENS EXAMINED: **BRUNEI:** Belait, M. H. Abdullah 42 (A), M. J. E. Coode 6762 (A), J. Dransfield 6723 (A), K. M. Wong 303 (A), Temburong, M. J. E. Coode 7834 (A). **INDONESIA:** Borneo, A. C. Church et al. 2246 (A), 2392 (A), 2577 (A), 2817 (A), A. Kostermans 4343 (A), 4345 (A), 7476 (A), 9964 (A), A. Kostermans & Sabana 8 (A), H. P. Nootboom et al. 4262 (A), G. T. Prance et al. 30690 (A), Pontianak, J. S. Burley et al. 3303 (A), Sumbawa, A. Kostermans 18514 (A). **MALAYSIA:** Ampang, K. M. Kochummen 26215 (A), Baram, P. Chai 35476 (A), Kapit, J. A. R. Anderson & I. B. Paie 28275 (A), I. B. Paie 28417 (A), Lamag, P. F. Cockburn 83301 (A), Lambir Hills, S. A. Luang 24145 (A), Miri, O. Haron 21338 (A), Mulu, A. Mohtar et al. 49563 (A), 49569 (A), Pitas, Gorge & Amin 121255 (A), Sabah, P. F. Stevens et al. 476 (A), Sarawak, H. P. Nootboom et al. 1830 (US), Trengganu, K. M. Kochummen 2498 (A), Ulu Atun, S. A. Luang 22745 (A).

This species is very easily identified in the section due to the rugose leaves with lateral veins strongly impressed above and prominent beneath, as well as its distribution and habitat.

74. *Euonymus chloranthoides* YANG, J. W. China Border Res. Soc. 15, ser. B: 90. 1945. TYPE: CHINA. Sichuan: Pa Hsien, K. L. Chu 6658 (PE!). [Fig. 48]

Evergreen shrub, c. 1 m tall; branches terete, young twigs with 4 striations or angles. Leaves thinly coriaceous, obovate, oblong-obovate or elliptic to oblong-elliptic, 8-12.5 x 2.5-5 cm, apex acuminate, base attenuate to broadly attenuate, margin regularly dentate with large teeth, lateral veins 7-9 pairs, redivided and webbing into veinlets; petiole sturdy, 1-2 mm long or leaves sessile. Peduncle



Fig. 48. *Euonymus chloranthoides* YANG – 1. flower branch; 2. flower.

1-2 cm long, with 1-2 dichotomous branches and several flowers; pedicel c. 5 mm long. Flower 5-merous. Sepals suborbicular. Petals red-pink to black-purple at maturity, obovate, c. 10 mm in diam. when fully open. Capsule obovate, 5-angled and shallow grooves, brown or yellow-brown to red-brown, c. 1.2 cm in diam. and c. 1 cm long, opening into 5 lobes at maturity, sometimes only 3-4 lobes developed; seeds subglobose, red, partly covered by orange-red aril.

Phenology. Flowering: May to August; Fruiting: October to November.
Distribution: China (Sichuan); alt. 300-400 m, in woodlands and forests; rare.

SPECIMENS EXAMINED: **CHINA:** SICHUAN: Beipei, *T. He & Z. L. Zhou 1497* (SZ), *L. Y. Lin 1905* (PE), *1938* (PE). *C. Pei 7780* (PE), *Z. L. Zhou s.n.* (PE), Pa Hsien (Baxian), *T. T. Yu 2820* (PE 2 sheets).

This is very rare species in the section and there have been only a few collections since it was found in the 1940's. However, it is very distinctive in the genus for its large, regularly dentate leaves with large teeth, as well as large fruit in autumn.

75. *Euonymus cochinchinensis* PIERRE, Fl. Forest. Cochinch. 4, t. 309. 1894. TYPE: VIETNAM. *L. Pierre 4073* (A! BM! E! P!). [Fig. 49]

- ≡ *Sphaerodiscus cochinchinensis* (PIERRE) NAKAI, Jap. Bot. Mag. 17: 686. 1941.
- = *E. philippinensis* MERR., Philipp. J. Sci. 3: 238. 1908. TYPE: PHILIPPINES: *H. Cuming 1552* (GH!).
- = *E. similis* CRAIB, Kew Bull. 1912: 147. 1912. SYNTYPES: THAILAND. Chiangmai: on Doi Sootep, alt. 720-1200m, *A. F. G. Kerr 649* (BM! K!), *736* (BM! E! K!), *736a* (BM! K!).
- = *E. viburnifolia* MERR., Philipp. J. Sci. 9: 312. 1914. TYPE: PHILIPPINES. *P. Commerson s.n.* (not seen).
- = *E. oligantha* MERR., Philipp. J. Sci. 10: 320. 1915. TYPE: PHILIPPINES: *E. D. Merrill 9644* (US!).
- = *E. pahanguensis* RIDLEY, Fl. Mal. Penins. 5: 299. 1925.
- = *E. colonoides* CRAIB, Kew Bull. 1926: 348. 1926. SYNTYPES: THAILAND. *A. F. G. Kerr 3194* (BM! K!, photo A! PE!), *6342* (K!, photo A!).

Evergreen small tree, sometimes a shrub, to 15 m tall and c. 20 cm DBH; branches terete, sturdy, twigs green to light green, 4-angled. Leaves coriaceous or thickly papyraceous, elliptic or oblong-elliptic, 9-22 x 3-7 cm, apex acute or acuminate, base cuneate or attenuate, margin entire to crenulate or remotely serrate in upper part, lateral veins 9-14 pairs, curving forward, disappearing before reaching the margin; petiole sturdy, 8-18 mm long. Peduncle 3-5 cm long, sturdy, several clustered or from 1 node with 1-3 dichotomous branches and several flowers each; pedicel 5-7 mm long flower 5-merous. Sepals semiorbicular. Petals pink to red at maturity, obovate, 10-12 mm in diam. when fully open, apex long-fimbriate. Capsule obovate, 5-angled and deeply grooved, brown or yellow-brown to red-brown, c. 1.2 cm in diam., c. 1 cm long, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, lower part covered by orange-red aril.

Phenology. Flowering: April to September; Fruiting: August to February.

Distribution: Cambodia, India, Indonesia, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; alt. 100-1,600 m, in woodlands and forests; very common.

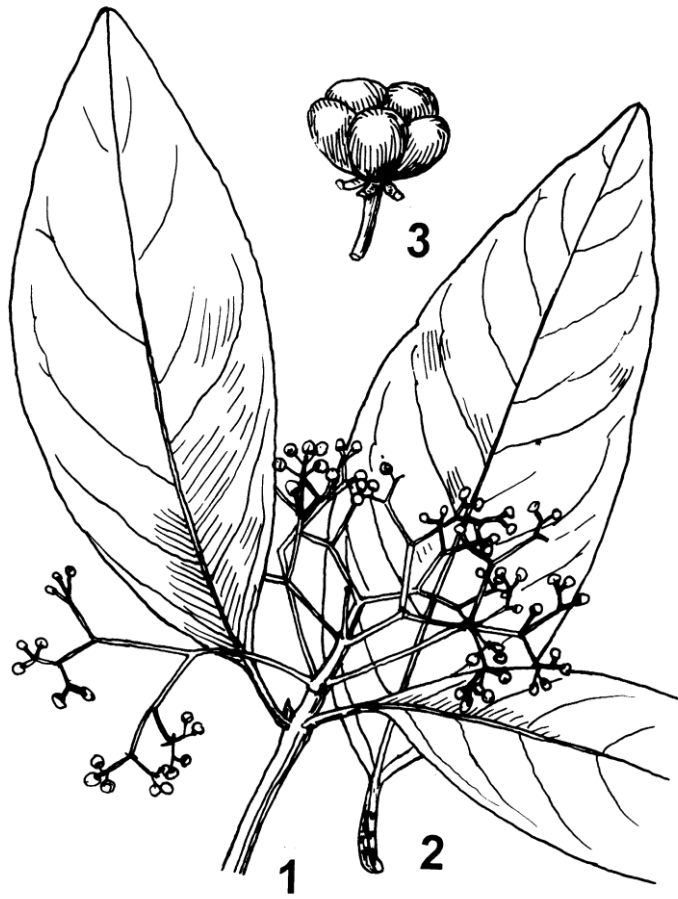


Fig. 49. *Euonymus cochinchinensis* PIERRE – 1. flower branch; 2. leaves; 3. fruit.

SPECIMENS EXAMINED: **S. ASIA:** Without location, *L. Pierre* 4074 (BM). **CAMBODIA:** *M. Bejoud* s.n. (BM), *E. Poilane* s.n. (K); Mekong, *M. D. Thorel* 2080 (BM, K). **INDIA:** Bombay, *J. Fernandes* 968 (A); **INDOCHINA:** Mekong, *M. D. Thorel* 9080 (BM), without location, *J. H. A. J. Harmand* s.n. (K), *L. Pierre* 658 (A), 900 (A). **INDONESIA:** Baing, *McDonald & Sunaryo* 4388 (A), Buru, *V. Balgooy* 5083 (A), Kalimantan, *Z. Arifin* 641 (A), Enrekang, *M. J. S. Sands* 208 (A), 250 (A). **MALAYSIA:** Kota Kinabalu, *Berhaman et al.* 134617 (A), *W. Meijer* 136585 (A), Ulu Kelantan, *UNESCO Limestone Exped.* 347 (A). **MYANMAR:** Tenasserim and Andamans, *Herb. Helfer.* 1969 (GH), *J. Keenan et al.* 968 (A), *A. F. G. Kerr* 21597 (BM). **NEW GUINEA:** Bivak Prao, *R. Kanehira & S. Hatusima* 12834 (A), Papaya, *R. Kanehira & S. Hatusima* 11696 (A), Patema, *R. Kanehira & S. Hatusima* 12360 (A, 2 sheets), Vogelkop, *P. V. Roen & H. Sleumer* 6735 (A), Waigeo, *P. V. Royen* 5473 (A). **PHILIPPINES:** Bancaban, *C. M. Weber* s.n. (A), Benquet, *A. D. E. Elmer* 6462 (US), Cagayan, *M. Adduru* 68 (A,

US), 179 (A, US), Cuming, *A. Journ.* 1552 (WU), 1942 (WU), Luzon, *Alcasid et al.* 1699 (A), A. L. *Cenabre & Party* 28517 (A), D. C. *Domingo* 21677 (US), V. V. *Elgincolin* 27990 (A), A. D. E. *Elmer* 22055 (GH), R. B. *Fox* 4776 (A), M. *Ramos* 1037 (GH), 1078 (US), 1897 (GH), 4612 (GH), Masbate, E. D. *Merrill* 3064 (US), Montalban, A. *Loher* 12035 (A), Mindanao, E. *Fenix* 24946 (A, US), Palawan, D. D. *Soejarto & D. A. Madulid* 6228 (A), Polillo, R. B. *Fox* 9080 (A), Rizal, A. *Loher* 12597 (A), M. *Ramos* 2037 (US), Sulu, M. *Ramos & G. Edano* 26322 (US), 48335 (US), Tawitawi, M. *Ramos & G. Edano* 43988 (A, US), Tayabas, H. M. *Curran* 10267 (US), E. D. *Merrill* 3356 (US). **THAILAND:** Ban Mang, M. C. *Lakshnakara* 907 (BM), Baria Gallicae, L. *Pierre* 4972 (BM), Bienboa Gallicae, L. *Pierre* 2793 (BM), Chiangmai, C. F. *Beusekom & C. Phengkklai* 2365 (P), N. *Fukuoka* 62152 (A), J. F. *Maxwell* 89-885 (A), 90-483 (A), 91-680 (GH), 92-586 (GH), 93-13 (GH), 93-746 (A), C. *Phengkklai et al.* 4104 (A), T. *Smitinand* 190 (A), Chaiyaphum, R. *Geesink et al.* 6997 (P), Chanthaburi, R. *Geesink et al.* 6697 (P), Chumpawn, A. F. G. *Kerr* 11564 (A, BM, P), Doi Kao, *Sunett* 683 (A), 912 (A), Doi Sutep, *Native Collector* 321 (A), Th. *Sorensen et al.* 5734 (A), Doi Chom Cheng, J. F. *Rock* 258 (US), 383 (US), 385 (US), Huay Riachia, B. *Nimanon & S. Phusomsaeng* 283 (P), Hue Me Pan, J. F. *Rock* 447 (US), Kanchanaburi, J. F. *Maxwell* 94-476 (A), T. *Smitinand* 93-624 (A), Lake Langsuan, L. L. *Put* 1722 (BM), Lampoon, N. C. *Charoenphol et al.* 4067 (US), J. F. *Maxwell* 87-442 (A), T. *Smitinand* 93-710 (A), Loei, H. *Koyama* 61554 (A), Nakhon Ratchasima, C. F. *Beusekom & C. Charoenpol* 1676 (P), Nakhon Nayok, T. *Smitinand & C. Pengklai* 10876 (P), Peninsula, C. *Phloenchit* 452 (A), Phu Luang, K. *Bunchai* 1614 (P), Ranong, R. *Geesink et al.* 7452 (P), L. L. *Put* 4196 (BM), T. *Santisuk* 1246 (A), Songkla, J. F. *Maxwell* 85-620 (A, E), 86-478 (A), T. *Smitinand & M. Thephasdin* 11492 (K), M. D. *Thorel s.n.* (E), Sreracha Bondan, A. *Marcant* 1373 (BM), Suratthani, *Geesink et al.* 7767 (B), without location, C. F. *Beusekom et al.* 4421 (K), H. B. G. *Garrett* 300 (BM, E, K), 638 (A, E, K), 889 (A), 912 (A), R. *Geesink et al.* 5309 (E), H. *Hoe* 288 (BM), 912 (K), A. F. G. *Kerr* 4192 (BM), 6202 (BM), 14416 (K, BM), 15920 (BM), 17043 (BM), 18010 (BM 2 sheets), 21433 (BM, US), S. S. *Larsen* 31329 (K). **VIETNAM:** L. *Pierre* 2793 (US), E. *Poilane* 15283 (US), *Sino-Vietnam Exped.* 1925 (KUN).

This is a very common species within its range. However, it does not occur in China. The name *E. colonoides* used for plants from Yunnan (Ind. Plants Yunnanensis 1: 763. 1984) is *E. bullata* (see specimens cited under that species).

76. *Euonymus congolensis* R. WILCZEK, Bull. Jard. Bot. Etat. Brux. 29: 183. 1959. TYPE: CONGO BELGE. District du Kasai: Dec. 1910, *Sapin s.n.* (not seen).

Shrub to small tree, to 8 m high; branches and twigs slender, gray-green to gray-brown, indistinctly 4-striated. Leaves thinly papyraceous, oblong-elliptic or ovate-elliptic, 6-8 x 2-2.5 cm, apex caudate or long-acuminate, base subattenuate, margin crenulate, lateral veins 4-6 pairs, curving forward, netting and disappearing before reaching the margin; petiole 2-3. Peduncle 1-2 cm long, with 1-2 dichotomous branches and several flowers; pedicel 3-5 mm long. Flower 5-merous, c. 5 mm in diam. Sepals equal, ciliolate. Petals pale green, elliptic. Capsule turbinate, (4-) 5-angled, 8-1.4 cm long, opening into 5 (4) lobes at maturity; seeds ellipsoid, partly covered by aril.

Phenology. Flowering: November; Fruiting: Unknown.
Distribution: Congo, Gabon, Zaire; alt. c. 200 m, in forests; rare.

SPECIMENS EXAMINED: **GABON**: Lepe-Okanda Reserve, G. McPherson 16179 (US).

Aside from the original publication, there is no additional information or material available for the present revision, with the exception of the cited flowering specimen. However, this is the only species in the genus so far found in the African continent, besides *E. latifolia* which occurs in N Africa.

77. *Euonymus crenulata* WALL., Cat. n. 4297. 1826, nom. nud.; et WALL. ex WIGHT & ARN., Prod. Fl. Pen. Ind. Or. 161. 1834. TYPE: INDIA. *N. Wallich Cat. 4297* (not seen).

Evergreen small tree, to several meters tall; branches and twigs gray-green to gray-brown, terete. Leaves thinly coriaceous, elliptic or obovate-elliptic, 5-7 x 2-3 cm, apex obtuse, base subround or attenuate, margin indistinctly crenulate to entire, revolute, lateral veins 5-7 pairs, indistinct, curving forward, disappearing before reaching the margin; petiole 5-20 mm long. Peduncle c. 4 cm long, with 1-2 dichotomous branches and several flowers; pedicel 5-10 mm long. Flower 5-merous. Sepals semiround. Petals purple, orbicular. Capsule turbinate, 5-angled, brown or red-brown, c. 1.5 cm in diam., c. 1.4 cm long, opening into 5 lobes at maturity; seed ellipsoid, dark brown, base covered by orange aril.

Phenology. Flowering: May to July; Fruiting: August to October.

Distribution: India (South); alt. 300-1,000 m, in woodlands and forests; occasional.

SPECIMENS EXAMINED: **INDIA**: Avalake-mara, *Pr. Melur. 1544* (A, US, WU), Kodaikanal Region, *L. L. Uhl s.n.* (A), without location, *R. Wight 444* (GH), *E. H. Wilson 23* (A 2 sheets).

This species was reported without an aril in the original literature (WIGHT & Arn. 1834), which has proved to be inaccurate.

78. *Euonymus dichotoma* HEYNE ex WALL. in ROXB., Fl. Ind. 2: 410. 1824. TYPE: INDIA. *N. Wallich Cat. 4289* (not seen).

= *E. thwaitesii* LAWSON in J. D. HOOK., Fl. Brit. India 1: 608. 1875. TYPE: CEYLON. *G. H. K. Thwaites s.n.* (K!).

Shrub; branches and twigs gray-green to gray-brown, terete, slender. Leaves thickly chartaceous, elliptic or obovate-elliptic, 5-7 x 2.5-3 cm, apex acute or attenuate, base cuneate or attenuate, margin entire, lateral veins indistinct, curving forward, disappearing before reaching the margin; petiole 3-5 mm long, slender. Peduncle 2-4 cm long, with 1-2 dichotomous branches and several

flowers; pedicel c. 5 mm long. Flower 5-merous. Sepals semiround. Petals brown-red, orbicular, 7-8 mm in diam. Capsule obpyramidal, 5-angled, brown or yellow-brown to red-brown, 1.0-1.2 cm in diam., c. 1.0 cm long, opening into 5 lobes at maturity; seeds ellipsoid, dark brown.

Phenology. Flowering: May to August; Fruiting: August to November.

Distribution: India, Sri Lanka; in woodlands and forests, occasional.

SPECIMENS EXAMINED: **INDIA:** Kodaikanal Region, *L. L. Uhl s.n.* (A), Peninsula Indian Orientalis, *R. Wight 484* (A, GH, K), Tamil Nadu, *K.M. Matthew 16336* (BM). **SRI LANKA:** *G. H. K. Thwaites 171* (GH), *Anglade s.n.* (A), *A. Kostermans 25527* (P).

79. *Euonymus dolichopa* MERR. ex J. S. MA, Harvard Pap. Bot. 10: 95, fig. 9. 1997. TYPE: CHINA. Guangxi: Shangsi, Deng Long village, *W. T. Tsang 24459* (Holotype, NA!, Isotypes: A! MO!). [Fig. 50]

Evergreen shrub, 2-3 m tall; branches and twigs gray-green to gray-brown, terete, sturdy. Leaves thickly chartaceous to coriaceous, elliptic or oblong-elliptic, 8-12 x 3-4.5 cm, apex acute or acuminate, base cuneate or subround, margin nearly entire or obscurely and finely crenulate, lateral veins 9-11 pairs, obscure, curving forward, webbing before reaching the margin; petiole 3-4 mm long. Peduncle c. 6 cm long, with 1-2 dichotomous branches and several flowers; pedicel c. 10 mm long. Flower 5-merous (not seen). Capsule subglobose, obscurely 5 angled, the angles small, apex emarginate, yellow, c. 1.0 cm in diam., c. 0.9 cm long at nearly full maturity; seeds ellipsoid, dark brown, lower part covered by orange aril.

Phenology. Flowering: Unknown; Fruiting: October.

Distribution: China (Guangxi); rare.

The above description is directly from the type specimen, since no further material has become available; further collection is strongly recommended.

80. *Euonymus eberhardtii* TARD., Bull. Soc. Bot. France 95: 180. 1948. TYPE: LAOS. Muong ngoi: *E. Poilane 20613* (A!).

= *E. poilanei* TARD., Suppl. Fl. Indo-Chine, ed. Humbert 1: 788. 1949, sine descr. et in Not. Syst., ed. Humbert 14: 46. 1950. SYNTYPES: VIETNAM. Tonkin: *E. Poilane 25701* (not seen); Annam: *E. Poilane 32132* (A!).

Deciduous shrublike climbers, reaching up to 10 m; branches terete, sturdy, twigs green to light green, 4-angled. Leaves papyraceous to thickly papyraceous, ovate-elliptic, 7-11 x 3-5 cm, apex acuminate, base suborbicular, margin crenulate, lateral veins 7-9 pairs, curving forward, disappearing before reaching the margin; petiole short, 2-4 mm long. Peduncle 2-3 cm long, slender, with 1-2 dichotomous branches and several flowers; pedicel 5-7 mm long. Flower



Fig. 50. *Euonymus dolichopa* J. S. MA – 1. branch; 2. fruit; 3. seed.

4-merous. Sepals ovate. Petals greenish-white, obovate, c. 8 mm in diam.. Capsule not seen; seeds unknown.

Phenology. Flowering: August; Fruiting: Unknown.

Distribution: Laos, Vietnam; alt. 400 m, in woodlands and forests; rare.

The species was published without mention of fruit or seeds. No additional information has become available for the present work.

81. *Euonymus europaea* L., Sp. Pl. 197. 1753. TYPE: EUROPE. W. Europe (LINN?, not seen)

- = *E. vulgaris* MILL., Gard. Dict. ed 8, no. 1. 1768, non Scop. 1772.
- = *E. latifolia* S. G. GMEL., Reise 1: 130. 1770-74.
- = *E. angustifolia* GILIB., Fl. Lithuan. 2: 128. 1782.
- = *E. europaea* L. var. *velutina* C. A. MEY., Verzeich. Pfl. Cauc. Casp. 134. 1831.
≡ *E. velutina* (C. A. MEY.) FISCH. & C. A. MEY., Bull. Soc. Imp. Naturalistes Moscou 337. 1838. TYPE: EUROPE. Caucasus (not seen).
- = *E. fibrillifera* FISCH. & C. A. MEY., Bull. Soc. Imp. Naturalistes Moscou 11(4): 338. 1838. TYPE: EUROPE. Caucasus (not seen).
- = *E. multiflora* OPIZ. ex BERCHT., Oekon. Techn. Fl. Boehm. 2: 153. 1838.
- = *E. quadrigona* GUELD. ex LEDEB., Fl. Ross. 1: 497. 1842.
- = *E. floribunda* STEV., Bull. Soc. Imp. Naturalistes Moscou 29(2): 122. 1856.
- = *E. pubescens* STEV., Bull. Soc. Imp. Naturalistes Moscou 29(2): 122. 1856.
- = *E. media* KIT., Linnaea 32: 641. 1868.
- = *E. bulgarica* VELEN., Fl. Bulg. 116. 1891. Type: Bulgaria.
- = *E. tenuifolia* DALLA TORRE & SARNTH., Fl. Tirol. 6(2): 788. 1909.
- = *E. czernjaevii* KLOK., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 19: 301. 1959. TYPE: UKRAINE. 3 June 1932, *L. Morosova s.n.* (not seen).
- = *E. medirossica* KLOK., Bot. Mater. Garb. Bot. Inst. Komarova Akad. Nauk SSSR 19: 296. 1959. SYNTYPES: RUSSIA. Russia Media: June 1900 (fl., not seen), Sept. 1900 (fr. not seen), *I. Shirajevskij 1061* (LE, not seen).
- = *E. moldavica* KLOK., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 19: 299. 1959. TYPE: RUSSIA. Moldavia: Aug. 4, 1949, *A. Borissova 1126* (LE, not seen).
- = *E. odessana* KLOK., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 19: 306. 1959. TYPE: UKRAINE. 4 June 1951, *M. Klovov s.n.* (not seen).
- = *E. suberosa* KLOK., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 19: 284, fig. 2. 1959. TYPE: UKRAINE. 13 May 1952, *M. Klovov & I. Artemczuk s.n.* (not seen).

Deciduous shrub to small tree, 2-6 m tall; branches terete, sturdy, twigs green to light green, 4 angled. Leaves thinly coriaceous or thickly papyraceous, elliptic, or sometimes ovate-elliptic, 6-10 x 3-4 (5) cm, apex acute or acuminate, base cuneate or attenuate, margin finely crenulate, lateral veins 6-9 pairs, curving forward, disappearing before reaching the margin; petiole sturdy, 5-15 mm long. Peduncle 2-3.5 cm long, sturdy, with 1-2 dichotomous branches and several flowers; pedicel 5-7 mm long. Flower 4-merous. Sepals ovate. Petals white, lanceolate or long-ovate, 8-9 (12) mm in diam. when fully open, apex acuminate. Capsule obovate, with 4 angles and deep grooves, brown or yellow-brown to red-brown, 1.4-1.6 cm in diam., c. 1 cm long, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, wholly covered by orange-red aril.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: Europe (Albania, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Yugoslavia, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine), Iran, Turkey, Turkmenia; N America (cult.); alt. 120-1,000 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **AUSTRIA:** *A. Rehder s.n.* (A). **BULGARIA:** *C. Schneider 627* (GH). **CAUCASUS:** *E. A. & N. A. Busch s.n.* (A), *Hohenackar s.n.* (US). **CROATIA:** *Z. Debreczy s.n.* (A). **CZECHOSLOVAKIA:** *M. Kral s.n.* (A). **GERMANY:** *A. Schulz 597* (GH). **GREECE:** *L. Awzan et al. 384* (NA). **FRANCE:** *I. Tidestrom 13437* (A). **RUSSIA:** *A. K. Skvortsov s.n.* (US). **SILESIA:** *B. Goerth 502* (GH). **SCANDINAVIA:** *J. Eriksson s.n.* (A). **SWITZERLAND:** *A. S. Pease 3365* (GH).

This species is very similar to *E. hamiltoniana* from E Asia via Himalayas to W Asia, but differs from the latter by the shorter leaves, short petiole, as well as the leaves more or less smooth on both sides. For the other synonyms which were designated as varieties or forms by BLAKELOCK under this species, and excluded here, see BLAKELOCK (1951) for details.

82. *Euonymus fusiformis* R. PARKER, Fedde Repert. Sp. Nov. Regni. Veg. 29: 104. 1931. TYPE: BURMA. Tenasserim: alt. 1200 m, *R. N. Parker 3099* (A!).

Evergreen shrub; branches terete, sturdy, twigs green to light green, 4-angled. Leaves thinly coriaceous, elliptic, 8-10 x 2.5-3.5 cm, apex acuminate, base attenuate, margin entire, lateral veins indistinct, curving and disappearing before reaching the margin; petiole sturdy, 5-10 mm long. Peduncle 4-5 cm long, slender, with 1-2 dichotomous branches and several flowers; pedicel 15 mm long. Flower 4-merous. Sepals ovate. Petals deep red, oblanceolate or long-obovate, c. 12 mm in diam. when fully open. Capsule lanceolate-fusiform, c. 4 cm long; seeds long-ellipsoid, c. 6 mm long, partly covered by orange aril.

Phenology. Flowering: January; Fruiting: Unknown.

Distribution: Myanmar; c. 1,200 m, rare.

This species is similar to *E. glaber*, but the capsule is c. 4 cm long, which is quite different from all other species in the genus. The plants can be difficult to identify without fruit.

83. *Euonymus gibber* HANCE, J. Bot. 20: 77. 1882. TYPE: CHINA. Hongkong: *H. F. Hance 21780* (not seen, photo A!). [Fig. 51]

= *E. miyakei* HAYATA in MATSUMURA & HAYATA, Enum. Pl. Form. 83, t. 7. 1906 et in J. Coll. Sci. Imp. Univ. Tokyo 22: 83. 1906. TYPE: CHINA. Taiwan: *K. Miyake s.n.* (not seen).

= *E. xylocarpa* C. Y. CHENG & Z. M. GU, Acta Phytotax. Sin. 31(2): 178, f. 1: 4-7. 1993. TYPE: CHINA. Yunnan: Yingjiang, alt. 1,200 m, Apr. 17, 1984, Z. M. Gu 84039 (not seen).



Fig. 51. *Euonymus gibber* HANCE – 1. flower branch; 2. flower; 3. fruit.

Evergreen shrub to small tree, to several meter tall; branches terete, sturdy, twigs green to light green, 4-angled, sometimes with covering of white powder together with leaves. Leaves thinly coriaceous or thickly papyraceous, obovate-elliptic, 6-10 x 3-4.5 cm, apex obtuse or round, base cuneate or attenuate, margin entire, lateral veins invisible; petiole sturdy, less than 10 mm long. Peduncle 3-4 cm long, with 1-2 dichotomous branches and several flowers; pedicel c. 5 mm long. Flower 5-merous. Sepals semiorbicular. Petals white to pink, obovate, 10-12 mm in diam. when fully open, apex fimbriate. Capsule obovate, with 5 angles and deep grooves, brown or yellow-brown to red-brown, 1.2-1.4 cm in diam., c. 1 cm long, opening into 5 lobes at maturity, base with persistent sepals; seeds ellipsoid, dark brown, lower part covered by orange-red aril.

Phenology. Flowering: June to August; Fruiting: August to October.

Distribution: China (Guangdong, Hainan, Taiwan, Yunnan); alt. 100-1,600 m, in woodlands and forests; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Hongkong, *E. Bodinier* 1271 (E), Ruyuan, *C. Wang* 44125 (IBSC, MO); HAINAN: Changkiang (Changjiang), *S. K. Lau* 1767 (A, BM, IBSC, NY), 1852 (A, BM, NY), 1924 (A, BM, NY), Dongfang, *S. H. Chun* 11309 (MO), Five Finger Mt. [Wuzhishan], *F. A. McClure* 8579 (A, MO, NA), Ganen, *S. K. Lau* 5331 (A, IBSC), 27606 (A, MO, PE), *H. Y. Liang* 63554 (NY, PE, US), Kunugun, *S. K. Lau* 27833 (A), Lingshui, *L. Deng* 2678 (MO), Loktung (Ledong), *S. K. Lau* 27025 (MO), Ngai District [Yaxian], *S. K. Lau* 140 (A, B, BM, E, MO, NA, NAS, NY, PE 2 sheets, US), 205 (A, B, BM, E, MO, NA, NY, US), 416 (A, B, BM, E, MO, NA, NY, PE 2 sheets), 481 (A, B, BM, E, NA, NY, PE, US), Poting [Baoting], *Hainan Middle Exped.* 959 (PE), Yaxian, *C. Wang* 33324 (A, NAS, NY, PE), 34920 (A, MO 2 sheets, NY, PE), Yachow [Yanzhou], *F. C. How* 70966 (A, B, E, MO, NY, US), *H. Y. Liang* 70147 (A, IBSC), without location, *C. Wang* 33101 (NY); TAIWAN: Kotosyo, *T. Hosokawa* 8051 (US), Lanyu, *H. L. Ho* 1027 (A), Pingtung, *C. E. Chang* 8564 (MO).

This species is very close to *E. cochinchinensis* in many aspects. However, it is quite different from it by its narrow, obovate and thinly coriaceous leaves, also by the somewhat smaller fruit compared to the latter, which has larger, oblong-elliptic, thickly coriaceous leaves, as well as a difference in distribution.

84. *Euonymus glaber* ROXB., Fl. Ind. 2: 403. 1824. TYPE: INDIA. Chittagong: *N. Wallich* Cat. 4281 (GH! K!).

= *E. serrulata* WALL., Cat. n. 4296. 1826.

= *E. mitrata* PIERRE, Fl. Forest. Cochinch. sub t. 308b. 1894. TYPE: CAMBODIA. (not seen).

= *E. carinata* CRAIB, Kew Bull. 1926: 347. 1926. TYPE: SIAM. *J. F. Collins* 842 (K! US!, photo A!, PE!), 153 (K!, photo A! PE!).

= *E. ligustrina* CRAIB, Kew Bull. 1926: 348. 1926. TYPE: SIAM. *A. F. G. Kerr* 5852 (BM! K!, photo A!).

Evergreen small tree or shrub, to 5 (15) m tall; branches and twigs dark-brown to purplish-brown, terete. Leaves chartaceous, elliptic to oblong-elliptic, 9-11 x 4-4.5 cm, apex acute or acuminate, base cuneate to attenuate, margin crenulate in upper 3/4, entire below 1/4 or subentire, lateral veins 6-9 pairs, curving forward, and disappearing before reaching the margin; petiole 5-10 mm long. Peduncle short, less than 2.5 cm long, with 1, rarely 2, dichotomous branches and several flowers; pedicel 2-3.5 mm long. Flower usually 5-merous, occasionally combined with 4-merous. Sepals semiorbicular, very small. Petals cream, ovate to obovate, c. 6 mm in diam. Capsule compressed-globose and concave at the apex, with 5 (4) angles and grooves, narrowed towards base, c. 1 cm in diam., 1.4-1.5 cm long, opening into (4) 5 lobes at maturity; seeds ellipsoid, sometimes only 1 developed at maturity.

Phenology. Unknown.

Distribution: Bangladesh, Cambodia, China (Guangxi, Yunnan), Himalayas, India, Malaysia, Myanmar, Thailand, Vietnam; alt. 500-1,600 m, in forests or woodlands; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Bose, *D. Fang et al.* 36883 (PE, plate), Longjin, *C. H. Tsoong* 91036 (IBSC); YUNNAN: Pingpien [Pingbian], *K. M. Feng* 5289 (PE), *H. T. Tsai* 61615 (A, NAS, PE), Jinghong, *C. W. Wang* 77914 (PE), 78991 (PE 2 sheets), Wenshan, *H. T. Tsai* 51828 (A, PE), without locality, *Y. Y. Hu* 60002299 (YIM). **HIMALAYAS:** Without location, *W. Griffith* 1965 (K). **INDIA:** Namakkal, *K. M. Matthew* 27648 (A). **MALAYSIA:** Pahang, *R. Ismail* 100128 (A). **VIETNAM:** Annam, *E. Poilane* 31177 (A, US), Lao Jie to Sha Ba, *Sino-Vietnam Exped.* 869 (IBSC). **THAILAND:** *P. Charoenmayu* 449 (A), *A. Kostermans* 372 (A), *L. L. Put* 2895 (K), Nakhon Nayok, *K. Larsen et al.* 3399 (P), *T. Shimizu et al.* 18096 (P), Nan, *K. Larsen et al.* 43581 (P), Phitsanulock, *K. Larsen et al.* 483 (P), 571 (P), Prachuap, *A. F. G. Kerr* 10792 (P), *Winit* 612 (K).

This species is very similar to *E. laxiflora* but the leaves have some prominent dentate teeth on the margin, and the veins are incurved on the upper surface and prominent below. It is also similar to *E. attenuata*, which differs by the leaves dentate above, and the flower smaller, about 2/3 the size. At the same time, the leaves of this species are highly variable.

85. *Euonymus glandulosa* (MERR.) D. HOU, *Fl. Males.* ser. 1, 6(2): 251. 1963. (Type: see below).

Bas.: *Glyptopetalum glandulosum* MERR., *Philipp. J. Sci.* 12: 279. 1917. TYPE: PHILIPPINES. *E. D. Merrill* 9547 (US!).

Evergreen shrub to tree, 3-8 (18) m tall and 20 (-50) cm DBH; branches and twigs black or dark purple, terete, slender. Leaves chartaceous to thinly coriaceous, obovate-elliptic or oblong-elliptic, 8-10 x 3-4.5 cm, apex acute or

acuminate, base cuneate or attenuate, margin entire to crenulate in upper 1/3 and revolute, lateral veins 5-7 pairs, impressed above and prominent beneath, curving forward, webbing and disappearing before reaching the margin; petiole 5-15 mm long. Peduncle slender, 1-3 cm long, with 1-3 dichotomous branches and several flowers; pedicel slender, c. 5 mm long. Flower 4-merous. Sepals semiround. Petals purple or dark red, nearly obovate, 6-8 mm in diam., margin erose or ciliate. Capsule obovoid, with 4 angles and grooves, 4-lobed, yellow-brown to brown-red, 1.5-1.8 cm in diam., opening into 4 lobes at maturity; seeds ellipsoid, base covered by orange to red aril.

Phenology. Flowering: March to November; Fruiting: May to January.

Distribution: Indonesia, Malaysia, Philippines; alt. 900-2,700 m, in montane forests; occasional.

SPECIMENS EXAMINED: **INDONESIA:** Sumatra, *J. S. Burley et al. 1166* (A). **MALAYSIA:** Kapit, *I. E. Paie 40859* (A), *40952* (A), Sabah, *J. H. Beaman 9577* (GH, US), *J. & M. S. Clemens 29511* (A), *33904* (A), *34478* (A), *D. Hou 234* (A). **PHILIPPINES:** Mindanao, *D. Mendoza & P. Convocar 10732* (A), Palawan, *G. E. Edano 154* (A, 2 sheets).

One specimen's field record (*I. E. Paie S. 40859*) indicates a plant to 18 m tall and 50 cm DBH. However, the original description of this species (see above) was only 3-5 m tall. Evidently, detailed field records of additional specimens are still needed for future work.

86. *Euonymus globularis* D. HOU, *Blumea* 22: 271, fig. 1. 1975. TYPE: AUSTRALIA. Northeast, *L. J. Brass 20224* (not seen).

Shrub to small tree, c. 5 m tall; branches and twigs sturdy, terete, usually black or dark purple. Leaves thinly coriaceous to coriaceous, oblong-elliptic, 8-11.5 x 2-3.5 cm, apex round or obtuse, base broadly attenuate to round or obtuse, margin crenulate, lateral veins 6-8 pairs, curving forward and reaching into margin, veinlets reticulate; petiole absent or leaf subsessile. Peduncle very short or nearly absent, with 1 dichotomous branch and few flowers; pedicel c. 5 mm long. Flower 5-merous. Sepals semiround. Petals green, nearly ovate, 6-7 mm in diam. Capsule subglobose with 5 angles, brown or yellow-brown to red-brown, 1.2-1.5 cm in diam., opening into 5 lobes at maturity; seeds ellipsoid, 6-8 in each locule, dark-brown, partly covered by orange-red aril.

Phenology. Flowering: September to December; Fruiting: August to October.

Distribution: Australia (Northeast); alt. 200-300 m, in rain forests; rare.

SPECIMENS EXAMINED: **AUSTRALIA:** Cape York Peninsula, *L. J. Brass 20019* (A), *20162* (A), *20224* (A), Cook, *L. W. Jessup 679* (A), Cooktown, *S. T. Blake 15083* (NA), *L. S. Smith 10746* (A).

This species is very unusual, having 8 ovules in each locule, and 6-8 seeds in each locule at maturity, a characteristic that is much different from the others in the genus, which may represent a new rank (see original discussion). However, the capsule before opening at maturity is globose with 5 clearly evident angles, and thus it should be treated as a member of this section.

87. *Euonymus gracillima* HEMSL., J. Linn. Soc., Bot. 23: 118. 1886. TYPE: CHINA. Without location: *Reeves s.n.* (K!, merotype A!, photo. A!).

Deciduous shrub, slender, to 4 m tall; branches terete, slender, twigs green to light green, slender, 4-angled. Leaves thinly coriaceous or thickly papyraceous, elliptic or narrow-elliptic, 4-5 x 1.2-2 cm, apex acuminate or long acute, base cuneate or attenuate, margin entire to crenulate or remotely serrate in upper part, lateral veins indistinct, curving forward and webbing and disappearing before reaching the margin; petiole slender, 2-4 mm long. Peduncle 3-4 cm, slender, with 1-2 dichotomous branches and several flowers; pedicel 3-5 mm long. Flower not seen. Capsule rhombic, with 4 angles and deep grooves, brown or yellow-brown to red-brown, c. 1.2 (1.4) cm in diam., c. 8 (10) mm long, opening into 4 lobes at maturity; seeds ellipsoid, dark brown, wholly covered by orange-red aril.

Phenology. Flowering: Unknown; Fruiting: August to November.

Distribution: China (Guangdong, Guangxi, Hainan); alt. c. 1,200 m, in thickets and forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Dabu, *L. Deng 5319* (IBSC), Kochow, *K. P. To et al. 2652* (US), Lofoshan, *E. D. Merrill 10802* (A), Moming, *N. Lian et al. 1079* (MO); GUANGXI: Linyuin, *A. N. Steward & C. C. Cheo 621* (NY), Shangsze [Shangsi], *W. T. Tsang 22384* (A), *24271* (A, MO); HAINAN: Baisa, *East Hainan Exped. 445* (MO, PE), Five Fingers Mt. (Wuzhishan), *F. A. McClure 9447* (PE), *9531* (NA), Lingshui, *L. Deng 2870* (IBSC, KUN, MO, PE), Ng Chi Leng, *F. A. McClure 8683* (NA), Qiongzong, *S. H. Chun 10866* (KUN, PE), *10921* (IBSC, KUN, MO), FanYah [Sanya], *N. K. Chun & C. L. Tso 44046* (A, IBSC, KUN, MO, NY, PE, US), Wanning, *Y. Zhong 4154* (MO, PE), without locality, *L. Deng 407* (A).

This species was described in 1886 by Hemsley based on a specimen collected by Reeves without exact locality from China. The unlocalized specimens undoubtedly came from South China where the collector, John Reeves, resided in Guangzhou (Canton) and Macao from 1812-1813 (CHUN, 1940). This species is readily distinguished by its extreme slenderness, narrow leaves and minute flowers on the filiform peduncles; and it is very rare in the field. Another question is that the original description indicates a 5-merous flower. However, from the type (K), it is difficult to examine the numbers of parts since they are just before the flower bud. In this revision, all the specimens that conform to the description and the type have only a 4-lobed fruit. Thus, it is evident that there are still some questions remaining, especially the relationship to *E. nitida* which has somewhat larger leaves and the same fruit.

88. *Euonymus grandiflora* WALL. in ROXB., Fl. Ind. 2: 404. 1824. TYPE: NEPAL. *N. Wallich C. s.n.* (not seen). [Fig. 52]

- = *E. mairei* H. LEV., Fedde Repert. Sp. Nov. Regni Veg. 13: 260. 1914, p.p. TYPE: CHINA. Yunnan: Tong- Tchouan et Tche-Hai, alt. 2,500 m, Mai-Aout 1912, *E. E. Maire s.n.* (not seen, merotype A!).
- = *E. grandiflora* WALL. f. *salicifolia* STAPF & BALLARD, Bot Mag. 57: t. 9183. 1927, non LOES. 1902, nom. illegit. superfl.
- = *E. grandiflora* WALL. var. *angustifolia* CHEN H. WANG, Chin. J. Bot. 1: 49. 1936. SYNTYPES: CHINA. Szechuan: Chaohua, alt. 550 m, May 31, 1930, K. S. Hao 327 fl. (not seen); Wenchuan, July 1930, F. T. Wang 21790 fr. (A! PE! 2 sheets).
- = *E. grandiflora* WALL. f. *longipedunculata* C. Y. CHANG, Bull. Bot. Res., Harbin 5(1): 83. 1985. TYPE: CHINA. Sichuan: Jiany(u)ang, Apr. 22, 1936, S. S. Chien 5251 (not seen).

Deciduous shrub to small tree, to 15 m tall; branches and twigs gray-green to gray-brown, terete, sturdy. Leaves thickly chartaceous to coriaceous, oblong-elliptic to obovate-elliptic, 4-10 x 2-4 cm, apex obtuse or mucronulate, base cuneate or long attenuate, margin finely crenulate, lateral veins 10-13 pairs, slightly curving forward, disappearing before reaching the margin; petiole 5-10 mm long. Peduncle single or clustered, 2-3.5 cm long, with 1-3 dichotomous branches and several to many flowers; pedicel 10-15 mm long. Flower 4-merous. Sepals semiround, persistent. Petals yellow or brown-green, orbicular, 17-22 mm in diam. when fully open. Capsule 4- right angled, brown or yellow-brown to red-brown, 1.1-1.4 cm in diam. 1.2-1.4 cm long, opening into 4 lobes at maturity; seeds usually 2, sometimes 3 in each locule, ellipsoid, dark brown.

Phenology. Flowering: March to May; Fruiting: August to November.

Distribution: Bhutan, China (Gansu, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Yunnan), India, Myanmar, Nepal, Vietnam; alt. 1,400-3,300 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **CHINA:** GANSU: Bailongjiang, C. K. Chow 74 (NAS), Wenxian, Y. Q. He 933 (PE), 983 (PE 2 sheets), Q. X. Li & X. C. Zhao 2382 (PE), J. X. Yang & Z. X. Hu 3440 (PE), 3580 (PE), G. L. Zhang & R. N. Zhao 606 (PE), T. Y. Chang 13996 (PE); GUANGXI: Quaxian, Z. Y. Chen 52628 (KUN); GUIZHOU: Weining, Y. Tsiang 9124 (A, NY), 9133 (A, NY, NAS, PE); HUBEI: Oufan, R. Silvestri 1343 (GH); HUNAN: Dongan, P. C. Tsoong 1046 (PE 2 sheets), Tungan et Schisjidjang, H. Handel-Mazzetti 11295 (A); SHAANXI: Ankang, K. M. Liu 8337 (PE), Hanzhong, J. W. Wang & Z. C. Shi 34 (PE), Ningqiang, T. N. Liou & F. T. Wang 156 (PE), Shanyang, T. P. Wang 16529 (KUN, PE 2 sheets), 16530 (PE); SICHUAN: Baoxing, X. S. Zhang & S. X. Ren 4620 (PE), 4758 (PE), 5017 (PE), 5020 (PE), Chaohua (Zhaohua), Ho 327 (P), Chengtu [Chengdu], W. K. Hu 7865 (US), 7888 (A, US), T. N. Liou 9738 (PE), T. P. Wang 9390 (KUN), 12372 (A, PE), 12447 (A), 19254 (A), 19575 (A), Daocheng, Daocheng Exped. 2283 (KUN), Guangyuan, T. N. Liou & F. T. Wang 176 (KUN, PE), 501 (PE), 574 (KUN,

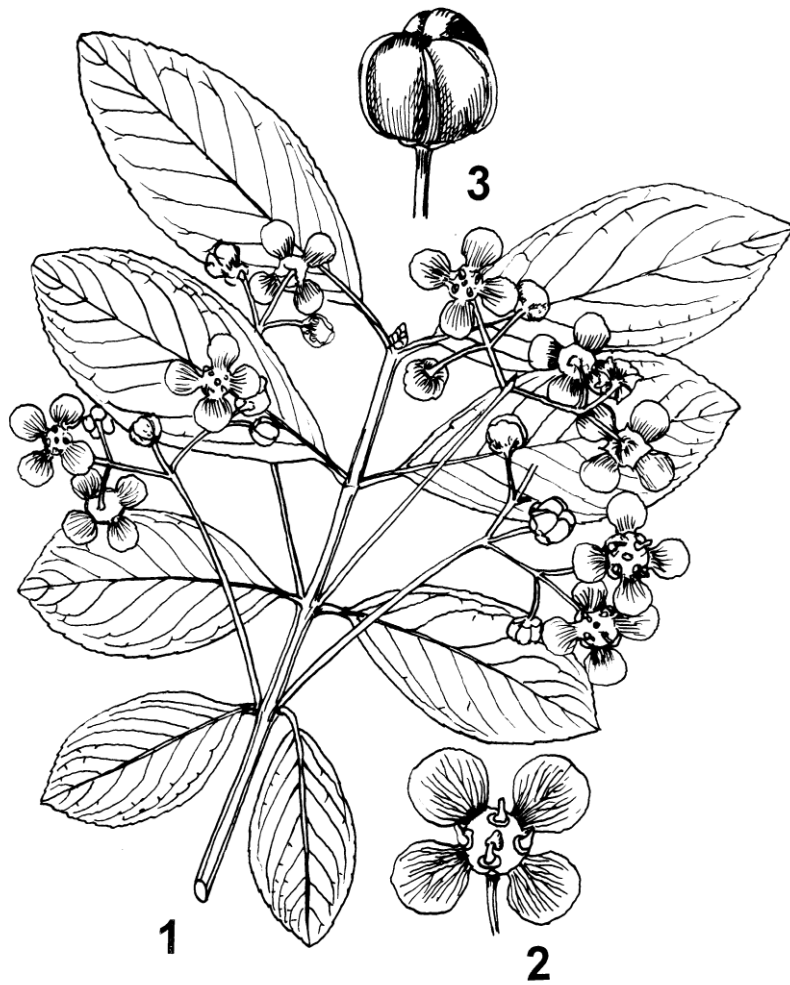


Fig. 52. *Euonymus grandiflora* WALL. – 1. flower branch; 2. flower; 3. fruit

PE), Hechang, T. T. Yu 1133 (A, PE), Hueili [Huil], T. T. Yu 1378 (A, PE 2 sheets), Huidong, S. K. Wu 798 (KUN), 1711 (KUN), 1850 (KUN), Jiange, T. N. Liou & F. T. Wang 365 (KUN 2 sheets), Jiulong, Z. G. Liu 4518 (PE), Jueishe, T. T. Yu 992 (A), Lixian, T. He & Z. L. Zhou 12296 (PE), 13131 (NAS, PE), 13874 (PE), 13899 (PE), Maowen, Maowen Exped. 2492 (PE), 2496 (KUN), Maoxian, W. P. Fang 5536 (PE), F. T. Wang 21893 (KUN, NAS, PE), Meigu, Nanshuibeidiao Exped. 7423 (KUN), Mienning [Mianning], T. T. Yu 1774 (A, PE 2 sheets), S. K. Wu 2327 (PE), Moupin [Baoping], S. Y. Hu 1090 (A 2 sheets), 1519 (A 2 sheets), Muli, Qinghai-Xizang Exped. 11277 (KUN), 13292 (KUN, PE 2 sheets), 13277 (KUN, PE 2 sheets), 13386 (KUN, PE), 14075 (KUN, PE 2 sheets), J. F. Rock 16030 (A, NY, US), 16134 (A, NY, US), 24134 (A, NY), 24578

(A, NY), S. K. Wu 2872 (KUN 2 sheets), 3545 (KUN 2 sheets), 3923 (KUN 2 sheets), T. T. Yu 5924 (KUN, PE 2 sheets), 5531 (PE 2 sheets), 5855 (A, PE 2 sheets), 6093 (A, KUN 2 sheets, PE), 6095 (PE), 7202 (KUN, PE 2 sheets), 7301 (KUN, PE), Nanchuan, W. P. Fang 5454 (NAS), 6813 (NAS), Ningyuan, C. Schneider 840 (A), Omeishan [Emeishan], W. P. Fang 13603 (A), 19213 (A), Paohsin [Baoxing], T. P. Soong 39133 (KUN 2 sheets), 39314 (KUN, NAS, PE), 39382 (KUN, PE), Pengxian, Y. Chen 7775 (NAS), Qionglai, Z. P. Huang et al. 2124 (KUN), Wenchuan, E. H. Wilson 4201 (A), West Sichuan, G. Forrest 22497 (A, US), E. H. Wilson 1022 (A, MO, PE), 3128 (A, MO), West China, E. H. Wilson 3326 (A), Wushan, H. F. Chow 110123 (PE), Yalung [Yalong], C. Schneider 4157 (A); YUNNAN: Anning, X. R. Luo 223 (MO), Chengkiang (lat. 24.39 N, long. 102.58 E), H. Wang 41410 (A), Y. Tsiang & H. Wang 16247 (A), 16248 (A), Chungtien [Zhongdian], K. M. Feng 2451 (A, KUN 2 sheets), 3195 (A, KUN 2 sheets), 3379 (A, KUN 2 sheets, PE), C. Schneider 3102 (A), 3103 (A), T. T. Yu 11436 (KUN, PE 2 sheets), 13538 (A, KUN, PE), Deqen: K. M. Feng 5745 (KUN, PE 2 sheets), 5945 (KUN) Eryuan, R. C. Ching 23186 (KUN, PE 2 sheets), Guangnan, Wenshan Exped. 238 (KUN 2 sheets, PE 2 sheets), Haba Snow Range, K. M. Feng 1089 (A, KUN 3 sheets), 1191 (A, KUN 2 sheets, PE), Kienshuei [Jianshui], H. T. Tsai 53127 (A, NAS, PE), Kunming, P. Y. Chiu 8079 (KUN 2 sheets), 50166 (KUN 2 sheets), 50946 (KUN, PE), 54541 (KUN 2 sheets), C. D. Chu 1250 (MO), K. M. Feng 488 (KUN 2 sheets), 10318 (KUN, PE 2 sheets), 10352 (KUN, PE), 10694 (KUN), T. N. Liou 13957 (PE), 14068 (KUN, PE 2 sheets), 15445 (PE), 15811 (PE), 16073 (PE), 16326 (PE), 16644 (PE), 16861 (PE), 16862 (PE), 20602 (PE), 20707 (KUN, PE), P. I. Mao 15 (PE 2 sheets), 90 (PE 2 sheets), 1984 Sino-Amer. Exped. 1342 (US), 1459 (A, US), 1981 Sino-Brit. Exped. 21 (A), Y. Tsiang & H. Wang 16492 (A), C. W. Wang 62923 (A, KUN, NAS, PE 2 sheets), F. T. Wang 2417 (KUN), S. H. Yang 101284 (KUN), Lanping, H. T. Tsai 54010 (A, KUN, NAS, PE), Lichiang [Lijiang], K. M. Feng 407 (KUN 2 sheets), 21365 (KUN 2 sheets, PE), Lichiang Botanic Garden 11001008 (KUN 3 sheets), Lijiang, H. Li et al. 631 (KUN 2 sheets), P. I. Mao 100 (KUN 2 sheets, PE), 302 (KUN 2 sheets, PE), S. W. Yu 24792 (KUN), 65072 (KUN, PE 2 sheets), Likiang [Lijiang], R. C. Ching 20146 (KUN), 20298 (A, KUN), 21552 (A, KUN, PE), 21581 (A, KUN), 22206 (A), J. F. Rock 3296 (A, NY, US), 5091 (NY, US), 8323 (A, US), 8479 (A, US), C. Schneider 3192 (A), T. T. Yu 8097 (KUN 2 sheets, PE 2 sheets), Likiang [Lijiang] Snow Range, J. F. Rock 3625 (A, US), 4185 (A, US), Lungling [Longling], H. T. Tsai 35600 (A, NAS, PE), C. W. Wang 89826 (KUN), Marlipo [Malipo], K. M. Feng 13027 (PE), Mekong-Salween divide, G. Forrest 14878 (A), J. F. Rock 8900 (A, US), Menghwa, Y. Tsiang 11790 (NAS), Mengtse [Mengzhi], A. Henry 9706 (A, MO, NY), 11011 (A, MO), 13245 (MO), 13253 (NY), Peyen, P. S. Ten 41 (A), Mow Hsien [Maoxian], W. P. Fang 5582 (A), Ningliang, Nanshuibeidiao Exped. 6069 (PE), Phomi, O. Schoch 12 (A), Qiubei, Forestry Bureau s.n. (KUN), Red River [Honghe], J. F. Rock 3049 (A, US), Shihping [Shiping], H. T. Tsai 53396 (A, KUN), Shizong, Shizong Team 191 (A), Shuangbo, W. Q. Yin 377 (KUN, PE), 405 (KUN, PE), 523 (KUN, PE), 540 (KUN 2 sheets, PE), 541 (KUN 2 sheets, PE), Shweli-Salween divide, G. Forrest 18532 (A), 26364 (A, US), Songming, P. Y. Chiu 50374 (KUN 3 sheets), 51317 (KUN 2 sheets, PE), 51318 (KUN 2 sheets, PE), 51506 (KUN 2 sheets, PE), 51744 (KUN, PE), 54215 (KUN, PE), 54304 (KUN, PE), 54305 (KUN 2 sheets, PE), 54546 (KUN, PE), 54551 (KUN, PE), 55020 (KUN 2 sheets, PE), 55171 (PE), 55480 (PE), P. Y. Chiu & S. T. Li 81-30 (A), P. Y. Chiu & S. H. Yuan 82022 (A), 1984 Sino-Amer. Exped. 1342 (A, KUN), P. I. Mao 90 (KUN 2 sheets), 95 (KUN), Suenoui, E. E. Maire 175 (A), 413 (A), 414 (A), Tali [Dali], T. N. Liou 16277 (PE, KUN 2 sheets), 16311 (KUN 2 sheets), 16322 (KUN), Tengcong, S. T. Li 80380 (KUN 2 sheets), S. K. Wu 6694 (KUN 2 sheets), Tongqian, A. L. Zhang 101008 (KUN), Weihsi [Weixi], K. M. Feng 3703 (KUN 2

sheets, PE 2 sheets), 4218 (KUN 3 sheets), 4318 (KUN 2 sheets, PE 2 sheets), J. F. Rock 11551 (A, NY, US), Weisi [Weixi], H. T. Tsai 59829 (KUN, PE), 59927 (A, PE), 59929 (A), 59958 (A, NAS, PE), C. W. Wang 63708 (A, KUN, PE 2 sheets), 67737 (A, KUN, NAS, PE 2 sheets), 67957 (A, KUN, NAS, PE 2 sheets), 71730 (A, NAS, PE 2 sheets), Weixi, C. S. Yang 1018 (KUN), Wei Hsi [Weixi] G. Forrest 13909 (A), Weixi: Hengduan Mt. Exped. 1631 (PE 2 sheets), Wenshan, K. M. Feng 11077 (A, KUN, PE), Yunnan Univ. Exped. 50157 (KUN), 55086 (KUN), Without location, F. Ducloux 65 (NY), G. Forrest 6496 (PE), 7851 (A), 9821 (A), 10890 (A), 11420 (A, PE), 28371 (PE), 29096 (PE), 29210 (PE), H. Handel-Mazzetti 6083 (US), E. E. Maire 3872 (NY), 10200 (NY), 10229 (NY), 10230 (NY), H. Smith 1586 (A), H. T. Tsai 57038 (NAS), Yangbi, S. Y. Bao 545 (KUN 2 sheets), T. N. Liou 20711 (KUN), Yanshan, C. W. Wang 84415 (KUN 2 sheets, PE), Yungning [Ningliang], T. T. Yu 5320 (A, KUN, PE), Zhaotong, Northeast Yunnan Exped. 858 (KUN 2 sheets), Zhongdian, 1981 Sino-Brit. Exped. 275a (KUN), Zhongdian Exped. 2014 (KUN 2 sheets, PE), 2559 (KUN 2 sheets). **BHUTAN:** Without location A. J. C. Grierson & D. G. Long 2826 (A), W. Griffith 986 (GH), H. Kanai et al. 361 (A). **HIMALAYAS:** Without location, J. D. Hooker & T. Thomson s.n. (GH). **INDIA:** Assam, N. L. Bor s.n. (A), L. F. Ruse 56 (A), Darjeeling, G. Ghose s.n. (NA), Khasia, C. B. Clarke 38248a (US), J. D. Hooker & T. Thomson s.n. (GH), F. K. Ward 18755 (BM), Shilling, C. B. Clarke 44857f (US). **INDOCHINA:** Without location, E. Poilane 28617 (A). **MYANMAR:** Kutkhai, F. G. Dickason 4023 (A).

This species is generally very similar to *E. carnos*. However, it differs significantly from it by the smaller leaves, larger flower, as well as the distribution in the Sino-Himalayas area, rather than the Sino-Japan area. These two species are mixed together in Hubei and Hunan provinces in SC China. The distribution record from Henan is from the local flora (Flora of Henan 2: 524. 1988). Y. R. LI (Vascular Plants of Mt. Hengduan 1:1097. 1993) states that the species is also in several provinces of E China, however those plants are *E. carnos*.

89. *Euonymus hamiltoniana* WALL. in ROXB., Fl. Ind. 2: 403. 1824. TYPE: NEPAL. W. Hamilton s.n. (not seen). [Fig. 53]

- = *E. atropurpurea* ROXB., Hort. Beng. 18. 1814, non Jacq. 1772, nom. illegit. superfl.
- = *E. sieboldiana* BLUME, Bijdr. Natuurk. Wetensch. 1147. 1826. TYPE: JAPAN. P. F. Siebold s.n. (not seen).
 - ≡ *E. hamiltoniana* WALL. subsp. *sieboldiana* (BLUME) H. HARA, Fl. E. Himal. 1st Rep. 639. 1966.
- = *E. majume* SIEBOLD, Syn. Pl. Oecon. 49. 1827.
- = *E. vidalii* FRANCH. & SAV., Enum. Pl. Jap. 2: 312. 1879. TYPE: JAPAN. P. A. Savatier 5595 (not seen).
- = *E. hamiltoniana* DIPPEL ex KOEHNE, Deutsche Dendrol. 365. 1893, non Wall. 1824, nom. illegit. superfl.
- = *E. europaea* FORBES & HEMSL., J. Linn. Soc., Bot. 23: 121. 1886, non L. 1753, nom. illegit. superfl.
- = *E. lanceifolia* LOES., Bot. Jahrb. Syst. 30: 462. 1902. TYPE: CHINA. Yunnan: in montosis apud Mengtze, alt. 2670 m, A. Henry 11165 (A! MO!).

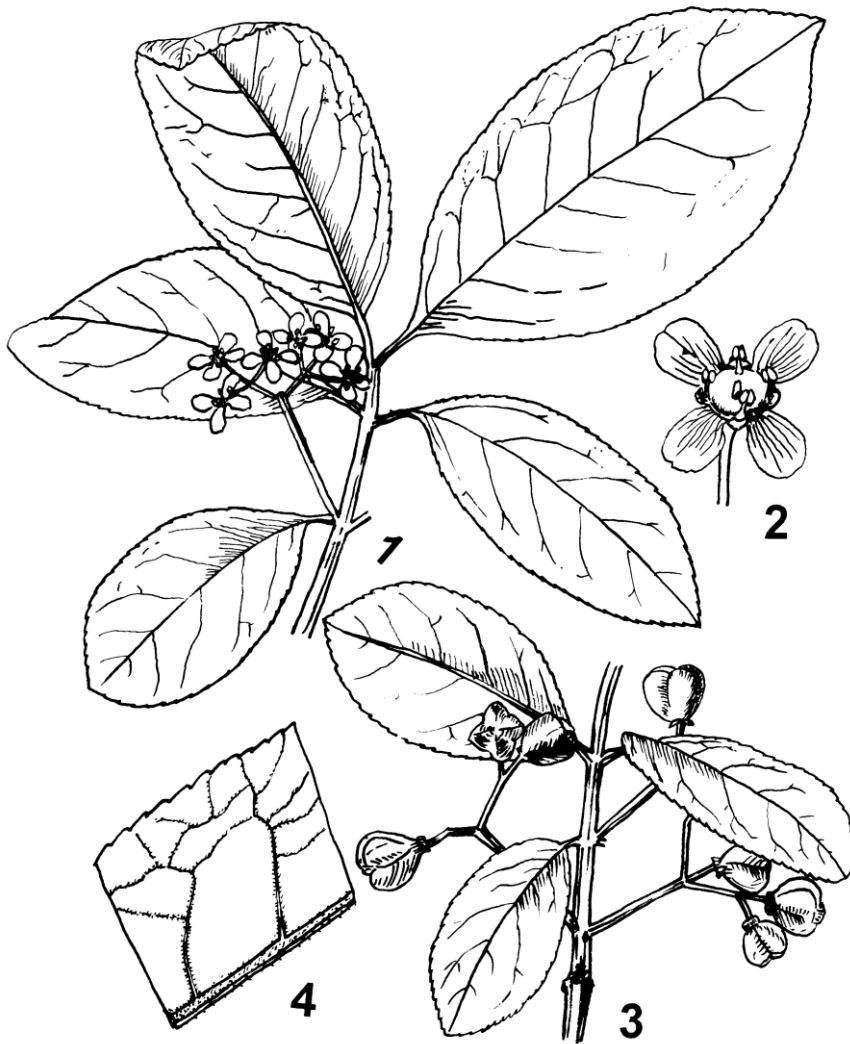


Fig. 53. *Euonymus hamiltoniana* WALL. – 1. flower branch; 2. flower; 3. fruit branch; 4. leaves (lower)

≡ *E. hamiltoniana* WALL. var. *lanceifolius* (LOES.) BLAKELOCK, Kew Bull. 1951: 246. 1951.

≡ *E. hamiltoniana* WALL. f. *lanceifolius* (LOES.) C. Y. CHENG ex Q. H. CHEN, Fl. Guizhou. 2: 402. 1986.

= *E. hians* KOEHNE, Gartenfl. 53: 33. 1904.

= *E. yedoensis* KOEHNE, Gartenfl. 53: 31. 1904.

- = *E. vidalii* FRANCH. & SAV. var. *stenophylla* KOIDZ., Bot. Mag. (Tokyo) 31: 32. 1909. TYPE: JAPAN. (not seen).
- = *E. semiexserta* KOEHNE, Fedde Repert. Sp. Nov. Regni. Veg. 8: 54. 1910. TYPE: JAPAN. (cult., not seen).
- = *E. yedoensis* KOEHNE var. *koehneana* LOES. in SARG., Pl. Wilson. 1: 491. 1913. TYPE: CHINA. Western Hupeh: north and south of Ichang, *E. H. Wilson 353a* (A! 3 sheets, US!).
- = *E. bodinieri* H. LEV., Fedde Repert. Sp. Nov. Regni Veg. 8: 261. 1914. TYPE: CHINA. Kouy-Tcheou: Gan-Chouen, Juin 1910, *J. Cavalerie 3824* (not seen, merotype A!, photo. A!).
- = *E. darrisii* H. LEV., Fedde Repert. Sp. Nov. Regni Veg. 13: 261. 1914. TYPE: CHINA. Kouy-Tcheou: *M. Esquirol 711* (not seen, merotype A!, photo. A!).
- = *E. maackii* H. LEV., Fl. Kouy-Tcheou 73. 1914, non Rupr. 1857, nom. illegit. superfl.
- = *E. rugosa* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 261. 1914. TYPE: CHINA. Kouy-Tcheou: Hoang-Tsao-Po, *M. Esquirol 1532* (not seen, merotype A!, photo. A!).
- = *E. dorsicostata* NAKAI, Bot. Mag. (Tokyo) 40: 493. 1926. TYPE: JAPAN. Nikko: *T. Nakai s.n.* (not seen).
- = *E. nikoensis* NAKAI, Bot. Mag. (Tokyo) 40: 492. 1926. TYPE: JAPAN. Hondo: *T. Nakai s.n.* (not seen).
- = *E. sieboldiana* BLUME var. *sanguinea* NAKAI, Bot. Mag. (Tokyo) 40: 493. 1926. TYPE: JAPAN. *T. Nakai s.n.* (not seen).
- = *E. dolichophylla* KOIDZ., Acta Phytotax. Geobot. 10(1): 56. 1941. TYPE: JAPAN. *G. I. Koidzumi s.n.* (not seen).
- = *E. maackilides* KOIDZ., Acta Phytotax. Geobot. 10(1): 56. 1941.
- = *E. sieboldiana* BLUME var. *sphaerocarpa* NAKAI, J. Jap. Bot. 17: 685. 1941. TYPE: JAPAN. *K. Mayebar 2493* (not seen).
- = *E. juzepczukii* LEONOVA, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 19: 324. 1959. SYNTYPES: INDIA. Bor.-Occid: Tihri-Garhwal, *G. F. Duthie 661, 664, 665* (LE, not seen).
- = *E. hamiltoniana* WALL. var. *pubinervia* S. Z. QU & Y. H. HE, Bull. Bot. Res., Harbin 8(4): 92, f. 1-3. 1988. TYPE: CHINA. Shaanxi: Xunyang, alt. 750 m, July 29, 1958, *M. C. Wang 285* (NWFC, not seen).

Deciduous shrub to small tree, 3-20 m tall, to 25 cm DBH; branches and twigs terete, sturdy, green to light green. Leaves thinly coriaceous or thickly papyraceous, elliptic, or sometimes ovate-elliptic, 11-13 (15) x 3-5 (7) cm, apex acuminate, base attenuate, finely crenulate, rugose on both sides, lateral veins 6-9 pairs, curving forward, webbing and disappearing before reaching the margin; petiole sturdy, 9-20 mm long. Peduncle 3-4.5 cm long, with 1-3 dichotomous branches and several flowers; pedicel 5-7 mm long. Flower 4-merous. Sepals ovate. Petals white, lanceolate or long-ovate, 9-10 mm in diam. when fully open, apex acuminate or obtuse. Capsule rhombic, with 4 angles and deep grooves, brown or yellow-brown to red-brown, 1.0-1.3 cm in diam., c. 8 mm

long, opening into 4 lobes at maturity; seeds ellipsoid, dark brown, wholly covered by orange-red aril.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: Afghanistan, Bhutan, China (Anhui, Fujian, Gansu, Guangxi, Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang), India, Japan, Kashmir, Korea, Myanmar, Nepal, Pakistan, Russia (Sakhalin?), Sikkim, Thailand; alt. 30-3,000 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Huangshan, L. K. Fu 737 (NAS), 757 (NAS), Jinzhai, K. Yao 9062 (A), Juhuashan, *East China Station* 6033 (NAS), Wangshan [Huangshan], N. K. Ip 4772 (A); FUJIAN: Wuyishan, *Wuyishan Team* 80-0488 (MO); GUANGDONG: Ruyuan, W. Y. Chun 10951 (MO), *Ruyao Team* 731 (MO), Yuyuan [Ruyuan], S. P. Ko 51720 (NAS), 52745 (A); GUANGXI: Lingui, Y. F. Tan et al. 70006 (IBSC, LBG), 70184 (IBSC), 70870 (IBSC), Longsheng, Y. F. Tan et al. 70397 (IBSC), Xingan, C. H. Tsoong 81717 (A, IBSC, MO); GUIZHOU: Anlung [Anlong], Y. Tsiang 7370 (A, NAS), Z. S. Zhang & Y. T. Chang 2540 (IBSC), Fanchingshan, A. N. Steward et al. 471 (A); Jiangkou, 1986 *Sino-Amer. Guizhou Exped.* 448 (A), Kweiyang [Guiyang], Y. Tsiang 8430 (A), Langtai, Y. Tsiang 9508 (A), Pitsieh [Bijie], H. T. Tsai 52752 (NAS), Songtao, 1986 *Sino-Amer. Guizhou Exped.* 2023 (A, NA), Without location, *Cavalerie M. M. & P. Fortunat* 2121 (P), *Guizhou Exped.* 3597 (IBSC), Xingyi, *Guizhou Exped.* 6361 (IBSC); HENAN: Nanzhao, Z. W. Wen 51284 (NAS); HUBEI: Badong, C. M. Hu 388 (NAS), Changyang, E. H. Wilson 765 (A), Fang Hsien [Fangxian], E. H. Wilson 353 (A 2 sheets, US), Huantsao, W. C. Cheng 4565 (US), Lichuan, Y. W. Djou 122 (A), Paokang, C. Silvestri 5079 (A), Shennongjia, 1980 *Sino-Amer. Exped.* 137 (A), 1023 (A, NA), 1054 (A, NA), 1233 (NA), 1522 (NA), Patung [Badong], E. H. Wilson 3112 (A, US), Wudang, 1994 *NACPE WD* 52 (NA); HUNAN: Changning, C. S. Fan & Y. Y. Li 222 (A, NAS); JIANGSU: Ishing [Yixiang], R. C. Ching 518 (A), Jurong, *East China Station* 6962 (NAS), Siao Hsien [Xiaoxian], J. Hers 1004 (A); JIANGXI: Hwanglungshan [Huanglongshan], Y. K. Hsiung 5617 (A), Lushan, H. H. Chung & S. C. Sun 575 (A), H. Migo s.n. (NAS), M. C. Wang et al. 803 (NAS), Wuning, Y. K. Hsiung 5355 (A); SHAANXI: Fuping, K. T. Fu 4621 (MO), Lueyang, C. L. Tang 1040 (NAS), Taibeishan [Taibaishan], Wm. Purdom 8 (A), Tsinling [Qinling], J. Hers 3014 (A), without location, F. G. Meyer 1935 (NA), Yanan, Z. W. Zhang 727 (NAS); SICHUAN: Dujiangyan, D. E. Boufford & B. Bartholomew 24000 (A), Kai Xian, T. L. Dai 101797 (MO), Kangding, H. L. Tsiang 2950 (SZ), Kiangyu [Jiangyou], F. T. Wang 22222 (A), Kuan Hsien [Guan Xian], W. P. Fang 1951 (A, NAS), Nanchuan, W. P. Fang 643 (A), 1138 (A), Y. Y. Ho 25599 (NAS), K. F. Li 61974 (NAS), 62371 (NAS), Omeishan [Emeishan], W. P. Fang 19799 (A, KUN, SZ), Tachienlu [Kangding], W. P. Fang 3605 (A), E. H. Wilson 4180 (A), Tianquan, H. L. Tsiang 34563 (SZ), 52290 (SZ), Wanxian, C. T. Hwa 82 (A, NAS), Wenchuan, E. H. Wilson 1105 (A 2 sheets), Wushan, A. Henry 5737 (A, US), Wuxi, K. H. Yang 59450 (MO); YUNNAN: Chenghsiung [Zhenxiong], J. F. Rock 3731 (US), H. T. Tsai 52290 (A, NAS, SZ), Lichiang [Lijiang], T. T. Yu 15111 (A), Likiang [Lijiang], R. C. Ching 21519 (A), C. W. Wang 70980 (NAS), Mengtze [Mengzhi], A. Henry 10367 (US, 2 sheets), 13411 (A, US), Tali [Dali], J. F. Rock 6788 (US), 6812 (A), without location [27.20 N, 100.11 E], G. Forrest 22600 (A), Yongshan, H. T. Tsai 51114 (NAS, SZ); ZHEJIANG: Changhua, Y. Y. Ho 29916 (NAS), Chingyuan [Qingyuan], R. C. Ching 2373 (A), Hongchow [Hangzhou], R. C. Ching 2595 (A), Y. Y. Ho 20007 (NAS), S. Y. Chang 704 (NAS), Huating, C. Y. Chiao 14315 (A), Ningpo [Ningbo], D. MacGregor s.n. (A), Tienmoshan [Tianmushan], Y.

Y. Ho 1839 (NAS), 21793 (NAS), T. Tang & W. Y. Hsia 398 (A), Tientai [Tiantai], H. H. Hu 267 (A), M. C. Wang et al. 1212 (NAS), West Lake, H. H. Hu 1446 (A). **KASHMIR:** T. A. Rao 9466 (A), R. R. Stewart 6910 (A), 12079 (A), 17676 (A), 21480 (US). **NW HIMALAYAS:** D. Brandis 895 (A), J. D. Hooker & T. Thomson s.n. (GH, 2 sheets, US), R. R. Stewart 13002 (A). **W. HIMALAYAS:** J. F. Duthie s.n. (A). **INDIA:** Chamba, R. N. Parker s.n. (A, 2 sheets), Dehra Dun, M. R. Beli 41 (A), Khasia, W. Griffith 1065 (GH), Kumaon, W. Koelz 20548 (NA), R. Strachey & J. E. Winterbottom 1 (GH), 5 (GH, K), Naga Hills, D. Prain s.n. (A), Punjab, N. Parmanand 86a (NA), Sirhoi, F. K. Ward 17496 (A), Tehri, W. Koelz 22096 (NA). **JAPAN:** Akita, P. H. Dorsett & W. J. Morse 1445 (A, US), Aomori, H. Muroi 4539 (A), Chiba, E. H. Walker et al. 5657 (A, US), Echigo, M. Mizushima 2997 (A), Fukushima, H. Ohashi et al. 9412 (A), Gifu, H. Muroi 4293 (A), Hokkaido, W. P. Brooks 45 (A), C. S. Sargent 22 (A), Hukui, G. Murata 70088 (A), Hyogo, H. Muroi 4871 (A), Ibaraki, H. Iketani 691 (A), Iburi, F. G. Meyer et al. 19206 (NA), Idzu, M. Mizushima 1835 (A), Ishikawa, K. Deguchi 7755 (A), Iwate, Y. Tateishi et al. 11240 (A), Izu, M. Mizushima 836 (A), Kobe, H. Muroi 349 (A), Kyoto, S. Tsugaru et al. 20149 (A), Mie, H. Muroi 1966 (A), Mino, K. Shiota 138 (A), Miyagi, Y. Tateishi et al. 9241 (A), Musashi, M. Mizushima 2501 (A), Nagano, H. Muroi 3707 (A), Nagasaki, R. Oldham 157 (GH), Nara, H. Muroi 823 (A), Nikko, J. G. Jack s.n. (A), Ohsumi, S. Hatusima 16504 (GH), Okayama, S. Naroba s.n. (A), Sagami, M. Mizushima 3077 (A), Sappo, S. Arimoto s.n. (GH), Shimani, K. Deguchi & S. Tsugaru 4335 (A), Shinano, M. Mizushima 2284 (A), Shiribesi, H. Takahashi et al. 6241 (NA), Shizuoka, F. Konta 1373 (A), Shojiko & Kofu, P. H. Dorsett & W. J. Morse 524 (US), 536 (US), Teshio, B. Kasapliligil 3550 (NA), Teshiwo, M. Furuse 8729 (NA), Tochigi, S. Ogawa et al. 263 (A, NA), Tokyo, H. Kanai et al. 10811 (A), P. H. Dorsett & W. J. Morse 786 (US), Tottori, H. Muroi 5469 (A), Toyama, J. Jutila et al. 443 (GH), Usuitoge, P. H. Dorsett & W. J. Morse 991 (US), 992 (US), Without location, E. H. Wilson 6842 (US), Yamagata, H. Ohashi et al. 6634 (A), Yamanashi, S. Suzuki s.n. (A), Y. Tateishi et al. 504 (US). **KOREA:** Chonpuk, K. Y. Shik s.n. (A), Chungchong Namdo, B. R. Yinger et al. 2943 (NA), Heigigo, E. H. Wilson 8759 (US), Hongosan, E. H. Wilson 9265 (A, US), 9456 (US), 10531 (US), 10617 (US), 10701 (US), Kyongjido, C. S. Chang 52 (A), Seoul, E. H. Wilson 8448 (A), Quelpaut Island, E. H. Wilson 9413 (A), Tsu-sima Island, C. Wilford s.n. (A). **NEPAL:** Chyangthaphu, H. Hara et al. 6303413 (A), Khunga Chuli, H. Hara et al. 6303414 (A). **PAKISTAN:** Muzaffarabad, M. A. Siddiqi 13 (A). **SIKKIM:** Gangtok, H. Hara et al. 6590 (A 2 sheets), 69769 (A).

This is one of the most common species in the genus, with large populations throughout its range. It is undoubtedly similar to *E. europaea* in most characters, but has a different geographical distribution. Y. R. LI (Vascular Plants of the Mt. Hengduan 1: 1099. 1993) reported the species from Xizang, but the record cannot be verified in the present revision.

90. *Euonymus hui* J. S. MA, Harvard Pap. Bot. 10: 96, fig. 11. 1997. TYPE: CHINA. Sichuan: Tianquan, Ku Hu Ping, 2000 ft., Jul-Aug 1939, S. Y. Hu 1596 (A! 2 sheets). [Fig. 54]

Deciduous tree, 25 m tall and 10 cm DBH; branches terete, sturdy, twigs green to light green, 4-angled. Leaves thinly coriaceous or thickly papyraceous, elliptic, 8-14 x 3-6 cm, apex acute or acuminate, base cuneate or attenuate,

margin crenate or serrate, lateral veins 8-11 pairs, curving forward, webbing and disappearing before reaching the margin; petiole sturdy, 10-13 mm long. Peduncle 2.5-3 cm long, sturdy, with 1-2 dichotomous branches and several flowers; pedicel 4-6 mm long. Flower 4-merous (not seen). Capsule subglobose, 4-angled, green when fresh and brown or yellow-brown when dry, 6-7 mm in diam., c. 8 mm long, slightly apiculate at apex; seeds ellipsoid, dark brown, wholly covered by orange-red aril.



Fig. 54. *Euonymus hui* J. S. MA – 1. fruit branch.

Phenology. Flowering: Unknown; Fruiting: July to September.
Distribution: China (Sichuan); rare.

The species is undoubtedly related to *E. nitida*, and differs from it by the smaller fruit (less than 6-7 mm in diam.) usually with smoother angles on it, similar to species in Sect. *Ilicifolia*, but differing by the angles. The species is also similar to *E. hamiltoniana* in the leaves, but different in the capsule. So far only type information is available, and further collections and study are required.

91. *Euonymus impressa* BLAKELOCK, Kew Bull. 1951: 256. 1951. TYPE: INDONESIA. Celebes: *Rachmat 544* (not seen).

Small tree, to 8 m tall and 10 cm DBH; branches terete, sturdy, twigs 4-angled. Leaves chartaceous to thinly coriaceous, elliptic or oblong-elliptic, 8-10 x 3-4.5 cm, apex acute or obtuse, base cuneate or attenuate, margin entire or crenulate only near apex, lateral veins 5-6 pairs, obscure on both sides; petiole 5-10 mm long. Peduncle 2-4 cm long, slender, with 1-2 dichotomous branches and several flowers; pedicel c. 10 mm long. Flower 5-merous. Sepals semiorbicular. Petals nearly orbicular, 3-6 mm in diam. Capsule rugose, obovoid, with 5 angles and slight grooves, base attenuate, brown or yellow-brown to red-brown, c. 1.0 x 1.0 cm, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, base covered by orange-red aril.

Phenology. Flowering: Unknown; Fruiting: July.
Distribution: Indonesia; alt. 700-900 m, in woodland; rare.

SPECIMENS EXAMINED: **INDONESIA**: Kabaena, *McDonald & Ismail 3876* (A).

92. *Euonymus indica* HEYNE ex WALL. in ROXB., Fl. Ind. 2: 409. 1824. TYPE: INDIA. *N. Wallich Cat. 4290* (not seen).

- = *E. javanica* BLUME, Bijdr. Natuurk. Wetensch. 1146. 1827. TYPE: INDONESIA. Java: *C. L. Blume s.n.* (A!).
- = *E. goughii* WIGHT, Illustr. Ind. Bot. 1: 178. 1840. TYPE: INDIA. Neigherries: *L. C. Gough s.n.* (K!).
- = *E. timorensis* ZIPP. ex SPAN., Linnaea 15:186. 1841.
 - ≡ *E. javanica* BLUME var. *timorensis* (ZIPP. ex SPAN.) MIQ., Fl. Ind. Bat. 1(2): 589. 1859.
- = *E. sumatrana* MIQ., Fl. Ind. Bat. Suppl. 1, 512. 1859. TYPE: INDONESIA. Sumatra bor. (not seen).
- = *E. bancana* MIQ., Fl. Ind. Bat. Suppl. 512. 1860. TYPE: INDONESIA. Bangka (not seen).
- = *E. horsfieldii* TURCZ., Bull. Soc. Imp. Naturalistes Moscou 36(1): 598. 1863. TYPE: INDONESIA. Java (not seen).
- = *E. sphaeorcepa* HASSK., Cat. Hort. Bog. Alt. 229. 1844.

- ≡ *E. javanica* BLUME var. *sphaerocarpa* HASSK., Pl. Rar. Java 230. 1848.
- = *E. javanica* BLUME var. *talungensis* PIERRE, Fl. Forest. Cochinch. 4: pl. 308. 1891.
- = *E. alata* ELMER, Leaflet Philipp. Bot. 4: 1484. 1912. TYPE: PHILIPPINES. A. D. *E. Elmer 12485* (A! GH!).
- = *E. elmeri* MERR., Philipp. J. Sci. 12: 281. 1917. SYNTYPES: PHILIPPINES. A. D. *E. Elmer 12485* (not seen), 12256 (not seen).
- ≡ *E. javanica* BLUME var. *elmeri* (MERR.) BLAKELOCK, Kew Bull. 1951: 257. 1951.
- = *E. coriacea* RIDLEY, Fl. Mal. Penins. 5: 299. 1925.
- = *E. micropetala* RIDLEY, Fl. Mal. Penins. 5: 299. 1925.
- = *E. sumatrana* MERR., Contr. Arnold Arbor. 8: 92. 1934, non MIQ. 1859, nom. illegit. superfl. TYPE: INDONESIA. Sumatra: *Bangham & Bangham-Masters 1064* (A!).
- *E. javanica* BLUME var. *genuina* KOORD & BAL., Bijdr. Booms. Java 7: 90. 1900, nom. inval.

Evergreen small tree, sometimes shrub, to 18 m tall and c. 20 cm DBH; branches and twigs terete, sturdy, dark brown to brown. Leaves coriaceous, rigid, elliptic or obovate-elliptic, 7-15 x 3-5 cm, apex acute or acuminate, base cuneate or attenuate, margin entire or remotely crenate only above, lateral veins 5-6 pairs, curving forward, webbing and disappearing before reaching the margin; petiole sturdy, 5-12 mm long. Flowers solitary or several clustered from one node; pedicel 1.5-2 cm long. Flower 5-merous. Sepals semiorbicular. Petals pale green, obovate, 10-12 mm in diam., revolute backwards, apex fimbriate or ciliate. Capsule obovate, with 5 angles and deep grooves, red when fresh, brown or yellow-brown when dry, c. 2.5 cm in diam., c. 2.5 cm long when fully developed, opening into 5 lobes at maturity, woody; seeds ellipsoid, dark brown, lower part covered by orange-red aril.

Phenology. Flowering and Fruiting: all year.

Distribution: Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Thailand, Vietnam; alt. 20-1,250 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **INDIA:** Kulhuffy Bababood, A. *Meebold 9295* (WU), Madras, J. S. *Gamble 18373* (K), S. E. *Wynaad s.n.* (K), Nilgiris, J. S. *Gamble 11309* (US), North Kanara, W. A. *Talbot s.n.* (K). **INDONESIA:** Borneo, T. G. *Laman et al. 151* (A), 244 (A), Buru, V. *Balgooy 5014* (A), Hassen, D. H. *Nicolson et al. s.n.* (US), T. P. *Ramamoorthy s.n.* (US), C. J. *Saldanha 13008* (US), 14412 (US), 16175 (US), Ilanga, J. S. *Burley et al. 3888* (A), Java, H. O. *Forbes 827* (A, GH), F. R. *Fosberg 39697* (US), A. *Kostermans 386* (A), 6239 (A), C. S. *Sargent s.n.* (A), Soepadmo 271 (A), 331 (A), C. G. *J. Steenis 12621* (A), N. *Wirawan 85* (A), Kabaena, *McDonald & Ismail 3877* (A), 4130 (A), 4020 (A), Kedah, S. *Kamarudin 31360* (A), Kempuhole, C. J. *Saldanha 13670* (US), Kenanger, H. *Wiradinata 497* (US), Mouccas, P. M. *Taylor 2425b* (US), Salibabu, H. J. *Lam 3169* (A), Seram, M. *Kato et al. 8234* (A), Shiradi, C. J. *Saldanha 13137* (US), Sumatra, H. O. *Forbes 831* (GH), 833 (GH), 1621 (GH), 1738a (GH, 2 sheets), 2115

(GH), *E. F. Vogel* 1331 (A), Sumbawa, *A. Kostermans* 18315 (A), 19103 (A), Telaga Ranao, *D. R. Pleyte* 208 (A). **LAOS:** Without location, *E. Poilane* 13483 (A). **MALAYSIA:** Jerteh, *Z. Sohadi* 17936 (A), Johore, *B. Everett* 14115 (A 2 sheets), *K. H. Salleh* 32322 (A), *J. Sinclair* 397517 (US), Kedah, *Y. C. Chan* 21733 (A), Lundu, *James et al.* 35057 (A), 35068 (A), Numpang, *P. Chai* 22885 (A), Pahang, *B. Everett* 14379 (A), *T. C. Whitmore* 15480 (A), Perak, *King's Collector* 4780 (US), 5757 (US), *F. S. P. Ng* 6094 (A). **MYANMAR:** Tenasserim, *Herb. Helfer* 1964 (GH). **NEW GUINEA:** Radjah Ampat, *P. V. royen* 5256 (A), Teminaboean, *C. Versteegh* 4957 (A), Vogelkop, *P. V. Royen* 7678 (A). **PHILIPPINES:** Agusan, *A. D. E. Elmer* 13423 (US), Alabat, *E. D. Merrill* 10509 (A, GH), Albay, *E. Quishumbing s.n.* (A), Camarines, *M. Ramos* 22113 (US), Laguna, *T. B. Banaga* 33387 (US 2 sheets), *F. W. Foxworthy s.n.* (US), *C. B. Robinson* 9681 (US), Leyte, *M. Ramos* 15195 (US), *C. A. Wenzel* 618 (A, US), 1016 (A), Luzon, *G. E. Edano* 48684 (A), *G. E. Edano & H. Gutierrez* 38470 (A), *A. D. E. Elmer* 7907 (A), 15265 (A, GH), 15355 (A, GH, US), 15546 (A, GH, US), 15648 (A, GH), 17547 (A, GH, US), 18417 (A, GH), *A. Loher* 13406 (A), *F. Manuel* 25325 (A), *E. D. Merrill* 1841 (GH), *M. Ramos* 23661 (A), *B. C. Stone* 15875 (A), *M. D. Sulit* 3613 (A), *R. S. Williams* 1024 (GH), 2048 (GH), 3024 (A), Manila, *D. Cumming* 1552 (A), *E. Quishumbing* 192 (A), Mindanao, *P. Anonuevo* 13483 (A), 13587 (A), 13640 (A), *Australian National University* 1657 (A), *G. E. Edano* 3262 (A), 11161 (A), 11456 (A), 13423(A, GH), *D. Mendoza & P. Convocar* 10647 (A), *B. Rafael & S. S. Ponce* 20743 (A, GH, US), *R. S. Williams* 2118 (US), Mindoro, *C. E. Ridsdale* 1704 (A), *M. Ramos & G. Edano* 40721 (A), Negros, *A. D. E. Elmer* 9679 (A), Palawan, *A. D. E. Elmer* 13095 (US), *E. D. Merrill* 11574 (A), *D. D. Soejarto et al.* 6932 (A), 7674 (A), 9137 (A), Puerto Galera, *J. S. Burley* 172 (A), Rizai, *M. Ramos* 13793 (US), San Teodoro, *C. E. Ridsdale* 896 (A), 950 (A), Sibuyan, *A. D. E. Elmer* 12256 (A, GH), Surigao, *C. A. Wenzel* 3072 (A, GH), 3098 (A, GH), Tayabas, *L. Escritor* 20739 (US), *M. Ramos* 13319 (US), *H. S. Yates* 25436 (US). **THAILAND:** Adang, *G. Congdon* 921 (A), Bang Son, *L. L. Put* 1471 (A), Khao Yai, *B. Nimanong & S. Phusomsaeng* 255 (P), Ko Chang, *N. C. Charoenphol et al.* 4958 (P), Nakon Ratchasma, *N. Fukuoka & M. Ito* 34547 (A), *R. Geesink et al.* 5437 (P), Naratiwat, *K. Larsen & S. S. Larsen* 32823 (US), Naresuan, *J. F. Maxwell* 94-508 (A), Pattalung, *J. F. Maxwell* 87-539 (A), Tarutao, *G. Congdon* 470 (A), 585 (A).

The fruit of this species is rather variable in shape and size, and it is commonly clavate or broadly obovoid, sometimes varying to globose. Several varieties or forms have previously been described based chiefly on the shape and size of the fruits, and from the many fruiting specimens examined for this revision, it is still very difficult to distinguish them as either varieties or forms within the species.

93. *Euonymus kachinensis* PRAIN, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 73, 2(4):193. 1904. TYPE: BURMA. Kachin Hills: *S. Muquin s.n.* (not seen).

– *E. depressocarpa* C. Y. WU, in herb., nom. inval.

Deciduous shrub, c. 2 m tall; branches terete, sturdy, twigs green to light green, 4-angled. Leaves thinly coriaceous or thickly papyraceous, elliptic, sometimes obovate-elliptic, 6-8 x 2-3 cm, apex acute with small mucro or caudate, base cuneate or attenuate, margin crenulate to crenate, lateral veins 7-

9 pairs, indistinct, curving forward, disappearing before reaching the margin; petiole sturdy, 4-7 mm long. Peduncle 1-2 cm long, slender, with 1-2 dichotomous branches and several flowers; pedicel 5-7 mm long, slender. Flower 4-merous. Sepals ovate. Petals red to purple, 5-6 mm in diameter. Capsule broadly pyriform, strongly 4-angled; seeds not seen.

Phenology. Flowering: July; Fruiting: Unknown.

Distribution: China (Yunnan), India (Assam), Myanmar; alt. 2,600-3,500 m, rare.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Gongshan, Q. Lin 790924 (KUN), Without locality, G. Forrest 12540 (BM). **India:** Assam, F. K. Ward, 19386 (BM). **MYANMAR:** Logmung, F. K. Ward 12869 (BM).

The original description of the species states that the fruit is broadly pyriform and strongly 4-angled, and does not describe the flower; materials examined for this revision show the flowers are red to purple; and the leaves are crenulate. However, more material is required for further examination.

94. *Euonymus lawsonii* C. B. CLARKE ex PRAIN, J. Astiat. Soc. Bengal, Pt. 2, Nat. Hist. 73, 2: 195. 1904. SYNTYPES: INDIA. Khasia: C. B. Clarke s.n. (not seen), Mann s.n. (not seen), C. J. Simons s.n. (not seen), M. B. Prain s.n. (not seen). [Fig. 55]

Evergreen shrub, c. 2 m tall; branches terete, sturdy, twigs green to light green, terete, with striations. Leaves papyraceous, long lanceolate, 15-22 x 3-5.5 cm, apex acuminate or caudate, base suborbicular, margin crenulate, lateral veins 12-15 pairs, webbing and disappearing before reaching the margin; petiole sturdy, 6-10 mm long. Peduncle slender, 2-5 cm long, with several flowers; pedicel 6-8 mm long. Flower 4-merous, 7-9 mm in diam. Petals purple. Capsule obpyramid, with 4 angles and deep grooves, brown or yellow-brown to red-brown, c. 2.5 cm in diam., c. 3 cm long, opening into 4 lobes at maturity; seeds ellipsoid, yellow to dark brown, covered by orange-red aril.

Phenology. Flowering: April to May; Fruiting: Unknown.

Distribution: India, Myanmar; alt. c. 1,500-3,000 m, in woodlands and forests; rare.

SPECIMENS EXAMINED: **INDIA:** J. Sinclair 3648 (US). **MYANMAR:** J. Keenan et al. 3028 (A), F. K. Ward 20523 (A), 22018 (A).

The species is similar to *E. salicifolia*, but leaves are papyraceous and wider than the latter species, the capsule is larger, and there are differences in distribution. D. G. LONG (Flora of Bhutan 2(1): 101. 1991) stated that this species is also in Bhutan. However, the description is of only "1-celled anthers", which makes that material referable to another subgenus.



Fig. 55. *Euonymus lawsonii* PRAIN – 1. flower branch; 2. fruit branch.

95. *Euonymus laxicymosa* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 10: 96, fig. 10. 1997. TYPE: CHINA. Guangxi: Mubian, Baihe Xiang, C. C. Chang 12577 (Holotype, fr.: MO!, Isotypes: IBK! IBSC!). [Fig. 56]

- *E. pedunculo-longissima* C. Y. CHENG in herb., nom. inval. TYPE: CHINA. Yunnan: Marlipo, Sze Tai Po, K. M. Feng 13866 (A! fl., KUN).
- *E. phaeosticta* C. Y. WU, in herb., nom. inval.

Evergreen shrub, to 4 m tall; branches terete, sturdy, dark brown to brown, twigs 4-angled. Leaves coriaceous and rigid, lanceolate, sometimes elliptic-lanceolate, 12-16 x 3-4.5 cm, apex acute or acuminate, base cuneate or attenuate, margin entire, sometimes with finely and remotely crenulate with small teeth, lateral veins 8-11 pairs, curving forward, webbing and disappearing before reaching the margin; petiole sturdy, 5-10 mm long. Peduncle 10-15 cm long, with 1 or 2 dichotomous branches and several flowers; pedicel 1-1.8 cm long. Flower 5-merous. Sepals semiorbicular. Petals dark pink to purple or purplish-brown, obovate, 8-9 mm in diam., margin ciliate. Capsule subglobose, 5-angled, red when fresh, brown or yellow-brown when dry, c. 1.5 cm in diam., c. 1.2 cm long when fully developed, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, lower part covered by orange-red aril.

Phenology. Flowering: May to December; Fruiting: July to January.

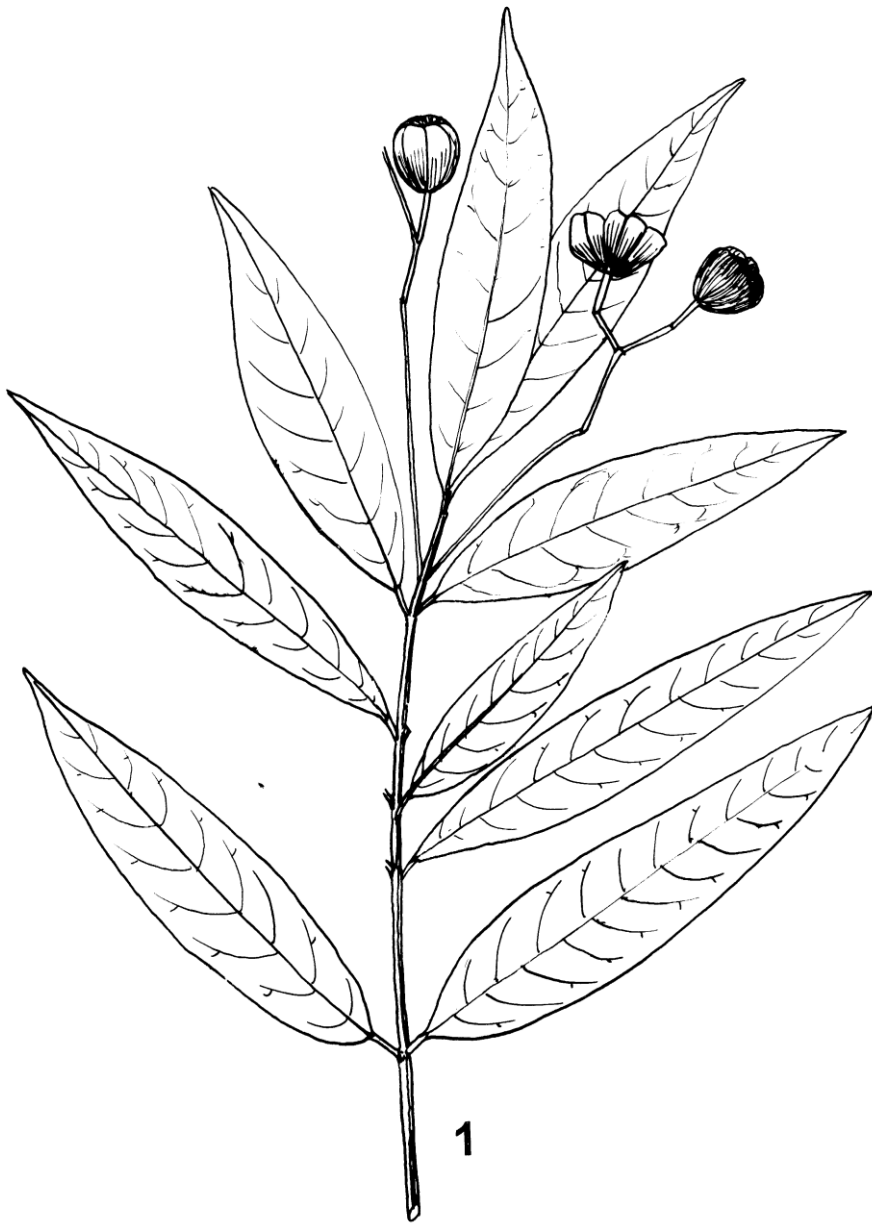
Distribution: China (Guangdong, Guangxi, Yunnan), Vietnam; alt. 1,200-1,400 m, in woodlands and forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Maoming, *Zhanjiang Exped. 4109* (IBSC), Shiwandashan, C. L. Tso 23582 (IBSC); **YUNNAN:** Marlipo [Malipo], K. M. Feng 13866 (A, KUN). **VIETNAM:** Tonkin, W. T. Tsang 26916 (A, IBSC, P).

The original citation contains 2 misidentified specimens (both collected by S. Z. Wang) which are now known to belong to another species; see treatment of *E. prismatomeroides*.

96. *Euonymus laxiflora* CHAMP. ex BENTH. in HOOKER'S J. Bot. Kew Gard. Misc. 3: 333. 1851. TYPE: CHINA. Hongkong: C. L. Champion s.n. (not seen). [Fig. 57]

- = *E. crenulata* WALL. var. *laxiflora* WIGHT, Icon. 1: 214. 1846.
- = *E. paniculata* WIGHT ex LAWSON in J. D. HOOK., Fl. Brit. India 1: 609. 1875. TYPE: INDIA. S. India: R. Wight s.n. (flower only, not seen).
- = *E. cuspidata* LOES., Notizbl. Konil. Bot. Gart. Berlin 3: 77. 1900. SYNTYPES: VIETNAM. Tonkin: B. Balansa 3983 (not seen), 3984 (not seen).
- = *E. forbesiana* LOES., Bot. Jahrb. Syst. 30: 457. 1902. TYPE: CHINA. Yunnan: in montibus silvis apud Fen Chen Lin, alt. 2330 m, A. Henry 10841 (A! MO! NY! US!).
- = *E. crosnieri* H. LEV. & VAN., Bull. Soc. Bot. France 51:146. 1907. TYPE: CHINA. Kouy--Tcheou: J. Cavalerie 1274 (not seen, merotype A!, photo A!).



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Fig. 56. *Euonymus laxicymosa* J. S. MA – 1. fruit branch



Fig. 57. *Euonymus laxiflora* BENTH. – 1. flower branch; 2. fruit branch.

- = *E. incertus* PITARD in LECOMTE, Fl. Indo-Chine 1: 874. 1912. TYPE: VIETNAM. Tonkin: forets du mont Bavi, *B. Balansa* 3983 (P!).
- = *E. rubescens* PITARD in LECOMTE, Fl. Indo-Chine 1: 875. 1912. SYNTYPES: VIETNAM. Tonkin: vallee de Lankok, au mont Bavi, *B. Balansa* 4109 (K!); mont Bove, pres Latson, *Bon s.n.* (not seen).
- = *E. pellucidifolia* HAYATA, Icon. Pl. Formosan. 3: 57, pl. 10. 1913. TYPE: CHINA. Taiwan: *B. Hayata* & *S. Sasaki s.n.* (not seen, photo A!).
- = *E. vaniotii* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 259. 1914. SYNTYPES: CHINA. Kouy-Tcheou: Pin-Fa, 10 Mars 1912, *J. Cavalerie* 1272

- (not seen, merotype A!, photo A!), moulins de Tong-Tcheou, 10 Juill. 1912, *M. Esquirol* 3236 (not seen, merotype A!, photo A!).
- = *E. rostrata* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 36. 1917. TYPE: CHINA. Yunnan: Shweli-Salween divide, lat. 25.30 N, alt. 9,000 ft, June 1913, *G. Forrest* 11851 (A!).
 - *E. sp. nov.* BLAKELOCK, Kew Bull. 1951: 252. 1951, nom. inval. TYPE: VIETNAM. Annam: *E. Poilane* 1573 (not seen).
 - *E. sessilifolia* C. Y. CHENG in herb., nom. inval. TYPE: CHINA. Yunnan: Marlipo, *K. M. Feng* 13781 (A! KUN!).

Deciduous shrub to small tree, 3-12 m tall, to 18 cm at DBH; branches greenish-gray, terete, sturdy, twigs greenish, 4-angled or striate when dry. Leaves thinly coriaceous, elliptic-obovate or ovate, 6-10 (12) x 2.5-3.5 cm, apex caudate or long-caudate, base attenuate or acuminate, margin crenate in upper part, nearly entire in lower part, lateral veins indistinct or invisible; petiole subsessile or only 2-4 mm long. Peduncle slender, 2-3.5 cm long, with 1-3 dichotomous branches and few flowers; pedicel 6-10 mm long. Flower 5-merous. Sepals semiorbicular, very small. Petals purple, suborbicular, c. 8 mm in diam. when fully open. Capsule obovoid, base attenuate, with 5 angles and grooves, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, c. 1.2 cm in diam., 8-10 mm long, opening into 5 lobes at maturity; seeds ovoid, dark brown, covered only at base by orange aril.

Phenology. Flowering: March to August; Fruiting: May to November.

Distribution: Cambodia, China (Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang), India, Myanmar, Vietnam; alt. 300-12,000 m, in thickets and mountain forests; very common.

SPECIMENS EXAMINED: **CHINA:** FUJIAN: Kuliang, *H. H. Chung* 6672 (A), Kushan [Gushan], *H. H. Chung* 7547 (A), 8107 (A), *S. G. Tang* 13102 (A), *M. C. Wang et al.* 1338 (NAS), 1355 (NAS), Nanjing, *Z. H. Wu* 150124 (MO); GUANDGONG: Boluo, *Guangdong Exped.* 6125 (MO), Conghua, *L. Deng* 8347 (MO), *Sino-Germ. Exped.* 1208 (MO 2 sheets), Dabu, *X. G. Li* 202767 (MO), *Z. Y. Li* 979 (MO), Dinghushan, *C. J. Liao et al.* 15171 (A), *G. L. Shi* 119 (MO), Gaoyao, *S. Y. Lau* 20218 (NY), *Sino-Germ. Exped.* 580 (MO), *C. Wang* 161063 (MO 3 sheets), 162615 (MO), Guangzhou, *L. Deng* 9861 (MO), Hongkong, *W. Y. Chun* 5051 (A), 6220 (A), *S. Y. Hu* 6373 (A), 9983 (A), 11354 (A), 12068 (A), 12730 (A), 13097 (A), 13629 (A), 13661 (A), *S. Y. Hu & P. P. But* 22078 (A), 22126 (A), *Y. S. Lau* 53 (A), *N. H. Li* 112 (A), *Y. W. Taam* 1145 (A), *H. C. Tang* 414 (A), *Y. K. Wang* 3052 (NY), *C. Wright s.n.* (US), 94 (GH), Jengwushan [Dinghushan], *C. O. Levine* 3060 (A, MO, NA), Kochow, *Y. Tsiang* 2274 (A), Lechang, *N. K. Chun* 42027 (MO), Liannan, *P. C. Tam* 59448 (MO 2 sheets), Lianxian, *P. C. Tam* 59883 (MO), Lohfaushan [Luofoshan], *W. T. Swingle* 10802 (NA, NY), Longmen, *C. Wang* 162035 (IBSC, MO), *X. W. Wang & G. C. Zhang* 8210 (MO), *Z. F. Wei* 121864 (MO), Pingyuan, *L. Deng* 4417 (MO), 4428 (MO), *X. G. Li* 202115 (IBSC, MO), Ruyuan, *Y. G. Liu* 466 (MO), *C. Wang* 42514 (MO), Sinfeng [Xinfeng], *Y. W. Taam* 191 (A), Tapu [Dapu], *W. T. Tsang* 21652 (A 3 sheets, NA, NY 2 sheets), Tinghushan [Dinghushan], *T. N. Liou* 7174 (NY), Tsing Leung Shan [Qinglongshan], *F. A. McClure* 856 (US), Wungyuen [Wengyuan], *S. K. Lau* 663 (NY), 2624 (A 3 sheets), 25345 (MO), 24204 (MO), Xinfeng,

Guang 77-5506 (MO), Xinyi, C. Wang 32224 (MO), 38069 (MO 2 sheets), 37729 (MO), Yangshan, T. M. Tsui 819 (A, MO, NA, NY), Yingtak [Yingtian], C. L. Tso 21874 (MO), Zengcheng, C. Wang 162186 (IBSC, MO), Zhuhai, W. C. Ko 292 (MO); GUANGXI: Cangwu, S. H. Chun 10001 (MO), Damiaoshan, S. H. Chun 15961 (MO), 16345 (MO), 16554 (MO), Daxin, S. H. Chun 12321 (MO), 12322 (MO), Debao, C. C. Chang 13608 (MO), 13664 (MO), Donglan, C. C. Chang 11405 (MO), C. Wang 43618 (MO), Fangcheng, W. Q. Chen 367 (MO), W. T. Tsang 26610 (A), Fusui, S. H. Chun 12181 (MO), Kiennan [Jiannan], S. K. Lau 4062 (A, US), Lingle, C. C. Chang 11132 (IBSC, MO), Lingwan, S. K. Lau 28438 (A), Linyuin [Lingyun], A. N. Steward & C. C. Cheo 337 (A, NY), 467 (A), Longan, J. Y. Liang 615 (MO), Longjin, S. H. Chun 11647 (MO), 12745 (MO), 13241 (MO), P. C. Tam 57518 (MO), Luchen, R. C. Ching 5824 (A, NAS, NY, PE), Nandan, C. Wang 41076 (A, MO), Ningming, C. C. Chang 12865 (MO), Nonggang, Nonggang Exped. 12120 (MO), Paishou [Baishou], Y. W. Taam 9 (A), Poseh [Bose], R. C. Ching 7478 (NY, US), Quanxian, C. H. Tsoong 81970 (A, MO), Rongshui, S. H. Chun 8885 (MO), Sanchiang [Sanjiang], A. N. Steward & C. C. Cheo 1046 (A, NY), Shangsi, C. C. Chang 13139 (MO), W. T. Tsang 24812 (A, MO, NA, NY), Supmantashan, H. Y. Liang 69552 (A), without location, Guangxi Exped. 3559 (PE), Xingan, C. H. Tsoong 81733 (MO), Xiuren, C. Wang 40583 (MO), Yaoshan, C. Wang 39406 (A), 40314 (A), Zhenbian, S. P. Ko 55856 (MO); GUIZHOU: Chengfeng, Y. Tsiang 4352 (A, NY), 4667 (A, NY), Kweiting [Guiding], Y. Tsiang 5625 (A, NY), Leishan, C. P. Tsien et al. 50255 (PE), Luodian, South Guizhou Exped. 322 (KUN), Pingfa, M. Esquirol 4315 (P), without location, M. Esquirol 6624 (P); HAINAN: Five Finger Mt., Christian College 9444b (NA), 9447 (NA, US), 9485 (NA, US), Hungmoshan [Hongmaoshan], W. T. Tsang & L. U. Fung 18099 (A), Lektung [Ledong], S. K. Lau 27376 (A, MO), 28405 (MO), Poting [Baoting], F. C. How 72783 (A), 73295 (A, IBSC), S. K. Lau 28075 (A, MO), Tam Xian [Danxian], W. T. Tsang & L. U. Fung 565 (A, NY); HUNAN: Dongan, Y. X. Liou & Her Father 718 (NAS), Ningyuan, P. C. Tam 62786 (MO); JIANGSU: Yixing, S. H. Mao et al. 167 (MO, PE); JIANGXI: Lushan, Y. Tsiang 10310 (NAS, NY), Tayu [Dayu], H. H. Hu 960 (A); SICHUAN: Omeishan [Emeishan], W. P. Fang 15281 (MO), O-pien [Ebian], T. T. Yu 707 (A); TAIWAN: Nantou, D. E. Boufford & B. Bartholomew 24985 (A, NY), T. P. Chiang 123 (A, MO), 14052 (A, MO), E. H. Wilson 9997 (A), Taichu, Y. Kudo s.n. (A), Taichung, C. M. Kuo 51071 (MO), Taipei, C. I. Peng 8679 (A, MO), without location, J. L. Gressitt 202 (A); YUNNAN: Daweishan, X. Wang 100101 (MO), Jinping, Sino-USSR Exped. 1022 (KUN), Lungling [Longling], H. T. Tsai 54593 (A), Makuan, K. M. Feng 13639 (A), Marlipo [Malipo], K. M. Feng 13706 (A), 13747 (A), 13963 (A), Mengtze [Mengzhi], A. Henry 4352 (NY), 10268 (A, MO), 11417 (MO), Mianning [Mianning], T. T. Yu 18169 (A), N'Maikha-Salween divide, G. Forrest 17863 (A), Pingpien [Pingbian], H. T. Tsai 61423 (A), 62135 (A), 62733 (A), Red River [Honghe], A. Henry 9478 (A, NY), Shweili-Salween divide, G. Forrest 17895 (A), Szemao [Simao], A. Henry 12848 (NY), Sicour [Xichou], K. M. Feng 11901 (A), 12227 (A), 12434 (A), Tali [Dali], C. W. Wang 71723 (NAS), Tengyueh & Burmese Border, J. F. Rock 7276 (A, US, NY), Tsingpien [Jinping], H. T. Tsai 52554 (A, NAS), Wenshan, K. M. Feng 11225 (A), H. T. Tsai 51625 (A, NAS), 51655 (A), 51692 (A, NAS), 51727 (A, NAS), 51741 (A), 51791 (A, NAS), Q. A. Wu 7755 (KUN 2 sheets), West Irrawaddy, F. K. Ward 10191 (A), without location, H. T. Tsai 55952 (A, NAS), 55992 (A, SZ), 57015 (A), 62838 (A), C. W. Wang 85059 (A), Yuanyang, Luchun Exped. 1626 (PE); ZHEJIANG: Fengyangshan, H. Y. Zou 359 (MO), 526 (A), 821 (A). **INDOCHINA:** Without location, A. Petelot 1782 (A), 2631 (A). **MYANMAR:** J. Keenan et al. 3995 (A), F. K. Ward 147 (A), 208 (A), 9093 (A 2 sheets), 21379 (A), 21433 (A), 21591 (A). **VIETNAM:** A. Petelot 5870 (A, US), 6346 (A 2 sheets, US), 8591 (A), E. Poilane 4424 (US), 11204 (A, US).

From the limited information on the type of *E. rubescens*, the 5-merous flower, purple petals and leaf characters of it are the same as in this species, and the name undoubtedly is a synonym. *E. incerta* was described as having the capsule long (6-8 mm), shorter than wide (10-12 mm), 5-valved and the habit as a shrub 2-3 m tall. However, the type material has an abnormal shape due to pressing, and in the living condition it should be much same as *E. laxiflora*.

97. *Euonymus lichiangensis* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 33. 1917. SYNTYPES: CHINA. Yunnan: eastern blank of the Lichiang Range, lat. 27.30 N, alt. 9000-10,000 ft, Sept. 1904, *G. Forrest 1125* (not seen), l.c., lat. 27.25 N, alt. 11,000 ft, June, 1906, *G. Forrest 2475* (not seen), l.c., lat. 27.15 N, alt. 10,000-11,000 ft., May 1910, *G. Forrest 5620* (PE!). [Fig. 58]

= *E. linearifolia* FORREST, Notes Roy. Bot. Gard. Edinburgh 7: 134. 1912, non FRENCH 1886, nom. illegit superfl. (*G. Forrest 2475* only).

Deciduous dwarf shrub, 1-1.5 m tall; branches greenish-gray, 4-angled, sturdy, twigs greenish, with 4 right angles. Leaves thinly coriaceous, linear, 2-4 x c. 0.2 cm, apex obtuse or acute, base suborbicular, margin entire, revolute, lateral veins invisible; petiole subsessile or only 1-2 mm long. Peduncle short, 0.5-1.5 (2.) cm long, with 1 dichotomous branch and few flowers, usually only the central flower developed; pedicel c. 5 mm long. Flower 4-merous. Sepals semiorbicular, very small. Petals white-green, suborbicular, 5-6 mm in diam. when fully open. Capsule obovoid-rhombic, base attenuate, 4-angled, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, c. 1.0 cm in diam., 8 mm long, sometimes only 2-3 locules developed, opening into 4 lobes at maturity; seed ovoid, dark brown, base covered by orange aril.

Phenology. Flowering: May to July; Fruiting: September to November.

Distribution: China (Yunnan); in high mountain thickets and forests; rare.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Chungtien [Zhongdian], *K. M. Feng 1215* (A, KUN 2 sheets, PE), *2447* (A, KUN 2 sheets, PE), Eryuan, *Jinshajiang Exped. 63-6321* (KUN 2 sheets, PE), Likiang [Lijiang], *K. M. Feng 2987* (KUN 2 sheets), *22734* (KUN 3 sheets, PE), *H. Handel-Mazzetti 6603* (WU), *8768* (WU), *J. F. Rock 3641* (A, US), *4077* (A, US), *5643* (A, US), *Qinghai-Xizang Exped. 249* (PE 2 sheets), *T. T. Yu 5146* (A, KUN, PE 2 sheets), *15434* (A, KUN 2 sheets, PE 2 sheets), *C. W. Wang 70699* (NAS), *A. L. Zhang & S. W. Yu 100925* (KUN), Zhongdian, *A. L. Zhang 101017* (KUN), *Zhongdian Exped. 63-2665* (KUN 2 sheets).

This species with linear leaves, small flowers and partly developed capsule seems very unusual, but it is typical for the alpine condition. It may be related to *E. nana*, but differs by the linear leaves, young branches and twigs usually with striations or winglike cork. In the latter species, the leaves are usually much wider than in this one, the young branches and twigs are usually terete. Furthermore, this species has an isolated distribution in SW China, and *E. nana* occurs from SE Europe to C Asia and N & NW China.

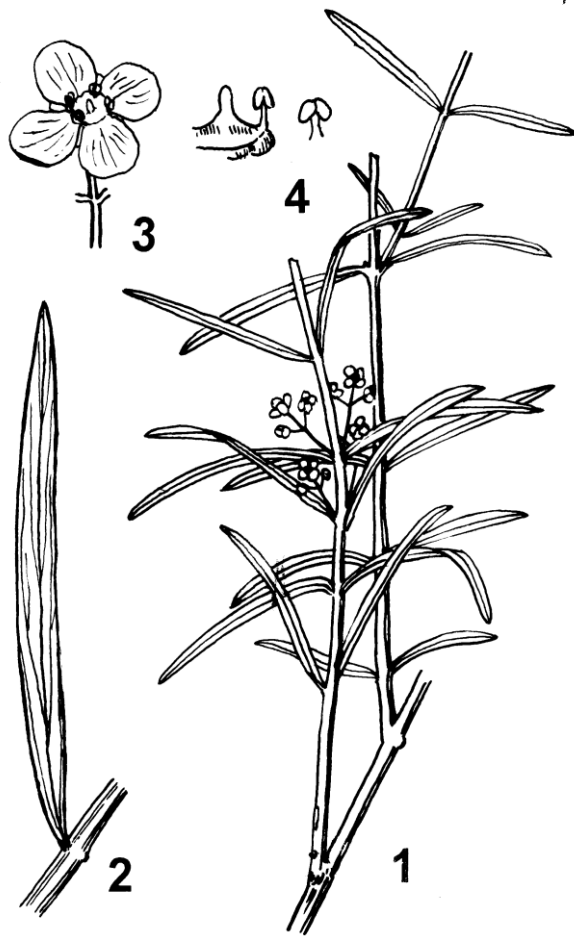


Fig. 58. *Euonymus lichiagensis* W. W. Sm. – 1. flower branch; 2. leaf; 3. flower; 4. anther and disc.

98. *Euonymus maackii* RUPR., Bull. Cl. Phys.-Math. Acad. Imp. Sci.-Saint Petersburg. 15: 358. 1857. TYPE: CHINA. Northeast China: Mandshuria ad fl. Amur, 1855, A. G. Schrenk s.n. (GH!). [Fig. 59]

≡ *E. europaea* L. var. *maackii* (RUPR.) REGEL, Fl. Ussur. 45. 1862.

≡ *E. hamiltoniana* WALL. var. *maackii* (RUPR.) KOM., Trudy Imp. S.-Peterburgsk. Bot. Sada 22: 710. 1904.

= *E. bungeana* MAXIM., Prim. Fl. Amur. 470. 1859.



Fig. 59. *Euonymus maackii* RUPR. – 1. fruit branch; 2. leaves; 3. flower.

- = *E. forbesii* HANCE, J. Bot. 259. 1880. TYPE: CHINA. Shanghai: *F. F. Forbes* 20762 (not seen).
- = *E. hamiltoniana* WALL. var. *semipersistens* REHDER ex BAILEY Cycl. Am. Hort. 2:559, 1900. TYPE: U.S.A. *Arnold Arb. Cultivated No. 4372* (A!).
- ≡ *E. semipersistens* (REHDER) SPRAGUE ex BEAN, Trees and Shrubs Brit. Isles 1: 543. 1914.
- = *E. coreana* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 8: 284. 1910. TYPE: KOREA. *U. J. Faurie* 520 (not seen, photo. A!).

- = *E. oukiakensis* PAMP., Nuovo Giorn. Bot. Ital. 17: 419. 1910. SYNTYPES: CHINA. Hupeh: Ou-kia-ki, alt. 300 m, 1906, *A. Silvestri* 1354 (not seen, merotype A!, photo. A! PE!), 1534a (not seen, merotype A!, photo A! PE!).
- = *E. quelpaertensis* NAKAI, Bot. Mag. (Tokyo) 28: 307. 1914. SYNTYPES: JAPAN. Quelpaert: 1907, *U. J. Faurie* 1617 (not seen), 1624 (not seen).
- = *E. trapococca* NAKAI, Bot. Mag. (Tokyo) 28: 307. 1914. TYPE: KOREA. Seisen: Aug. 1912, *Ueckii* s.n. (not seen).
- = *E. bungeana* MAXIM. f. *pendula* REHDER, J. Arnold Arbor. 7: 31. 1926. TYPE: U.S.A. *Arnold Arb. Cultivated No. 8025* (A!).
- = *E. micrantha* BUNGE, Enum. Pl. Chin. Bor. 14. 1833, non D. Don 1825, nom. illegit. superfl.
- = *E. mongolica* NAKAI, Rep. First Sci. Exped. Manch. 4(1): 7, t. 2. 1934.
 - ≡ *E. bungeana* MAXIM. var. *mongolica* (NAKAI) KITAG., Rep. Inst. Sci. Res. Manchoukuo 3(1): 307. 1939.
 - ≡ *E. bungeana* MAXIM. var. *mongolica* (NAKAI) CHEN H. WANG, Contr. Bot. Surv. Northw. China 1: 41. 1939.
- = *E. bungeana* MAXIM. var. *latifolia* CHEN H. WANG, Chin. J. Bot. 1: 45. 1936. TYPE: CHINA. Shansi: Si-Hsien, alt. 150 m, Aug. 13, 1935, *T. P. Wang* 3049 (not seen).
- = *E. maackii* RUPR. f. *lanceolata* REHDER, J. Arnold Arbor. 22: 578. 1941. TYPE: CHINA. Nei Mongol: Yakeshih, *B. V. Skortzov* s.n. (A!).
- = *E. bungeana* MAXIM. var. *ovata* F. H. CHEN & M. C. WANG, Acta Phytotax. Sin. 3(2): 237. 1954. TYPE: CHINA. Jiangsi: Lushan, Zhangjiashan, Oct. 20, 1951, *Y. K. Hsiung* 7014 (NAS!).
- = *E. maackii* RUPR. var. *trichophylla* Y. B. CHANG, Bull. Bot. Res., Harbin 1(3): 95, f. 1, 1981. TYPE: CHINA. Heilongjiang: Yilan, Tuchenzi, 4 Aug. 1959, *Y. L. Chang* 289 (not seen).
- = *E. maackii* RUPR. f. *salicifolia* T. CHEN, Bull. Bot. Res., Harbin 6(2): 159. 1986. TYPE: CHINA. Nei Mongol: Jagdaq, Tahe, alt. 650 m, Aug. 14, 1985, *T. Chen* 381 (not seen).

Deciduous shrub to small tree, 3-10 m tall, to 15 cm DBH; branches and twigs terete, sturdy, green to light green. Leaves thinly coriaceous or thickly papyraceous, ovate, orbicular-ovate, elliptic or ovate-lanceolate, 6-10.5 x 2-4 cm, apex acute or acuminate, sometimes caudate, base subattenuate, margin revolute, smooth on both sides, lateral veins 6-8 pairs, curving forward, webbing and disappearing before reaching the margin; petiole long, 1-2.5 mm long. Peduncle 2-3.5 cm long, with 1-3 dichotomous branches and several flowers; pedicel 5-7 mm long. Flower 4-merous. Sepals ovate. Petals white, lanceolate or long-ovate, 8-9 mm in diam. when fully open, apex acuminate or obtuse. Capsule rhombic, with 4 angles and deep grooves, base attenuate, brown or yellow-brown to red-brown, c. 9 mm in diam., c. 8 mm long, opening into 4 lobes at maturity; seeds subglobose, dark brown, partly covered by orange aril.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: China (Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia (cult.), Qinghai (cult.), Shaanxi, Shangdong, Shaanxi, Shanxi, Sichuan (cult.), Xinjiang, Yunnan (cult.), Zhejiang), Japan, Korea, Russia (FE), Europe (cult.), N America (cult.); alt. usually below 1,000 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Chienshan [Qianshan], C. S. Fan & Y. Y. Li 186 (A), Chiuwashan [Jiuhuashan], R. C. Ching 2680 (A 2 sheets), Jinzhai, K. Yao 9062 (NA), without location, R. C. Ching 2743 (A), F. A. McClure 15270 (A), Xiuning, W. Xiu 1888 (PE); GANSU: Without location, Yellow River Exped. 7562 (PE), 7791 (PE); HEBEI: Changli, P. H. Dorsett & W. J. Morse 7153 (A, US), Jehol [Chengde], J. C. Liu 626 (A), Paohwashan [Baihuashan], C. L. Tso 1185 (A), Peiping [Beijing], P. H. Dorsett & W. J. Morse 7405 (A), D. Bretschneider 1831 (A), F. G. Meyer 930 (A), C. S. Sargent s.n. (A), Siaoowutaishan [Xiaowutaishan], J. Hers 1528 (A), 1573 (A), 1576 (A), H. Smith 765 (A), Weichang, Wm. Purdom 99 (A), Yangjiaping, C. G. Yang 562 (PE); HEILONGJIANG: Harbin, P. H. Dorsett 4247 (NA), Tsitsihar [Qiqihar], B. W. Skvortzov s.n. (A); HENAN: Chengchow [Zhengzhou], J. Hers 13 (A), Tsiyuan [Jiyuan], J. Hers 1884 (A); HUBEI: Shengnongjia, 1980 Sino-Amer. Exped. 887 (NA), Wuchang, S. C. Suin 30 (A); JIANGXU: Ihsing [Yixing], K. Ling 12306 (A), Jiuyong, M. B. Deng et al. 3449 (PE), Kiangyin [Jiangyin], A. Allison 138 (A), Nanjing, C. Y. Chiao 18935 (US), Nanking [Nanjing], C. N. Chen 8729 (NAS), K. Ling 7903 (A), E. D. Merrill 11382 (A), A. N. Steward 2019 (A), Suchow [Shuzhou], J. Hers 2462 (A), C. L. Tso 1719 (A), Tengshan, C. T. Ren 12589 (GH), Yixing, W. Z. Fang et al. 17 (PE), S. H. Mao et al. 194 (PE), Yuntaishan, Sino-Amer. Yuntaishan Exped. 45247 (NA), Zhenjiang, Zhenjiang Exped. 2992 (PE); JIANGXI: Guixi, M. X. Nie & S. K. Lai 4050 (PE), Jiujiang, C. M. Tan 89186 (MO), Lushan, R. C. Ching 12058 (NAS), 12294 (NAS), M. C. Wang et al. 601 (LBG, NAS), 1267 (LBG, NAS), 1551 (NAS), 1854 (NAS), Y. K. Hsiung 570 (LBG, NAS), 929 (NAS), 1143 (LBG, NAS), 7105 (LBG, NAS), 9868 (LBG, NAS), Nanchang, J. N. Hsiung 510 (A), Sheshan, Y. W. Law 727 (NAS); JILIN: Changchun, L. C. Chiou 4349 (A), Shangking [Changchun], P. H. Dorsett 1134 (NA), F. G. Meyer 126 (NA), 379 (NA), without location, F. H. Chen 374 (A), 616 (A); LIAONING: Dalian, K. Katsu 8717 (A), Fengtian [Shenyang], Y. Yabe s.n. (NAS), Jinzhou, K. Katsiv 7149 (A), Liaoyang, F. G. Meyer 397 (A), Lushun, T. N. Liou 6617 (MO), Luda [Lushun], H. Koyama et al. 7693 (A), Qianshan, T. N. Liou 6694 (PE 2 sheets), Shenyang, C. S. Wang et al. 861 (PE); NEI MONGOL: Daxinganling, Y. C. Zhu 755 (PE), Hailar, H. G. MacMillan & J. L. Stephens 45 (A, NA); SHANDONG: Chifu [Yantai], C. S. Sargent s.n. (A), Laoshan, Chen 2471 (A), Mengshan, T. Y. Cheo et al. 169 (A), Tsingtao [Qingdao], C. Y. Chiao 2454 (US); SHAANXI: Huashan, J. Hers 3030 (A 2 sheets), without location, K. T. Fu 3398 (PE), Xunyi, C. L. Xiao 751 (PE 2 sheets), Yulin, Y. W. Tsui 10279 (NAS); SHANXI: Hiahsien [Xiadian], J. Hers 1868 (A), Hwehisen [Weixian], J. Hers 722 (A), Luliang, S. Ma 457 (MO), Yen-an, Wm. Purdom 7 (A), Yuncheng, H. Smith 6084 (A); ZHEJIANG: Chunan [Congan], Y. L. Keng 667 (A), Hangchow [Hangzhou], E. D. Merrill 11275 (A), Hangzhou, C. C. Wu 803 (MO), F. Zheng et al. 503 (MO), Mokanshan, C. C. Cheo & E. H. Wilson 12757 (A), Tianmushan, K. Yao 79245 (NA), Zhejiang Natural Museum 3163 (PE), without location, R. C. Ching 1575 (A), Zhoushan, G. R. Cheng 2182 (PE). **JAPAN:** Hyogo, H. Muroi 1258 (A), 2164 (A), Ibaraki, M. Furuse s.n. (A). **KOREA:** Hangyong, T. Nakai 2070 (A), Kyongsang Pukto, F. G. Meyer 41 (NA), North Hankyo, E. H. Wilson 8587 (A), 8938 (A 2 sheets), without location, T. Taquet 175 (A), 626 (A), 627 (A), 2726 (A), 2729 (A). **RUSSIA:** Amur, S. Korshinsky s.n. (A), V. Starchnoko & E. Boyko 6921 (A), Oriens Extremus, V. N. Korkina

s.n. (NA), Primorski, *V. N. Korkina 85* (A), without location, *C. J. I. Maximowicz s.n.* (A), *N. Palczewsky s.n.* (A 2 sheets).

This is one of the most common species in the genus, and it is also highly variable both in cultivation and under various growth conditions in the field. Only a representative selection of of the numerous specimens examined is cited here.

99. *Euonymus macrocarpa* GAMBLE ex OLIV. in HOOKER's Icon. Pl. 18, t. 1763. 1888. TYPE: BHUTAN. Khumpung: *J. S. Gamble s.n.* (not seen).

Evergreen climber; branches gray-black to gray-brown, terete, sturdy, twigs greenish, smooth. Leaves coriaceous, elliptic-lanceolate, 7-10 x 2.5-4 cm, apex acute, base cuneate to suborbicular, margin crenulate, lateral veins 7-8 pairs, curving forward and disappearing before reaching the margin; petiole 5-8 mm long. Peduncles numerous, 1.5-3.5 cm long, with 1-3 dichotomous branches and several flowers; pedicel 9-20 mm long. Flower 5-merous. Sepals semiorbicular. Petals white, orbicular, with crispate-denticulate margin, 1.0-1.5 cm in diam. when fully open. Capsule ellipsoid, 5-angled, reddish when fresh, brown or yellow-brown to red-brown when dry, c 4 cm long, 2 cm in diam., opening into 5 lobes at maturity; seeds ellipsoid, dark brown, partly covered by orange aril at base.

Phenology. Flowering: May to August; Fruiting: July to November.

Distribution: Bhutan; alt. c. 1,500 m, in woodlands and forests; very rare.

This species has ovate-lanceolate leaves with small crenulations on the margin, and the fruit with a short abrupt point at apex (apiculate). Another important character is that the capsule opens into 5 lobes, which is drawn in the original publication, and this combination of characters is not found in other species in the genus except *E. wui*, which is 4-merous, and totally different from this 5-merous species both in the flower and fruit.

100. *Euonymus melanantha* FRANCH. & SAV., Enum. Pl. Jap. 2: 312. 1879. TYPE: JAPAN. *P. A. Savatier 2829* (not seen). [Fig. 60]

Deciduous shrub, up to several meters tall; branches and twigs gray-green to gray, usually with 4 striations. Leaves papyraceous, ovate, ovate-orbicular or ovate-triangular, 4-6.5 x 2.5-3.5 cm wide, apex caudate, base truncate, sometimes attenuate, margin ciliate-serrate, lateral veins c. 5 pairs, redivided and disappearing before reaching the margin; petiole 3-5 mm long. Peduncle 1.5-2.0 cm long, with 1 or 2 dichotomous branches and several flowers, very slender; pedicel c. 10 mm long. Flower 5-merous. Sepals semiorbicular. Petals dark red or purple, ovate, 8-9 mm in diam. when fully open. Capsule subglobose, with 5 grooves, brown or yellow-brown to red-brown, c.13 mm in diam., 9-10 mm long, opening into 5 lobes at maturity; seeds subglobose, dark brown, covered by orange aril.

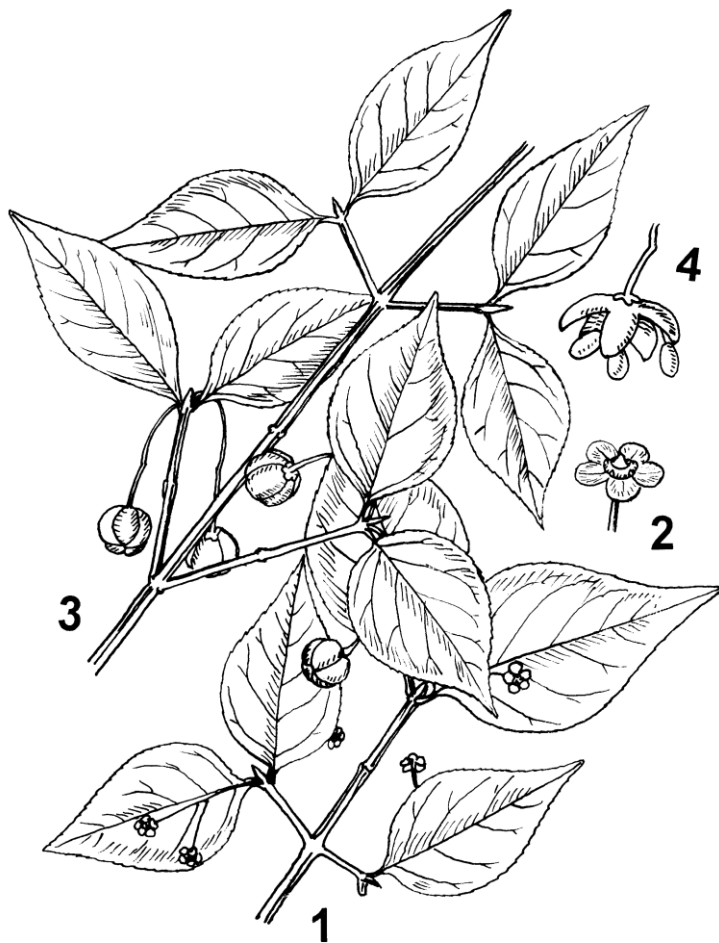


Fig. 60. *Euonymus melanantha* FRANCH & SAV. – 1. flower branch; 2. flower; 3. fruit branch; 4. fruit (in open) and seed.

Phenology. Flowering: May to July; Fruiting: August to November.

Distribution: Japan, alt. 900-1,450 m, in woodlands and forests; occasional.

SPECIMENS EXAMINED: **JAPAN:** Aomori, *F. G. Meyer et al.* 19272 (NA), Mt. Fuji, *K. Sakurai s.n.* (A), Gunma, *J. Murata* 2228 (A), 2378 (A, NA), Hondo, *M. Mizushima* 1941 (A), *H. Okuhara* 3148 (A), *K. Shiota* 144 (A), 145 (A), *E. H. Wilson* 6892 (A, US), Hida, *M. Mizushima* 1101 (A), Honshu, *T. Sawada* 2109 (A), *S. Suzuki s.n.* (A), Hyogo, *H. Muroi* 5460 (A), Iwato, *H. Muroi* 1161 (A), 1286 (A), Musashi, *M. Furuse s.n.* (A), *M. Mizushima* 2572 (A), Mutsu, *K. Hosoi* 10977 (A), Nagano, *K. Iwatsuki et al.* 140 (A, NY),

Rihuchu, *Sawatagu s.n.* (WU), Saitama, *T. Kurosawa et al. 3505* (NA), Shinano, *M. Mizushima 11706* (A), Shojiko & Kofu, *P. H. Dorsett & W. J. Morse 566* (US), Shizuoka, *F. Konta & S. Matsumoto 85* (A), Tottori, *H. Muroi 5498* (A), Yamanashi, *M. Furuse s.n.* (A), *M. Togashi 479* (A, NY, WU), *s. n.* (NA).

The leaves of this species are similar to *E. oxyphylla*, and the fruit is very similar to *E. lanceolata*. It is a very unusual species in the genus.

101. *Euonymus microcarpa* (OLIV. ex LOES.) SPRAGUE, Kew Bull. 1908: 35. 1908. (TYPE: see below). [Fig. 61]

Bas.: *E. chinensis* LINDL. var. *microcarpa* OLIV. ex LOES., Bot. Jahrb. Syst. 30: 456. 1902. SYNTYPES: CHINA. Hupeh: Ichang, *A. Henry 1397* (A! GH! PE! US!), *1650* (A! GH! P! PE! US!), *3099* (GH! PE! US!), *3580* (GH! US!), Nanto, *A. Henry 3073* (not seen); Western China: without precise locality, *E. H. Wilson 3332* (A! P!).

- = *E. aureovirens* HAND.-MAZZ., Oesterr. Bot. Z. 85: 216. 1936. TYPE: CHINA. Shaaxi: Timling-schan austr., *E. Fenzl (for H. Handel-Mazzetti) 657* (A! PE!).
- *E. weisiensis* C. Y. WU, in herb., nom. inval.
- *E. zogangensis* Y. R. LI in W. T. WANG, Vasc. Pl. Mt. Hengduan 1: 1100. 1993, nom. nud. TYPE: CHINA. Xizang: Zogang, *Qinghai-Xizang Exped. 11015* (KUN! 2 sheets, PE! 2 sheets).

Deciduous small tree to shrub, 3-8 m tall; branches greenish-gray, terete, sturdy, twigs greenish, terete. Leaves thinly coriaceous, ovate to ovate-elliptic or ovate-linear, 4.5-6.3 x (1) 2-3 cm, highly variable, apex obtuse or acute, base attenuate, suborbicular or acute, margin entire, lateral veins fine and straight, veinlets clear, not impressed above, prominent beneath, both disappearing before reaching the margin; petiole absent to 1-10 mm long, sturdy. Peduncle 2-3 cm long, with 1-3 dichotomous branches and several flowers; pedicel c. 5 mm long. Flower 4-merous. Sepals semiorbicular, very small. Petals white-green, suborbicular, 6-7 mm in diam. when fully open. Capsule 4-angled-rhombic, base truncate, apex emarginate and 4-angled, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, 9-10 mm in diam., 4-5 mm long, opening into 4 lobes at maturity; seed ovoid, dark brown, mostly covered by orange aril.

Phenology. Flowering: April to May; Fruiting: July to October.

Distribution: China (Henan, Hubei, Shaanxi, Sichuan, Xizang); alt. 1,000-2,600 m, in thickets and forests; common.

SPECIMENS EXAMINED: **CHINA:** HENAN: Funiushan, *Forestry Bureau 677* (PE 2 sheets), Lushih [Lushi], *J. Hers 954* (A); HUBEI: Chienshih [Jianshi], *H. C. Chow 1693* (NY, PE), Dangyang, *Z. D. Jiang & G. F. Tao 126* (A, NA), Fangxian, *K. M. Liu 8969* (PE 2 sheets), *9025* (PE 2 sheets), *K. R. Liu 414* (PE), Junxian, *K. R. Liu 55* (PE), Xingshan, *C. M. Hu 123* (NAS), Yichang, *T. P. Wang 11336* (KUN, PE); SHAANXI: Baocheng, *T. N. Liou & P. C. Tsoong 4086* (PE), Gucheng, *K. T. Fu 5374* (PE), Meixian, *X. M. Zhang 832*



Fig. 61. *Euonymus microcarpa* (Loes.) Sprague – 1. fruit branch.

(KUN), Ningshan, *B. Z. Guo* 1044 (PE), *H. W. Kung* 3112 (A), Pingli, *K. T. Fu* 12015 (KUN), *K. M. Liu* 8446 (PE 2 sheets), Shangnan, *S. B. He* 833 (KUN 2 sheets), 940 (KUN 2 sheets), Taipeishan [Taibaishan], *Wm. Purdom* 12 (A, US), without location, *G. Giraldi* s.n. (A); SICHUAN: Hanyuan, *K. H. Yang* 3634 (PE 2 sheets), Kangding, *T. S. Ying* 3474 (PE), Muli, *Qinghai-Xizang Exped.* 13382 (KUN 2 sheets), *T. T. Yu* 5921 (KUN 2 sheets, PE 2 sheets), West China, *E. H. Wilson* 3329 (A, P), 4165 (US), Wuqi, *P. Y. Li* 2317 (KUN), Yanyuan, *Qinghai-Xizang Exped.* 12575 (KUN 2 sheets).

The leaves of this species vary greatly in size and width, being c. 2-3 cm wide in C China (e.g., Hubei, Shaanxi), to in SW Sichuan only 1.5-2.0 cm wide, and only 1 cm wide in Zugang (Xizang). However, the fruit and flower characteristics are very stable, and there is no reason to separate it. The species can be easily recognized by the leaves, veins and veinlets as well as small fruit.

102. *Euonymus moluccensis* BLAKELOCK ex D. HOU, Fl. Males. ser. 1, 6(2): 254. 1963. TYPE: INDONESIA. Maluku: *Main & Aden 1040* (A!).

Small tree, c. 6 m tall; branches terete. Leaves papyraceous, elliptic or elliptic-oblong, rarely ovate, 6.5 - 9.5 x 3-4.5 cm, base cuneate, apex acuminate, margin subentire or remotely slightly serrulate, lateral veins 4-6 pairs, indistinct; petiole 5-10 mm long; peduncle 7-12 mm long, axillary; pedicel 4-5 mm long. Flower unknown. Capsule clavate, c. 1.5 cm long, 7 mm in diam., 4-lobed.

Phenology. Unknown.

Distribution: Indonesia: Moluccas.

No further collections are available outside of the type, and more are needed, especially of flowering material. However, it is a very distinctive species, as stated by D. Hou.

103. *Euonymus myriantha* HEMSLE., Kew Bull. 1893: 210. 1893. SYNTYPES: CHINA. Hupeh: South Patung and Chiensih, A. *Henry 5335* (GH! US!), *5945* (GH!). [Fig. 62]

= *E. rosthornii* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 437, t. 4, fig. B-F. 1900.

= *E. rosthornii* LOES. ex DIELS var. *crassifolia* LOES., Bot. Jahrb. Syst. 29: 438. 1900. SYNTYPES: CHINA. Sichuan: Nanchuan, C. *Bock & A. Rosthorn 1559* (not seen, merotype A!, photo A!), *1560* (not seen).

≡ *E. myriantha* HEMSLE. var. *crassifolia* (LOES.) BLAKELOCK, Kew Bull. 1951: 252. 1951.

= *E. rosthornii* LOES. ex DIELS var. *tenuifolia* LOES., Bot. Jahrb. Syst. 29: 438. 1900. TYPE: CHINA. Sichuan: Nanchuan, C. *Bock & A. Rosthorn 1563* (not seen), *1566* (not seen).

≡ *E. myriantha* HEMSLE. var. *tenuifolia* (LOES.) BLAKELOCK, Kew Bull. 1951: 252. 1951.

= *E. sargentiana* LOES. & REHDER in Sarg., Pl. Wilson. 1: 487. 1913. TYPE: CHINA. Western Szechuan: Washan, alt. 1300-2000 m, Oct. 1908, *E. H. Wilson 1187* (A! US!).

= *E. lipoensis* Z. R. XU, Acta Sci. Nat. Univ. Sunyats. 2: 44, f. 1. 1987. TYPE: CHINA. Guichou: Lipo, Z. R. *Xu L1746* (not seen).

= *E. myriantha* HEMSLE. var. *tenuis* C. Y. CHENG ex T. L. XU & Q. H. CHEN, Bull. Bot. Res., Harbin 14(4): 350, f. 2. 1994. TYPE: CHINA. Guizhou: Leigongshan, alt. 1480 m, Oct. 16, 1982, Y. K. *Li 8861* (not seen).

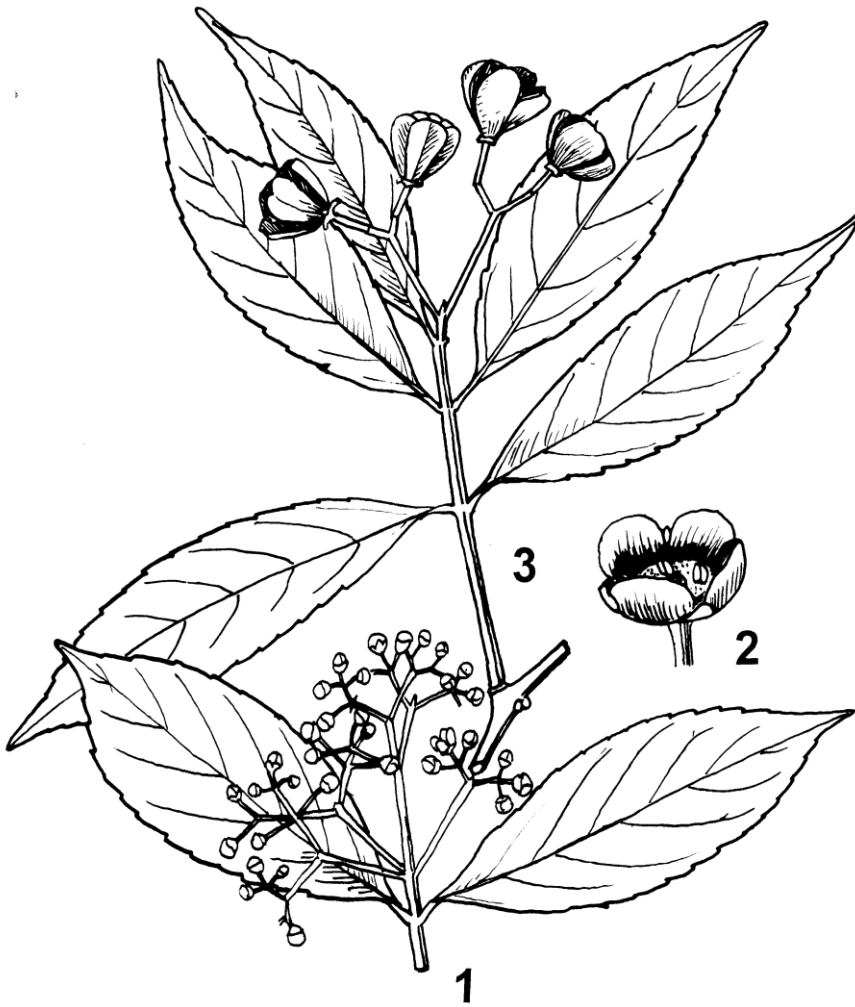


Fig. 62. *Euonymus myriantha* HEMSL. – 1. flower branch; 2. flower; 3. fruit branch.

Evergreen shrub to small tree, 3-12 m tall; branches gray-black to gray-brown, terete, sturdy, twigs greenish, sometimes with 4 striations. Leaves thickly coriaceous, obovate-elliptic or oblong-lanceolate, 7-11 x 2.5-5 cm, apex acute or acuminate, base attenuate or acuminate, margin dentate with large teeth, lateral veins 7-9 pairs, slightly curving forward and divided into veinlets before reaching the margin; petiole c. 5 mm long, sturdy. Peduncle 2-3.5 cm long, with 1-2 dichotomous branches and several flowers; pedicel 15-20 mm long. Flower 4-merous. Sepals semiorbicular. Petals greenish-yellow, orbicular or oblong, c. 1.0 cm in diam. when fully open. Capsule tetra-globose, usually with 4 right angles,

pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, 1.2-1.5 cm in diam., c. 1.5-1.8 cm long, opening into 4 lobes at maturity; seeds ovoid, dark brown, covered by orange aril.

Phenology. Flowering: April to July; Fruiting: August to November.

Distribution: China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang); England (cult.); alt. 50-1200 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **CHINA:** ANHUI: Qimen, *K. Yao 10287* (MO); FUJIAN: Congan, *M. C. Wang et al. 3271* (NAS), 3333 (NAS), 3390 (NAS), *Wuyishan Exped. 2203* (MO), Wuyishan, *M. C. Wang et al. 1640* (NAS), 1814 (NAS); GUANGDONG: Dabu, *L. Deng 5017* (IBSC, MO), Gaoyao, *C. Wang 164396* (MO), Jenhwa [Renhua], *W. T. Tsang 26291* (A, IBSC), Lechang, *N. K. Chun 42895* (MO), *W. T. Tsang 20716* (A 3 sheets, MO, NA, NY 2 sheets, P), 20936 (A, MO, NA, NY), Liannan, *P. C. Tam 59020* (IBSC, MO), Lianshan, *P. C. Tam 58349* (IBSC, MO), Lingle, *C. C. Ting et al. 1358* (NAS), Lingyun, *S. K. Lau 28482* (A, MO), Lohchang [Lechang], *S. P. Ko 51853* (A), Luofushan, *S. P. Ko 52467* (MO), Ruyuan, *S. P. Ko 53053* (MO), 54186 (MO), 54187 (MO 2 sheets), *X. G. Li 201158* (MO), *Y. G. Liu 468* (MO), 521 (MO 2 sheets), *C. Wang 42220* (MO), 43840 (MO 2 sheets), 44130 (MO), 44321 (MO), 44358 (MO), Yangshan, *L. Deng 1302* (MO), *S. P. Ko 51033* (A 2 sheets), *S. S. Sin 11827* (NY), *P. C. Tam 60400* (IBSC, MO), Yuyuan [Ruyuan], *S. P. Ko 52909* (A); GUANGXI: Chenpien, *S. P. Ko 55950* (A), Chuan Distr. [Quanxian], *W. T. Tsang 27685* (A), Chuyuen, *C. C. Chang 81934* (A), Damiaoshan, *T. C. Chen 461* (MO), *S. H. Chun 14625* (MO), 14805 (MO), 15549 (MO), 15774 (MO), 17176 (MO), Debao, *C. C. Chang 13616* (MO), Kweilin [Guilin], *W. T. Tsang 28229* (A, NA, US), 28383 (A, NA, US), Linyuin, *A. N. Steward & C. C. Cheo 207* (A, GH), 467b (A), Lingle, *C. C. Chang 10305* (MO), 11130 (IBK, IBSC, MO), Lingwan, *S. K. Lau 28663* (A), 28433 (A), 28734 (A), 28747 (A, IBSC), Longsheng, *Z. Y. Chen 51109* (KUN), Luchen, *R. C. Ching 6076* (NAS), Quanxian, *C. H. Tsoong 81934* (MO), Tzuyuen, *C. C. Chang 83478* (A), Yangshuo, *R. H. Shan et al. 812* (NAS), Yaoshan, *C. Wang 39574* (A, MO), 40511 (A, MO), Ziyuan, *Z. Y. Chen 51840* (MO); GUIZHOU: Chengfeng, *Y. Tsiang 4662* (NAS, NY), Jiangkou, 1986 *Sino-Amer. Guizhou Exped. 685* (A), 955 (A, NA), 1167 (A), Kiangkow [Jiangkou], *Y. Tsiang 7535* (A, NY, NAS), Langtze, *Y. Tsiang 9515* (A, NAS, NY), Leigongshan, *South Guizhou Exped. 3491* (KUN), 3541 (KUN), 3663 (KUN), Pinfa [South Guiding], *M. Esquirol 4287* (P), Sanhoa, *Y. Tsiang 6387* (A, NAS, NY), Shihtsien, *Y. Tsiang 4139* (A, NY), Songtao, 1986 *Sino-Amer. Guizhou Exped. 1909* (A, MO, NY), Tuduan, *H. Handel-Mazzetti 10969* (A), Vahchingshan [Fanjingshan], *A. N. Steward et al. 580* (A, NY, US), without location, *J. Cavalerie 3098* (P), Yinjiang, 1986 *Sino-Amer. Guizhou Exped. 1301* (A), 1716 (A), *C. D. Chu 1172* (MO), Yinkiang [Yinjiang], *Y. Tsiang 7611* (A, NAS, NY), 7817 (A, NY); HUBEI: Badong, *C. M. Hu 419* (NAS), Chienshi, *E. H. Wilson 891* (NY, US), Enshih [Enshi], *H. C. Chow 1966* (A, NY 2 sheets), Hsingshan [Xingshan], *E. H. Wilson 557* (A, MO, US), Metasequoia Area, *W. C. Cheng & C. T. Hwa 949* (A), Patung [Badong], *H. C. Chow 165* (A, NY), 338 (A, NY), 816 (A, NY), West Hubei, *E. H. Wilson 995* (A, NY, P, US), 2106 (A, NY), 3118 (A, MO, US), 3122 (A, MO, US), 3123 (A, GH, MO), without location, *A. Henry 6126* (A, US), 7823 (A, GH, P), *C. Silvestri 5077* (A), *E. H. Wilson 864* (NY), Wushan, *A. Henry 7016* (A, GH, US), *E. H. Wilson 576* (A 2 sheets, NY, US); HUNAN: Changning, *C. S. Fan & Y. Y. Li 337* (A), Daoxian, *P. C. Tam 63729* (MO), Hengshan, *H. T. Chang 3244* (MO), *S. H. Chun 3392* (MO, 2 sheets), Jiangyong, *P. C. Tam 62187* (MO), Mangshan, *M. X. Huang 111228* (MO 2 sheets), 111873 (MO), 111880 (MO), 112436 (MO), 112680 (MO),

Mayang, X. G. *Li* 203619 (MO), Nanyue, Y. X. *Liou & Her Father* 138 (NAS), Ningyuan, P. C. *Tam* 62100 (MO), Yizhang, S. H. *Chun* 2777 (MO), P. H. *Liang* 83695 (MO), 85334 (MO), Yunschan, H. *Handel-Mazzetti* 11197 (A), Zhijiang, P. C. *Tam* 62645 (MO); JIANGXI: Dexin, K. *Yao* 11459 (A, NA, NY), 11492 (A, NA, NY), Hsiushui [Xiushui], Y. K. *Hsiung* 6510 (A), Lichuan, M. C. *Wang et al.* 2317 (NAS), Lushan, Y. K. *Hsiung* 5947 (A); SHAANXI: Pingli, C. L. *Tang* 1319 (NAS); SICHUAN: Chengkou, T. L. *Dai* 101577 (MO), 101919 (MO), 102900 (MO), 103168 (MO), 106741 (MO), Kai Xian, T. L. *Dai* 100364 (MO), Muping, Y. *Chen* 5339 (NAS), Nanchuan, W. P. *Fang* 978 (A), Y. Y. *Ho* 4136 (NAS), 4348 (NAS), Omeishan [Emeishan], Y. *Chen* 7499 (NAS), C. Y. *Chiao & C. S. Fan* 383 (A), H. C. *Chow* 9990 (A), 11472 (A), 11759 (A), W. P. *Fang* 2617 (A, NY), 3197 (A, NAS, NY), 7609 (A, NAS), 7832 (A, NAS, NY, US), 15251 (A), 16658 (A, SZ), 17748 (A), 18387 (A), 18542 (A), Y. Y. *Ho* 5525 (NAS), 5864 (NAS), T. C. *Lee* 2764 (A), 3623 (A), Y. S. *Liu* 1432 (A, NA), 2144 (A, NA), L. Y. *Tai* 177 (A), T. H. *Tu* 831 (NAS), 393 (A), F. T. *Wang* 23219 (A, NAS), W. H. *Wang* 8031 (A, US), E. H. *Wilson* 4786 (A), without location, W. P. *Fang* 10176 (NAS), A. *Henry* 5540 (GH, US), K. H. *Yang* 54670 (NAS), Z. W. *Yao* 2995 (NAS, SZ); YUNNAN: Marlipo [Malipo], K. M. *Feng* 13483 (A, KUN 2 sheets, PE); ZHEJIANG: Longquan, Y. Y. *Ho* 3427 (NAS), Taishun, D. X. *Zuo et al.* 23970 (NAS), 24014 (NAS), Yunhe, Y. Y. *Ho* 3506 (NAS). **ENGLAND:** Surrey, F. G. *Meyer* 3333 (MO cult.).

104. *Euonymus nana* M. BIEB., Fl. Taur. Cauc. 3: 160. 1819. TYPE: EUROPE. Caucasus. As. temp. (not seen). [Fig. 63]

- = *E. rosmarinifolia* VIS., Acta Ist. Ven. Sc. ser. 3, 4: 141. 1838-39, hab.
- = *E. caucasica* LODD. ex LOD., Arbor. Frutic. Brit. 4: 2545. 1858.
- = *E. koopmannii* LAUCHE in WITTM., Garten Zeit (Berlin) 2: 112. 1883.
 - ≡ *E. nana* M. BIEB. var. *koopmannii* (LAUCHE) BEISSN., Schelle & Zabel, Handb. Laubh.-Bennen 294. 1903.
- = *E. nana* M. BIEB. var. *turkestanica* DIECK. f., Nachtr. I. Haupt Ver. Baum. Zoschen 10. 1887.

Deciduous procumbent or ascending shrub, 1-2 m tall; branches greenish-gray, 4-angled, sturdy, twigs greenish, with 4 right angles. Leaves thinly coriaceous, linear to linear-lanceolate, 2-7 x 2-20 mm, highly variable, apex obtuse or acute, base suborbicular or attenuate, margin entire, revolute, lateral veins invisible; petiole subsessile or only 1-2 mm long. Peduncle short, slender, 0.5-1.5 (2.) cm long, with 1 dichotomous branch and few flowers, usually only the central flower developed; pedicel c. 5 mm long. Flower 4-merous. Sepals semiorbicular, very small. Petals white-green, suborbicular, 5-6 mm in diam. when fully open. Capsule obovoid-rhombic, base attenuate, 4-angled, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, c. 1.0 cm in diam., 8 mm long, sometimes only 2-3 locules developed, opening into 4 lobes at maturity; seeds ovoid, dark brown, base covered by orange aril.

Phenology: Flowering: May to July; Fruiting: September to November.

Distribution: China (Gansu, Ningxia, Qinghai, Shaanxi, Shanxi); C & N Asia (Mongolia, Turkestan); Europe (Albania, Austria, Bulgaria, Greece, Hungary, Italy, Jugoslavia, Moldavia, Poland, Romania, Russia, Ukraine); Turkey; in high mountain thickets and forests; occasional.

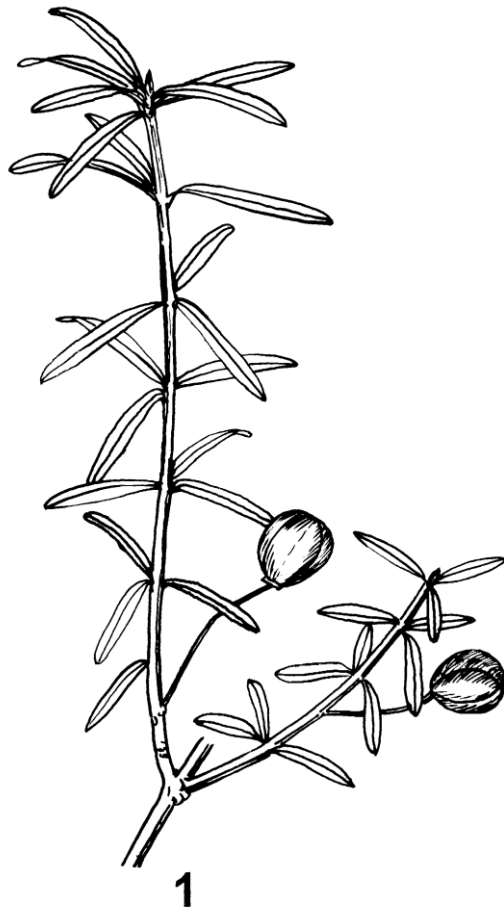


Fig. 63. *Euonymus nana* M. BIEB. – 1. fruit branch.

SPECIMENS EXAMINED: **CHINA:** GANSU: Gulan, *Qinghai-Gansu Exped. 1431* (PE 2 sheets), Haiyuan, *Yellow River Exped. 5280* (PE), Huning, *Yellow River Exped. 5107* (PE), Kangle, *W. Y. Hsia 8880* (PE), Lichen, *R. C. Ching 327* (GH, US), 389 (NY 3 sheets, US), *Qinghai-Gansu Exped. 3431* (PE); NINGXIA: Helanshan, *Yellow River Exped. 8897* (KUN, PE); QINGHAI: Huzhu, *J. S. Yang 91-872* (KUN); SHAANXI: Longxian, *T. P. Wang 4237* (PE 2 sheets), Wuqi, *Yellow River Exped. 8294* (PE), Zizhou, *Yellow River Exped. 6988* (PE); SHANXI: Zhongyang, *Yellow River Exped. 154* (PE). **C. ASIA:** Tianschan occidentalis, *A. K. Skvortsov s.n.* (A). **KIRGHIZIA:** Chatkal Range, *A. K. Skvortsov s.n.* (A, NA). **KHAZAKSTAN:** Taschkent, *Z. Minkwitz 1346* (A). **ROMANIA:** *A. Borza et al. 974* (GH, US), *J. C. Conostantineanu s.n.* (A). **RUSSIA:** Crimea, *V. Korzhenevsky s.n.* (NA). **UKRAINE:** *G. Kleopow s.n.* (US). **USA:** NORTH CAROLINA: *USDA Baltimore Herb. 2233a* (US 2 sheets, cult.).

The species is highly variable in habit and leaves, but the flower and fruit remain constant without much difference throughout its range. It is similar to *E. nanooides* in habit, flower and fruit. However, the branches and twigs are without striations or corky wings, and the leaves are also larger than in the latter.

105. *Euonymus nanooides* LOES. & REHDER in SARG., Pl. Wilson 1: 492. 1913. TYPE: CHINA. Western Szechuan: Min valley, Weichou, alt. 1600-2300, Aug. 1910, *E. H. Wilson 4567* (A!). [Fig. 64]

= *E. oresbia* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 34. 1917. TYPE: CHINA. Yunnan: Mountains of the Chungtien plateau, S.E. of Chungtien, Lat. 27.55 N, alt. 10,000-11,000 ft, July 1913, *G. Forrest 10453* (A!).

≡ *E. nanooides* LOES. & REHDER var. *oresbius* (W. W. SM.) Y. R. LI, Vasc. Pl. Mt. Hengduan 1: 1098. 1993.

= *E. pachyclada* HAND.-MAZZ., Anz. Akad. Wiss. Wien Math.-Nat. 58: 147. 1921. SYNTYPES: CHINA. Yunnan: *H. Handel-Mazzetti 7722* (WU!); Sichuan, Daliangshan, *H. Handel-Mazzetti 1504* (WU!), Yenyuan, *2284* (WU!).

Deciduous dwarflike shrub, ascending, many branches at middle and above, 1-3 m tall; branches greenish-gray, 4-angled, sturdy, twigs greenish, with 4 right angles. Leaves thickly papyraceous, linear-elliptic, 2-4 x 0.3-1.0 cm, apex obtuse or acute, base suborbicular, margin entire to crenulate, lateral veins invisible; petiole very short, 2-3 mm long. Peduncles very few, mostly axillary with several flowers in cluster; pedicel 1-5 mm long. Flower 4-merous. Sepals semiorbicular, very small. Petals white-green or greenish yellow, suborbicular, 5-7 mm in diam. when fully open. Capsule obovoid-rhombic, base attenuate, 4-angled, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, c. 1.0 cm in diam., 8 mm long, sometimes only 2-3 locules developed, opening into 4 lobes at maturity; seeds ovoid, dark brown, base covered by orange aril.

Phenology. Flowering: April to July; Fruiting: July to October.

Distribution: China (Gansu, Hebei, Henan, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan); alt. 2,950-3,350 m, in thickets and forests; common.

SPECIMENS EXAMINED: **CHINA:** HEBEI: Beijing, *L. Chanet & J. H. Serre 2026* (P), Hsiaowutaishan [Xiaowutaishan], *F. G. Meyer 1353* (A, NA), Zuolu, *C. G. Yang 1715* (PE); GANSU: Choni [Zuoni], *J. F. Rock 13554* (A), between Choni and Lanchow [Zuoni and Lanzhou], *R. C. Ching 1039* (A, NY, US), Guyuan, *C. Hou & Q. Y. Li 108* (PE), Lienhoashan [Lianhuashan], *J. F. Rock 12670* (A, US), Lintai, *W. Y. Hsia 8760* (PE), *8771* (PE), *Taohe Exped. 3497* (KUN 2 sheets), Luqu, *Q. R. Wang & M. S. Yan 10907* (PE), Lower Tebbu, *J. F. Rock 14749* (A), *14955* (A), Taochow, *R. C. Ching 847* (A, US), *935* (NY, US), *Taohe Exped. 3196* (KUN), without location, *T. P. Wang 5072* (PE 4 sheets), *5381* (PE 2 sheets), Zuoni, *W. Y. Hsia 6950* (PE), *8364* (PE); SHANXI: Kelan, *Yellow River Second Exped. 2862* (PE), Lishan, *Yellow River Exped. 2315* (PE), Wutaishan, *Y. W. Tsui 2900* (KUN, PE 3 sheets), *W. T. Wang 2109* (PE 2 sheets),

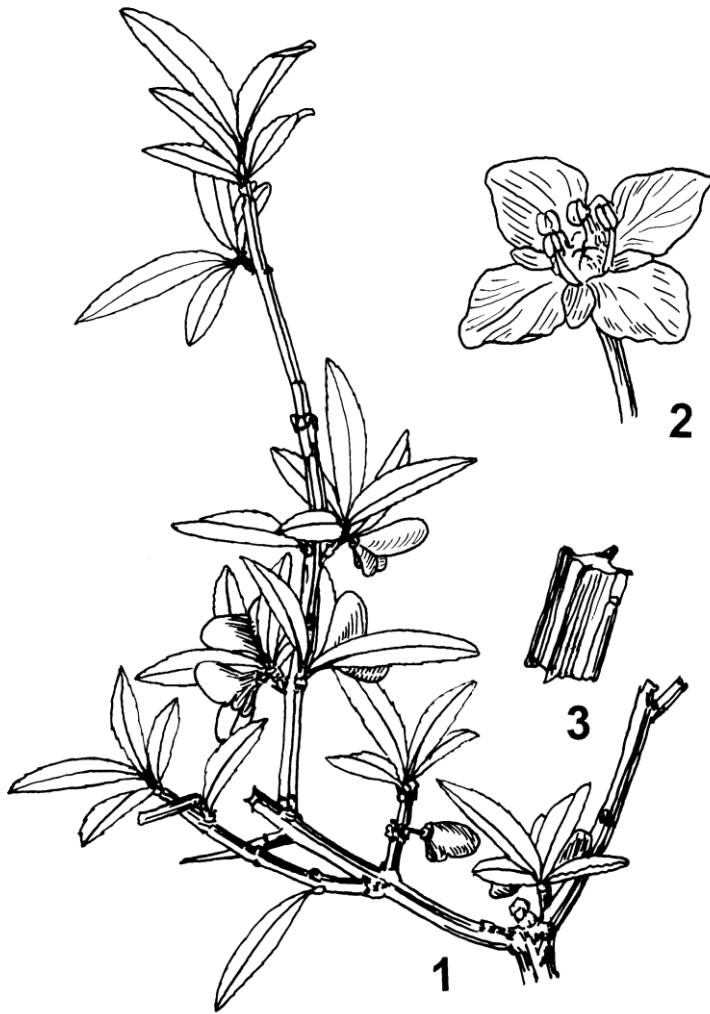


Fig. 64. *Euonymus nanooides* LOES. & REHDER – 1. fruit branch; 2. flower; 3. section of branch.

Zhongyang, *Yellow River Exped.* 123 (PE), 198 (PE), 2032 (PE), without location, *E. Licent* 10892 (PE), X. L. Zhang 18 (PE); SICHUAN: Barkam, W. L. Chen *et al.* 7611 (PE), X. Li 70111 (PE), 70201 (PE), 70645 (NAS, PE), 70774 (PE), 71267 (KUN, NAS, PE), 71335 (KUN, PE), Drogochi, H. Smith 4493 (A, MO), Kangding, J. S. Yang 91-038 (KUN), Muli, G. Forrest 22381 (A), *Qinghai-Xizang Exped.* 12956 (KUN 2 sheets, PE 2 sheets), J. F. Rock 23902 (A, NY, US), S. K. Wu 2483 (KUN 2 sheets), 2785 (KUN 2 sheets), T. T. Yu 7019 (A, KUN 2 sheets, PE 2 sheets), 13476 (A, KUN), 14269 (A, KUN, PE), 14540 (A, KUN, PE), Ningyuan, C. Schneider 966 (A), Songfan, W. L. Chen *et al.* 8294 (PE), Southwest Sichuan, G. Forrest 21262 (A, US 2 sheets), Sungfan [Songfan],

H. Smith 2721 (A, MO), Taofu [Daofu], *W. K. Hu* 13225 (PE), *H. Smith* 12344 (MO), Yetsi, *J. F. Rock* 24435 (A, NY); XIZANG: Lingzhi, *T. Naito et al.* 1296 (PE); YUNNAN: Chungtien [Zhongdian], *J. F. Rock* 24724 (A, NY, US), 25275 (A, NY), *T. T. Yu* 11358 (A, KUN, PE 2 sheets), Liuku, *C. Schneider* 1251 (A, GH), without location, *G. Forrest* 10458 (A), 28681 (PE), 30716 (PE), Yangtse-Yungning divide, *G. Forrest* 20694 (A), Yunning [Ningliang], *C. Schneider* 1645 (A), *T. T. Yu* 5386 (A, KUN, PE), Zhongdian, *K. M. Feng* 1400 (A, KUN 2 sheets), 23568 (KUN, PE), *Qinghai-Xizang Exped.* 1443 (KUN 2 sheets, PE 2 sheets), *Nanshuiheidiao Exped.* 10162 (KUN), 10253 (KUN), *Zhongdian Exped.* 63-3533 (KUN 2 sheets).

The species is similar to *E. ternifolia* in habit. However, it has smaller flowers, shorter and wider leaves than the latter, and the branches and twigs with corky wings, not terete as in the latter species.

106. *Euonymus nitida* BENTH., *J. Bot.* (Hooker) 1: 483. 1842. TYPE: CHINA. Hongkong: *Hinds s.n.* (not seen). [Fig. 65]

- ≡ *E. chinensis* LINDL. var. *nitida* (BENTH.) LOES., *Bot. Jahrb. Syst.* 30: 456. 1902.
- = *E. chinensis* LINDL., *Trans. Hort. Soc.* 6: 74. 1826, non LOUR. 1790, nom. illegit. superfl.
- = *E. lindleyi* K. KOCH, *Hort. Dendrol.* 21, no. 18. 1853.
- = *E. flavescens* LOES. ex DIELS, *Bot. Jahrb. Syst.* 29: 437, fig. A. 1900, non HORT. ex DIPPEL. 1894, nom. illegit. superfl. SYNTYPES: CHINA. Hupeh: Ichang, *A. Henry* 3337 (A! E! GH! K! P!); Sichuan: Nanchuan, *C. Bock & A. Rosthorn* 1561 (not seen).
- = *E. uniflora* H. LEV. & VAN., *Bull. Soc. Agric. Sarthe* 5, 59: 320. 1904. TYPE: CHINA. Kouy-Tcheou: *J. Cavalerie* 256 (not seen, merotype A!).
- = *E. oblongifolia* LOES. & REHDER in SARG., *Pl. Wilson* 1: 486. 1913. TYPE: CHINA. Western Hupeh: Changlo, alt. 1300-1600 m, May 1907, *E. H. Wilson* 3125 (A! MO! US!).
- = *E. esquirolii* H. LEV., *Fedde Repert. Sp. Nov. Regni. Veg.* 13: 261. 1914. TYPE: CHINA. Kouy-Tcheou: Tang-Tchang (Hoang-Tsao-Pa), Juin 1909, *M. Esquirol* 1569 (not seen, merotype A!).
- = *E. chibai* MAKINO, *Bot. Mag. (Tokyo)* 27: 69. 1913. TYPE: JAPAN. (not seen).
- = *E. merrilli* CHEN H. WANG, *Contr. Bot. Surv. Northw. China* 1: 34. 1939. TYPE: CHINA. Kuangtung: Tai-ue-shan, Dec. 21, 1927, *W. T. Tsang* 16497 (A! MO! NA! PE!).
- = *E. merrilli* CHEN H. WANG var. *longipetiolata* CHEN H. WANG, *Contr. Bot. Surv. Northw. China* 1: 35. 1939. TYPE: CHINA. Kuangtung: Luofoshan, *Y. Tsiang* 1635 (A! PE!).
- = *E. chengii* J. S. MA, *Harvard Pap. Bot.* 10: 95, fig. 8. 1997. TYPE: CHINA. Guangdong: Enping, Qingwan Xiang, *M. X. Huang* 110522 (Holotype: PE!, Isotype: MO! fr.).
- *E. nantoensis* LOES. ex HAND.-MAZZ., *Beih. Bot. Centralbl.* 52, Abt. B: 168. 1934, in obs., nom. inval.

– *E. punctata* WALL., Cat. n. 4286. 1829 in herb., nom. inval.

Evergreen shrub to small tree, 2-10 m tall; branches gray-black to gray-brown, terete, sturdy, twigs greenish or yellow-greenish, with striations. Leaves coriaceous to thickly papyraceous, elliptic or oblong-elliptic, 6.5-10 (15) x 3-4 (6) cm, apex acute or acuminate, sometimes shortly audate, base cuneate or acuminate, margin entire to crenulate, lateral veins 7-9 pairs, not very evident, slightly curving forward and redivided and disappearing before reaching the margin; petiole 5-8 (12) mm long. Peduncles usually many, 1.5-3.5 cm long, with 1-3 (4) dichotomous branches and many flowers; pedicel 5-10 mm long. Flower 4-merous. Sepals semiorbicular. Petals whitish-green, orbicular to obovate, 5-6 mm in diam. when fully open. Capsule tetra-globose, 4-angled at full maturity, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, (1.2) 1.4-1.6 cm in diam., (0.9) 1.5-1.7 cm long, opening into 4 lobes at maturity; seeds ovoid, dark brown, covered by orange aril.

Phenology. Flowering: March to July; Fruiting: July to January.

Distribution: Bangladesh, Cambodia, China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang), Japan, Vietnam; alt. 100-1,500 m, in woodlands and forests in low mountains or valleys; very common.

SPECIMENS EXAMINED: **CAMBODIA:** *E. Poilane* 15658 (A, US). **CHINA:** ANHUI: Guangde, *Anhui Exped.* 3143 (NAS, PE), *D. X. Zuo* 2803 (NAS), Qimen, *K. Yao* 10347 (A, MO), Sexian, *D. X. Zuo* 1823 (NAS), Xiuning, *no collector* 2544 (PE); FUJIAN: Amoy [Xiamen], *H. H. Chung* 6015 (A), Central Fukien [C. Fujian], *S. T. Dunn* 2498 (A), 2498a (A), Congan, *P. X. Qiu* 1959 (PE 2 sheets), Daling, *Xiamen Univ. Exped.* 1136 (PE), Guilongshan, *C. M. Hu* 3715 (KUN, PE), Huaan, *K. M. Wu* 60128 (MO), Kushan [Gushan], *S. G. Tang* 5744 (MO), Jiangle, *Longxishan Exped.* 2897 (PE), 3136 (PE 3 sheets), Nanqing, *South China Exped.* 617 (MO), Pucheng, *R. C. Ching* 2510 (A, US), Wuyishan, *M. C. Wang et al.* 1687 (NAS), 1688 (NAS), 1734 (NAS), *X. W. Wang et al.* 379 (MO), *Wuyishan Exped.* 254 (MO), Yonggan, *T. S. Wang* 1306 (PE), Zhaoan, *South China Exped.* 488 (MO); GUANGDONG: Boluo, *Guangdong Exped.* 5753 (MO 2 sheets), 5982 (MO), Canton [Guangzhou], *S. P. Ko* 80456 (MO), *C. O. Levine* 1864 (GH, MO), *R. Mell (for H. Handel-Mazzetti)* 545 (WU), 594 (WU), *Y. Tsiang* 1864 (A), Conghua, *L. Deng* 8812 (KUN, MO), 8320 (KUN, MO), *W. T. Tsang* 25171 (A), *C. Wang* 44502 (MO), Dabu, *X. G. Li* 202520 (MO), Fengkai, *Fengkai Exped.* 4286 (MO), 4878 (MO), Gaoyao, *C. Wang* 161839 (MO), Guangzhou, *C. Wang* 30550 (KUN), 31544 (A, KUN, MO, PE), *H. G. Yip* 343 (MO), Haifeng, *Z. X. Li et al.* 815 (MO), *G. C. Zhang et al.* 377 (MO), Heyuan, *Z. F. Wei* 120640 (KUN), Hongkong, *R. P. Bodioier* 938 (P), Huiyang, *T. M. Tsui* 185 (KUN), Hongkong, *B. Bartholomew* 1760 (GH), *S. Y. Hu* 5222 (A, US), 5273 (A, US), 6104 (A), 6347 (A), 7254 (A, US), 8120 (A), 8447 (A), 8532 (A), 9265 (A), 9868 (A, US), 10074 (A, US), 11072 (A, US), 11723 (A, US), 11898 (A, US), 12565 (A), 12638 (A), 12682 (A), 13107 (A), *K. Y. Chan* 1438 (A, PE), *S. Y. Hu & P. P. But* 20460 (A), 20591 (A), *W. Y. Chun* 7509 (NY), 8527 (A), *N. H. Li* 41 (A), *C. S. Sargent* 5 (A), *Y. W. Taam* 1746 (NY, US), 1944 (A, US), 1951 (US), 1953 (A, US), 29799 (US), *H. C. Tang* 505 (A), *C. Wright* 96 (A), *s.n.* (NY, US), *Y. Tsiang* 184 (A), Jiaoling, *L. Deng* 4732 (MO), 4849 (MO), Lechang [Lechang], *G. Q. Chen* 50059 (MO), *T. Y. Chien* 170001 (MO), *S. P. Ko*



Fig. 65. *Euonymus nitida* BENTH. – 1. flower branch; 2. fruit branch.

54569 (KUN), Liannan, Z. Y. Li 418 (MO), P. C. Tam 60165 (IBSC, KUN, PE), Lingyun, S. K. Lau 28734 (MO), 28747 (MO), Longmen, X. G. Li 200119 (MO), 200231 (MO), W. T. Tsang 25317 (A), Lungtaushan [Longtoushan], Christian College 12062 (US), 12328 (US), 12604 (US), 12803 (US), Luofoshan, N. K. Chun 40899 (MO), Y. Lee 43067 (A 2 sheets), Y. Tsiang 1712 (A, NAS, NY), Maoming, N. Liu et al. 1060 (MO), Nanhoi, N. K. Chun 40165 (NY), 40273 (NY), North River, L. Tak 11807 (A, NA), Pingyuan, X. G. Li 201926 (MO), Poonyue, C. O. Levine 3496 (A 2 sheets, US), Qingyuan, C. Wang

161547 (MO), Ruyuan, *L. Deng* 5681 (IBSC, MO, PE), *Ruyao Team* 312 (MO), *C. Wang* 43828 (KUN, PE), 44036 (KUN, MO), Sanon [Xinan], *T. M. Tsui* 216 (A, MO, NA, NY, US), Sinfeng [Xinfeng], *L. Deng* 8083 (KUN, MO, PE), *Y. W. Taam* 195 (A, MO), 364 (A, MO), 582 (A), 744 (A), 749 (A), 787 (A), 1206 (A), Taishan, *Guang* 73-2833 (MO), Tapu [Dapu], *W. T. Tsang* 21095 (A 2 sheets, NA, NY, P), Tsengcheng [Zengcheng], *W. T. Tsang* 20297 (A 3 sheets, KUN, MO, NA, NY, P), 20367 (A 3 sheets, NA, NY), 20636 (A), *s.n.* (MO), Tsunghwa [Conghua], *W. T. Tsang* 25104 (A), Waiyeung [Huiyang], *T. M. Tsui* 105 (MO, NA, NY, US), Wuhua, *Y. J. Wang* 58988 (MO), Wungyuen (Wengyuan), *S. K. Lau* 2442 (A), 2479 (A), 24838 (KUN, MO, PE), Xinhui, *X. B. Ye* *s.n.* (MO), Yangjiang, *C. Wang* 41715 (IBSC, MO), Yangshan, *S. S. Sin* 11737 (NY), *T. M. Tsui* 781 (A, MO, NA, PE, US), *C. Wang* 41751 (MO), Yingteh [Yingde], *T. Hai* 649 (MO), *C. Wang* 163758 (MO), Yingde, *Z. Y. Li* 537 (MO), 538 (MO), Yunfu, *C. Wang* 37420 (MO, PE), Zhaoqing, *G. L. Shi* 225 (MO), Zhuhai, *B. Y. Chen & Z. X. Li* 403 (MO), *W. C. Ko* 177 (MO), 239 (MO); GUANGXI: Dayaoshan, *Q. H. Lu* 4155 (KUN), Damiaoshan, *S. H. Chun* 14531 (MO), 15231 (MO, PE), Debao, *C. C. Chang* 13615 (IBSC), Fengshan, *C. C. Chang* 11220 (IBK, IBSC, MO 2 sheets), Guixian, *Z. Y. Chen* 50772 (IBSC), Huaijing, *S. H. Chun* 15436 (MO), Lingle, *C. Wang* 43137 (KUN, MO), Lingui, *C. F. Liang* 30352 (IBSC), *Y. F. Qin* 700085 (IBSC), Longjin, *C. H. Tsoong* 91017 (IBSC), Longsheng, *S. Q. Zhong* 889 (MO), Longzhou, *S. P. Ko* 55299 (A, IBSC, PE), Lucheng, *R. C. Ching* 5915 (A, NAS, NY, US), 5979 (A, NY, US), Luocheng, *S. H. Chun* 14976 (MO), Nanning, *R. C. Ching* 8224 (A, NY, US), Napo, *Z. G. Wang* 3-1653 (PE), 3-1696 (PE), 3-1727 (PE), *H. Q. Wen* 80 (US), Quan Xian, *W. T. Tsang* 27626 (A, NA, US), 27583 (A, NA, US), Shangsze [Shangsi], *W. T. Tsang* 22005 (A), 22618 (A), 24683 (A, MO), Xingan, *Guangxi Exped.* 4310 (PE 3 sheets), *Q. H. Lu* 106 (MO), 2064 (KUN), Yaoshan, *C. Wang* 40541 (A); GUIZHOU: Anlong, *Y. Tsiang* 7462 (A, NAS, NY), Chengfeng, *Y. Tsiang* 4579 (A, NAS, NY), Cishui, *Bijie Exped.* 1203 (PE), Dejiang, *P. C. Tsoong* 705 (PE 2 sheets), Jiangkou, *1986 Sino-Amer. Guizhou Exped.* 979 (A, NY, PE), *Wulingshan Exped.* 1208 (PE), Jinan, *Anshun Exped.* 1446 (PE 2 sheets), Kaili, *South Guizhou Exped.* 1974 (PE 2 sheets), Shiqian, *Wulingshan Exped.* 2687 (PE), Siuwen [Xiuwen], *Y. Tsiang* 8692 (A, NAS, NY, PE), Songtao, *Wulingshan Exped.* 661 (PE), Tsunyi [Zunyi], *A. N. Steward et al.* 140 (A, NY), Tuyuan, *Y. Tsiang* 5658 (A, NAS, NY), Xingyi, *P. C. Tsoong* 1656 (PE), Xishui, *Bijie Exped.* 1574 (PE 2 sheets), Yinkiang [Renjiang], *Y. Tsiang* 7601 (A, NAS, NY), 7782 (A, NAS, NY, PE), Zunyi, *Sichuan & Guizhou Exped.* 1529 (PE); HAINAN: Baisha, *East Hainan Exped.* 611 (MO), Ganen, *H. Y. Liang* 63454 (A, PE), Loktung [Ledong], *S. K. Lau* 27245 (A, MO), *Y. Tsiang* 1318 (A), *C. L. Tso* 20751 (NY), 21113 (NY), Nanhai, *S. P. Ko* 51548 (MO), Poting [Baoting], *F. C. How* 72158 (BM, MO), 72833 (A, BM, KUN, MO, P), 72893 (A), Qiongzong, *L. Deng* 3654 (IBSC, MO), Five Finger Mt. [Wuzhishan], *F. A. McClure* 8500 (A, NA), Yaxian, *C. Wang* 34921 (A, MO), Yanchow (Yanzhou), *F. C. How* 70370 (A, KUN, MO, NAS, NY, US); HUBEI: Ichang [Yichang], *A. Henry* 3337a (A, BM), Laifeng, *H. J. Li* 7215 (KUN), Lichuan, *T. Y. Dai & C. H. Qian* 787 (PE), Patung [Badong], *H. C. Chow* 564 (A, NY, PE), 749 (A, NY, PE), 1051 (A, NY, PE), *West Hubei Vegetation Exped.* 24871 (PE), *W. Hupeh [W. Hubei], A. Henry* 2099a (A), Wudang, *1994 NACPE WD* 171 (NA); HUNAN: Daoxian, *P. C. Tam* 61477 (MO), 62905 (MO), Dayong, *X. G. Li* 204865 (MO), Hupingshan, *Hupingshan Exped.* 87238 (PE), Jiangyong, *P. C. Tam* 63660 (MO), Nanyu, *K. C. Kuan* 203 (PE), Ningyuan, *P. C. Tam* 62608 (MO); Qianyang, *Anjiang Agricultural College Team* 1120 (PE), 1451 (PE), Sangzhi, *B. G. Li & S. B. Wan* 750191 (PE), Shimen, *Hupingshan Exped.* 1021 (PE 2 sheets), 1022 (PE), 1093 (PE), Taoyuan, *no collector* 1226 (PE), Xiangxi, *L. H. Liu* 9471 (KUN, PE), Xinning, *L. H. Liu* 15181 (KUN, PE), Yizhang, *S. H. Chun* 144 (IBSC), Yongshun, *Beijing Exped.* 633 (PE), 668 (PE),

1098 (PE), Yuanling, *Wulingshan Exped.* 51 (PE), Zangjiang, *Wulingshan Exped.* 2305 (PE); JIANGXI: Anyuan, *M. X. Nie* 2026 (KUN), 2533 (KUN 2 sheets), 2606 (KUN), Dayu, *J. S. Yue et al.* 1120 (KUN), 1409 (KUN), Dexing, *M. X. Nie* 5537 (KUN), Guangfeng, *M. X. Nie & S. K. Lai* 5859 (KUN, PE), Guixi, *M. X. Nie* 4022 (KUN 2 sheets, PE), Hsinfeng [Xinfeng], *H. H. Hu* 1140 (A); Huichang, *M. X. Nie* 2900 (KUN 2 sheets), *J. S. Yue et al.* 2617 (KUN), Jingdezhen, *Q. H. Li & M. Chen* 948 (PE), Jinggangshan, *J. Xiong* 3163 (PE), *M. X. Nie & S. K. Lai* 5024 (KUN), *J. Xiong* 2610 (PE), Jiujiang, *C. M. Tan* 92133 (MO), Lichuan, *M. X. Nie* 2988 (KUN 2 sheets), Linguui, *C. F. Liang* 30890 (IBSC), Mubian, *Z. D. Li* 602244 (IBSC), Ningdu, *M. X. Nie* 5677 (KUN, PE), Qianshan, *M. X. Nie & S. K. Lai* 4071 (KUN, PE), Ruijin, *M. X. Nie* 4027 (KUN 2 sheets), Sangrao, *M. X. Nie & S. K. Lai* 5022 (PE), Taihe, *S. K. Lai* 601 (PE), Wanzai, *Yi* 001543 (PE), Xiushui, *S. K. Lai* 3455 (KUN), Yifeng, *Y. K. Hsiung* 6292 (A), *Zhongshan Univ. Exped.* 6292 (PE), Yushan, *M. X. Nie* 6444 (PE), Zihua, *M. X. Nie & S. K. Lai* 3183 (KUN, PE); SICHUAN: Emei, *H. L. Tsiang & S. S. Chang* 30133 (SZ), *S. L. Sun* 41 (PE, SZ), 2215 (KUN), *T. H. Tu* 271 (PE), *K. H. Yang* 54970 (NAS, PE, SZ), 55028 (KUN, PE), Guan Hsien [Guanxian], *W. P. Fang* 2264 (A, NY, PE), *F. T. Wang* 29787 (KUN 2 sheets, NAS, PE), Hongya, *C. W. Yao* 4104 (PE), Junlian, *Sichuan Economic Pl. Exped.* (59) 243 (KUN 2 sheets), Leibo, *Nanshuibeidiao Exped.* 7175 (PE), Leshan, *W. P. Fang* 2284 (NAS), Miyi, *Sichuan Economic Pl. Exped.* (59) 57 (KUN), Muyushan, *K. H. Yang* 55930 (NAS), Nanchuan, *K. F. Li* 62032 (KUN), *J. H. Xiong & Z. L. Zhou* 93259 (KUN, PE), Omeishan [Emeishan], *H. C. Chow* 11705 (A), *W. P. Fang* 18060 (IBSC, PE), 18632 (A), 53095 (SZ), *Y. Y. Ho* 5602 (NAS), Pingshan, *Sichuan Economic Pl. Exped.* (59) 583 (KUN, PE), *T. T. Yu* 2965 (PE), Pingwu, *H. L. Tsiang* 11116 (PE 2 sheets), Tianquan, *Y. Y. Ho* 6844 (NAS), *W. K. Hu* 12044 (PE), Wushan, *K. H. Yang* 59712 (KUN), Yanyuan, *Nanshuibeidiao. Exped.* 5431 (PE); YUNNAN: Fooning [Funing], *C. W. Wang* 87148 (KUN 2 sheets), 89174 (KUN 2 sheets), 89587 (KUN 2 sheets, PE), Jingdong, *K. M. Li* 2541 (KUN 2 sheets), Szemao [Simao], *A. Henry* 12648 (A); ZHEJIANG: Changhua, *Y. Y. Ho* 20760 (NAS), 23549 (NAS), *no collector* 30369 (PE), Chenchiong, *R. C. Ching* 1776 (US), Chu Hsien [Quxian], *Y. L. Keng* 853 (A), Fengyang, *H. Y. Zou* 164 (A), 188 (A), 498 (A), 537 (A), 685 (MO), 845 (A), Hangzhou, *Botanical Garden* 2848 (PE), *M. Chen* 822 (PE), 827 (PE), *S. Y. Chang* 923 (NAS), 1331 (NAS), *Y. Y. Ho* 20211 (NAS), 20599 (NAS), *G. Tao* 610 (PE), *C. F. Zhang* 2 (MO), Haining, *S. Y. Chang* 2575 (PE), 5165 (PE), Jiande, *no collector* 29338 (PE), Jiangshan, *P. X. Qiu* 2110 (PE), Kaihua, *G. R. Cheng* 2465 (KUN 2 sheets), Leqing, *S. Y. Chang* 5375 (PE), Lishui, *S. Y. Chang* 6235 (PE), Longquan, *S. Y. Chang* 2749 (PE), 4302 (PE), *D. X. Zuo et al.* 23030 (NAS), 23501 (NAS), Pingyang, *M. L. Sheh* 24695 (NAS), *no collector* 8370 (PE), Qingyuan, *R. C. Ching* 2409 (A, US), Shangyao, *S. K. Lai & M. X. Nie* 4958 (PE), *Zhejiang Natural Museum* 3765 (KUN), Taishun, *R. C. Ching* 2154 (A, US), *D. X. Zuo et al.* 23610 (NAS), 23788 (NAS), 23906 (NAS), Wenzhou, *R. C. Ching* 1876 (A 2 sheets), Zhoushan, *G. R. Chen* 2224 (KUN). **JAPAN:** Kyushu, *Z. Tashiro s.n.* (A), Ohsumi, *S. Hatusina* 16286 (A), Okinawa, *M. Furuse* 5566 (A), Ryukyu, *S. Sonohara* 66 (GH). **VIETNAM:** *E. Poilane* 6439 (A, US).

This species varies in leaf shape and margin (entire to crenate, and no intersections in between); and in the fruit. The species has a very large fruit, but sometimes the fruit becomes smaller than usual due to poor conditions of growth. However, a study of numerous specimens clearly shows that plants formerly known as *E. oblongifolia* are simply an extreme form of the present species in the distribution area, and has been reduced to a synonym in this

revision, and specimens have been cited accordingly. The species is similar to *E. myriantha*, but leaves are without large teeth on the margin, and not thickly coriaceous in texture; and the fruit is also smaller than the latter. The name *E. chengii*, after a careful comparison with this species, is found to be only an extreme state in which the fruit was collected early before it was fully matured.

107. *Euonymus occidentalis* NUTT. ex TORR. & A. GRAY, Fl. N. Am. 1: 258. 1838. TYPE: U. S. A. Oregon: *L. W. Nuttall s.n.* (GH!).

- = *E. acuminata* RAF., New Fl. 3: 59. 1838. TYPE: U. S. A. Oregon (not seen).
- = *E. cuneata* RAF., New Fl. 3: 59. 1838. TYPE: U. S. A. Oregon (not seen).
- = *E. parishii* TREL., Trans. Acad. Sci. St. Louis 5: 354. 1892. TYPE: U. S. A. California: *S. B. Parish & W. F. Parish 957* (GH!).
 - ≡ *E. occidentalis* NUTT. ex TORR. & A. GRAY var. *parishii* (TREL.) JEPSON, Man. Pl. Calif. 610. 1925.
 - ≡ *E. occidentalis* NUTT. ex TORR. & A. GRAY subsp. *parishii* (TREL.) R. M. BEAUCHAMP, Phytologia 59(7): 438. 1986.
- *E. atropurpurea* auct., non JACQ.: HOOK., Fl. Bor. Amer. 1: 119. 1840.

Deciduous shrub, 3-5 m tall; branches gray-black to gray-brown, terete, sturdy, twigs greenish, sometimes with striations. Leaves papyraceous, ovate-elliptic or oblong-elliptic, 7-9 x 3-4 cm, apex acute or acuminate, base suborbicular, margin crenulate, lateral veins 5-6 pairs, slightly curving forward and divided into veinlets before reaching the margin; petiole c. 5 mm long. Peduncle slender and pendulous, 3.5-6.5 cm long, with 1-2 dichotomous branches and several flowers; pedicel 15-20 mm long. Flower 5-merous. Sepals semiorbicular. Petals purplish-red or dark purple, orbicular or oblong, c. 1.2 cm in diam. when fully open. Capsule obovoid-globose, usually with 5 angles and grooves, sometimes only 3-4 developed, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, 1.4 -1.6 cm in diam., 1.2-1.4 cm long, opening into 5 lobes at maturity, occasionally 3-4 lobes only; seeds obovoid, dark brown, covered by orange aril.

Phenology. Flowering: May to July; Fruiting: August to October.

Distribution: USA (California, Oregon, Washington); in woodlands and forests; common.

SPECIMENS EXAMINED: **USA:** CALIFORNIA: Humboldt, *J. T. Howell 12887* (A), Marion, *L. Rea et al. s.n.* (A), Mendocino, *P. H. Raven & R. Snow 13668* (GH), Riverside, *P. A. Munz 8148* (GH), San Diego, *F. F. Yander 2888* (GH), San Mateo, *F. W. Hunnewell 7813* (GH), Santa Clara, *J. I. M. Murphy 29* (GH), Santa Cruz, *F. R. Fosberg 5268* (GH), Sonoma, *H. E. McMann 190* (A); OREGON: Portland, *C. V. Piper 6204* (A), Salem, *J. C. Nelson 2537* (GH), Washington, *J. W. Thompson 4279* (GH); WASHINGTON: Cowlitz, *R. McVaugh 6337* (A), Lewis, *E. J. Palmer 37942* (A), Marion, *O. V. Matthews s.n.* (GH).

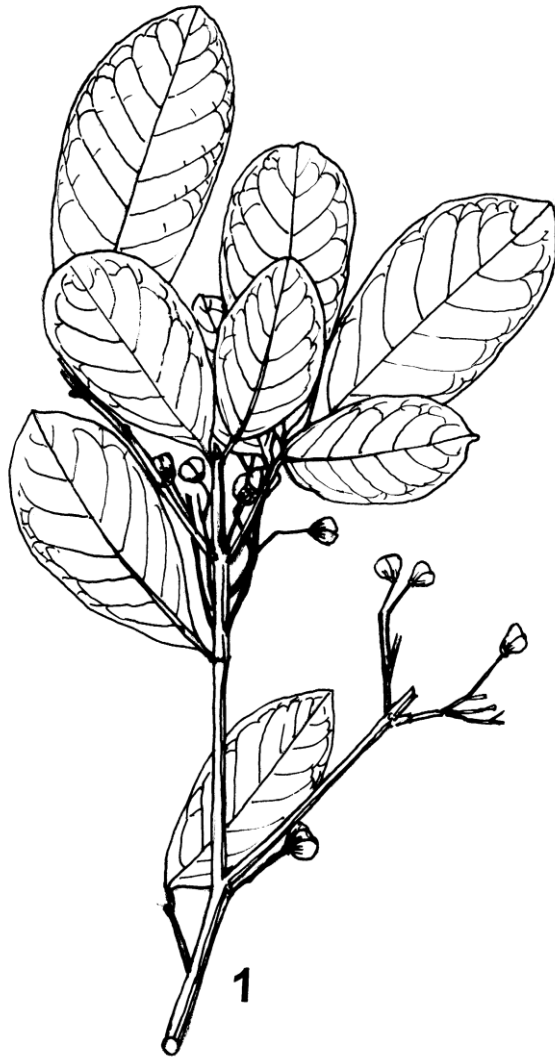


Fig. 66. *Euonymus parasimilis* J. S. MA – 1. fruit branch.

108. *Euonymus parasimilis* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 10: 96, fig. 12. 1997. TYPE: CHINA. Yunnan: Bijiang, Chih Tso Lo, 9 Sep 1933, 1500 m, H. T. Tsai 54201 (Holotype: A!); H. T. Tsai 62517 (A! NAS! SZ!). [Fig. 66]

Evergreen tree, to 10 m (30 ft.) tall and 30 cm (1 ft) at DBH (from field record, girth?); branches and twigs gray-brown, terete, sturdy. Leaves thickly coriaceous, elliptic to broadly elliptic, 9-10 x 4-6 cm, apex round or nearly round, base nearly

round, margin entire to finely crenulate, lateral veins 6-9 pairs, upper part curving forward and disappearing before reaching the margin, surface sometimes rugose, especially in fruit; petiole 3-6 mm long, sturdy. Peduncle 6-8 cm long, with 1-2 dichotomous branches and several flowers; pedicel 1-2 cm long. Flower 4-merous (not seen). Capsule obpyramidal, 4-angled, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, c. 1.5 cm in diam., c. 8 mm long, opening into 4 lobes at maturity; seeds ellipsoid, dark brown, covered by orange aril.

Phenology. Flowering: Unknown; Fruiting: August to October.

Distribution: China (Yunnan); alt. c. 1,500 m, mountain rocks; rare.

There are no further materials available in addition to the type, and further collections, especially of flowering material, are required.

109. *Euonymus percoriacea* C. Y. WU ex J. S. MA, Harvard Pap. Bot. 10: 97, fig. 14. 1997. TYPE: CHINA. Yunnan: Xichou, Fadou, Q. A. Wu 10014 (KUN! 2 sheets). [Fig. 67]

Evergreen shrub to small tree, 2-8 m tall; branches and twigs gray-green to gray-brown, terete, twigs with striations. Leaves coriaceous, ovate-elliptic or obovate-elliptic, 5-7 x 2.8-3 cm, apex obtuse or acuminate, sometimes caudate, base cuneate or attenuate or suborbicular, margin crenulate above and entire below, lateral veins indistinct; petiole 3-5 mm long. Peduncle 1.5-2.0 cm long, with 1-2 dichotomous branches and several flowers; pedicel 5-10 mm long. Flower 4-merous. Sepals semiround. Petals pale green or greenish-white, orbicular, c. 9 mm in diam. when fully open. Capsule obturbinate, 4-angled, brown or yellow-brown to red-brown, c. 10 mm in diam., 8 mm long, opening into 4 lobes at maturity; seeds subglobose, dark brown, wholly covered by orange aril.

Phenology. Flowering: May; Fruiting: December.

Distribution: China (Yunnan); alt. 1,000-1,500 m, in woodlands and forests; rare.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Xichou, Q. A. Wu 7877 (KUN 2 sheets, Type of flower), 8027 (KUN 2 sheets), C. W. Wang 86087 (IBSC, KUN 2 sheets, PE), Wenshan, K. M. Feng 22365 (KUN 2 sheets).

110. *Euonymus phellomana* LOES. ex DIELS, Bot. Jahrb. Syst. 29: 444, tab. 5: D, E. 1900. TYPE: CHINA. Shaanxi: Tsin ling shan, In kia pu, G. Giraldis 1480 (not seen). [Fig. 68]

Deciduous shrub, 2-3 (5) m tall; branches and twigs gray-green to gray-brown, terete, with corky wings or striations. Leaves thickly papyraceous, ovate-elliptic or oblong-elliptic, 6-10 x 2-3 cm, apex obtuse or acuminate, base cuneate or attenuate, margin crenulate, slightly pubescent, lateral veins 10-14 pairs, curving forward, disappearing before reaching the margin; petiole 3-5 mm long.

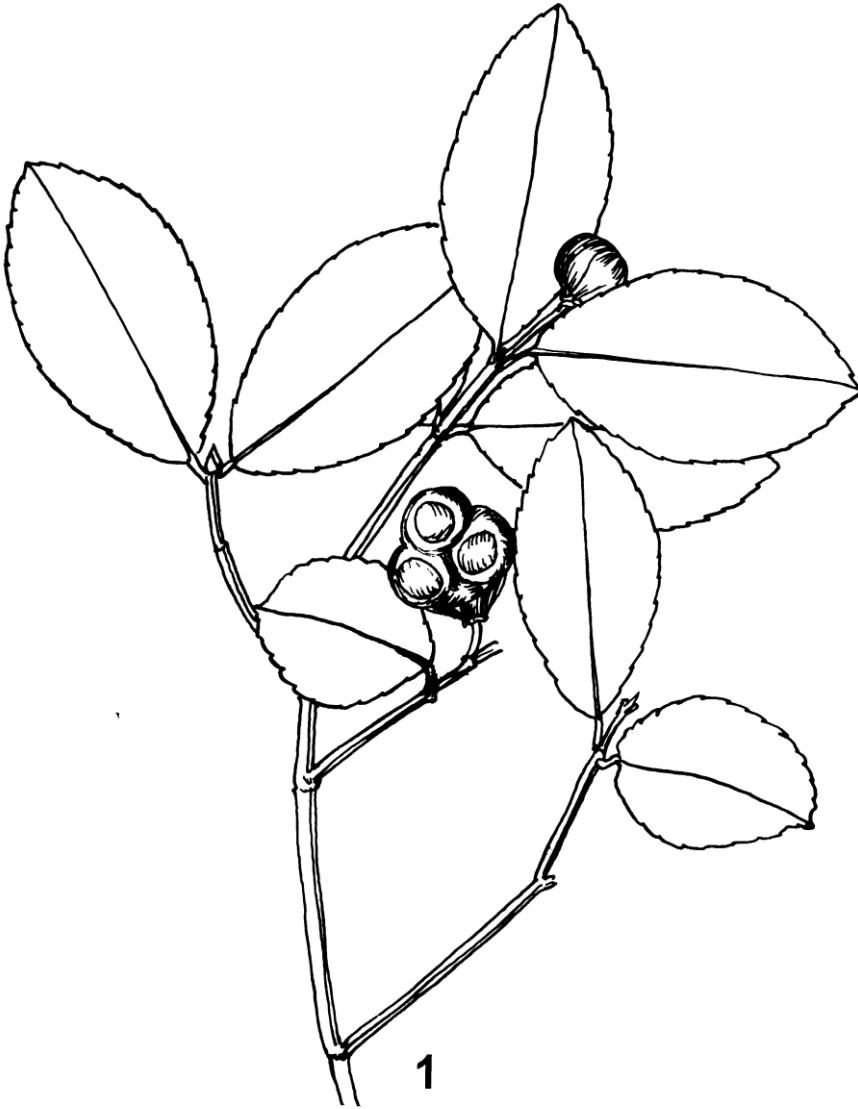


Fig. 67. *Euonymus percoriacea* J. S. MA – 1. fruit branch.



Fig. 68. *Euonymus phellomana* DIELS – 1. flower branch; 2. flower; 3. fruit.

Peduncle 1.8-3.0 cm long, with 1-3 dichotomous branches and several flowers, very slender; pedicel 5-10 mm long. Flower 4-merous. Sepals semiround. Petals greenish-white, oblong, c. 10 mm in diam. when fully open. Capsule subglobose, 4-angled, brown or yellow-brown to red-brown, c. 9 mm in diam., 8 mm long, opening into 4 lobes at maturity; seed ovoid, dark brown, half covered by orange aril.

Phenology. Flowering: May to July; Fruiting: August to November.

Distribution: China (Anhui, Gansu, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan); alt. 1,500-3,000 m, in woodlands and forests; common.

SPECIMENS EXAMINED: **CHINA:** GANSU: Huixian, *Lanzhou Medical Univ. Team 72-451* (PE), Jingyuan, *T. P. Wang 17056* (PE 2 sheets), Kangle, *Taohe Exped. 3517* (KUN, PE), Lower Tebbu, *J. F. Rock 14872* (A), *15072* (A), Lungte [Lingtai], *T. P. Wang 13092* (PE), Minxian, *W. Y. Hsia 8201* (PE), *R. N. Zhao & G. L. Zhang 707-27* (PE), Pingliang, *Y. W. Tsui 10241* (PE), *T. P. Wang 13334* (PE 2 sheets), *Yellow River Exped. 2050* (PE), Tianshui, *W. Y. Hsia 5671* (PE), *Q. X. Li 141* (PE), Tienschui [Tianshui], *G. Fenzel 2756* (A), Taochow, *R. C. Ching 833* (A, GH, NY 2 sheets, US), Tao River, *J. F. Rock 12626* (A), *12822* (A, US), *13521* (A, US), Xigu, *W. Y. Hsia 6592* (PE), *T. P. Wang 14471* (PE), Xingjiashan, *Yellow River Exped. 3905* (PE), Zhangxian, *Yellow River Exped. 4652* (PE), Zuoni, *W. Y. Hsia 5413* (PE 2 sheets), *8494* (PE); HENAN: Lingbao, *J. Q. Fu 98* (KUN 2 sheets, NAS, PE), Lingchuan, *Henan Exped. 20298* (KUN, PE), Lushi, *J. Q. Fu 1074* (KUN 2 sheets), *K. M. Liou 5146* (PE 2 sheets), Songxian, *Forest Bureau 1206* (PE); HUBEI: Badong, *G. X. Fu & Z. S. Zhang 1018* (PE 2 sheets), *1029* (PE 2 sheets), Shennongjia, *1980 Sino-Amer. Exped. 366* (A, KUN, NA, NY), *954* (A, KUN, NA, NY); SHAANXI: Fengxian, *K. M. Liu 10588* (KUN, PE), *10612* (KUN, PE), Fuping, *K. T. Fu 3672* (PE), *4779* (PE), *P. C. Kuo 1365* (PE), *X. M. Zhang 508* (NAS, PE), Huashan, *W. Y. Hsia 4465* (PE), Kiansan, *G. Giraldi s.n.* (A), Laihe, *X. M. Zhang 232* (KUN), Lantien [Lantian], *T. P. Wang 2195* (A), Lueyang, *K. T. Fu 5890* (PE), Minxian, *T. P. Wang 4732* (PE 2 sheets), Ningshan, *H. W. Kung 3247* (PE), Taibeishan [Taibaishan], *Wm. Purdom 2* (A), *10* (A), *1043* (A), Taibaishan, *T. N. Liou & P. C. Tsoong 1941* (PE), *2114* (PE), *Seed Collection Team 231* (KUN), *P. C. Tsoong 2193* (PE), Xixiang, *P. C. Tsoong 4032* (PE), Yanxian, *P. C. Kuo 908* (PE); SICHUAN: Barkam, *X. Li 74472* (KUN, PE), *74518* (KUN), Chengkou, *T. L. Dai 101716* (PE), Fubian, *T. T. Yu 2441* (PE 2 sheets), Heishui, *X. Li 73150* (KUN, PE, SZ), Maoxian, *T. He & Z. L. Zhou 14081* (PE), *14038* (PE), *F. T. Wang 22029* (KUN), *22059* (KUN, NAS), *22465* (KUN), Maowen, *Sichuan Economic Pl. Exped. (59) 2263* (KUN), Sungpan [Songfan], *W. P. Fang 4386* (A, NAS, PE 2 sheets), *4447* (A, NY, PE 2 sheets), *H. Smith 4029* (A), *T. T. Yu 2610* (PE), *2616* (PE), Tianquan, *Erlangshan Exped. 422* (SZ), Without location, *T. Y. Chang & H. F. Chow 22521* (NAS), Wushan, *H. F. Chow 109030* (PE), Xiaojin, *Sichuan Economic Pl. Exped. (59) 421* (KUN), *S. S. Chang & Y. X. Ren 6584* (PE), *6792* (PE). **UNITED KINGDOM:** Kew Botanic Garden, *E. N. F. 392* (US, cult.).

This species is very distinctive in its corky wings on young branches, which is also found in the genus only in *E. alata*, making recognition easy in the field and herbarium, even without fruit. The distribution in Anhui is a record from the local flora (Flora of Anhui 3: 364. 1990).



Fig. 69. *Euonymus pittosporoides* J. S. MA – 1. fruit branch.

111. *Euonymus pittosporoides* C. Y. CHENG ex J. S. MA, Harvard Pap. Bot. 3(2): 232, fig. 2. 1998. TYPE: CHINA. Guangxi: Nandan, Luo Fu Xiang, Honghongshan, in the mixed forest, alt. about 2000 ft., August 3, 1937, C. Wang 41260 (Holotype, fr.: PE!; Isotypes: A!, PE!). [Fig. 69]

– *E. tenuipes* C.Y.WU, in herb., nom. inval.

Small tree, to 3-7 m tall, DBH to 30 cm (by field record), sometimes shrublike, especially under forests or shaded woods; stem gray to gray-brown, terete, glabrous; twigs green to light-green, terete; winter buds very small, generally pubescent. Leaves more or less coriaceous, lanceolate or willowlike (saliciform), acuminate or acute at both ends; margin denticulate; lateral veins 6-9 pairs, disappearing before reaching the margin, glabrous or pubescent on both sides; petiole 5-10 mm long. Peduncles axillary, to 10 cm long, usually with only one flower, sometimes few flowered. Flowers not known. Petals white to pinkish (from field record). Fruit usually one, sometimes 2-3, with pedicel c. 5 cm long. Capsule c. 8 x 6 mm, lobes 4, usually only 2-3 locules opening at maturity, red when fresh, brown or yellow-brown when dry; seeds 2 in each locule, nearly round or oblong, c. 4 x 3-4 mm, red when fresh, black when dry, covered by aril only at base.

Phenology. Flowering: February to July; Fruiting: May to December.

Distribution: China (Guangdong, Guangxi, Guizhou, Sichuan, Yunnan), Vietnam; alt. 120-1,750 m, in forests; occasional.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Foolung, *H. Y. Liang* 69760 (A, IBSC, PE); GUANGXI: Dongxing, *Naqin Group* 403 (PE), Lingchuan, *Z. Y. Chen* 53711 (KUN 2 sheets), Lingui, *C. F. Liang* 31127 (KUN), Nandan, *C. Wang* 107030 (PE, SYS), Napo, *P. C. Tsoong & K. C. Kuan* 355 (PE 2 sheets, IBSC); GUIZHOU: Ludian, *Y. Tsiang* 7274 (A, NAS, NY, PE), *Guizhou Agricultural College* 31 (IBSC, PE); SICHUAN: Nanchuan, *J. H. Xiong & Z. L. Zhou* 93824 (SZ); YUNNAN: Funing, *C. W. Wang* 88391 (KUN 2 sheets), 88447 (KUN 2 sheets), 89177 (KUN 2 sheets), Hekou, *Hekou Exped.* 121 (KUN 2 sheets, PE), Marlipo [Malipo], *K. M. Feng* 13301 (A, KUN, PE), *C. W. Wang* 86460 (KUN 2 sheets, PE), 86477 (KUN, PE), 86660 (IBSC, KUN, PE), 87044 (KUN), *Q. A. Wu* 9898 (KUN 2 sheets), Wenshan, *H. T. Tsai* 58-8178 (KUN 2 sheets), Yanshan, *C. W. Wang* 84275 (KUN). **VIETNAM:** Tonkin, *W. T. Tsang* 27165 (A, P), without location, *Luyuch* 7110 (IBSC).

This species is similar to *E. bullata* in the pattern of veins of the leaves, but is much different from the latter in its small leaves which are linear-lanceolate or saliciform, acuminate or acute at both ends, and pubescent on both sides.

112. *Euonymus recurvans* Miq., Fl. Ind. Bat. Suppl. 513. 1860. TYPE: INDONESIA. Sumatra occid. (not seen).

Shrub; branchlets terete. Leaves chartaceous, elliptic, 7-8 x 3.5-4 cm, apex shortly acuminate, base cuneate, rarely obtuse, margin usually crenate in upper half, slightly recurved; lateral veins 4-7 pairs, obliquely ascending towards near the margin and curving upwards; petiole 5-8 mm long. Peduncle short, c. 1-2 cm long or shorter, with 1-2 dichotomous branches and several flowers, or several pedicels clustered together; pedicel 4-5 mm long. Flower 5-merous. Sepal lobes unequal, the inner 2 much larger, semi-orbicular to reniform, 1.5-2 x 1-2.5 mm, slightly erose, reflexed at anthesis. Petals (immature) suborbicular. Capsule (immature) suboblongate or subfusiform, 1.5 x 0.5 cm.

Phenology. Unknown.

Distribution: Indonesia (Sumatra); rare.

The species has very unusual characters for the genus, but no materials were available for this work. The above description is from Flora Malesiana (HOU 1963).

113. *Euonymus revoluta* WIGHT, Illustr. Ind. Bot. 1: 178. 1840. TYPE: SRI LANKA. *R. Wight s.n.* (not seen).

Evergreen shrub to small tree, 2-4 m tall; branches gray-black, terete, sturdy, twigs greenish-yellow. Leaves thickly coriaceous, rigid, elliptic or oblong-elliptic, 6-7 x 4-5 cm, apex obtuse or orbicular, base suborbicular or subattenuate, margin entire, revolute, lateral veins c. 6 pairs, upper part curving forward and disappearing before reaching the margin, surface sometimes rugose, especially in fruit; blade sessile or subsessile, or with petiole c. 2-4 mm long, sturdy. Peduncle very short, less than 1-2 cm long, with 1-2 dichotomous branches and several flowers, or several pedicel clustered together; pedicel 2-3.5 cm long. Flower 5-merous. Sepals semiorbicular. Petals white, orbicular to obovate, c. 8-9 mm in diam. when fully open. Capsule obtriangular-ovoid, with 5 sharp angles, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, c. 1.4 cm in diam., c. 1.4 cm long, opening into 5 lobes at maturity; seeds ellipsoid, dark-brown to orange, lower part covered by yellow aril.

Phenology. Flowering: May to August; Fruiting: July to November.

Distribution: Sri Lanka; alt. 1,000-3,000 m, in montane forest; occasional.

SPECIMENS EXAMINED: **SRI LANKA:** *N. Balakrishnan & S. Balasubramanium 1133* (US), *B. & K. Bremer 883* (US), *D. Fairchild 381* (US), *Garden 176* (BM), *W. J. Hooker 20* (GH), *J. D. Hooker & T. Thomson s.n.* (GH), *H. Huber 489* (US), *A. Kostermans 27025* (GH, US), *25684* (A, P), *S. H. Sohmer & D. B. Sumithraarachchi 10166* (US), *10177* (GH, US), *S. H. Sohmer & S. Waas 8661* (P), *D. D. Tirvengadum & L. H. Cramer 273* (P), *S. Waas 1555* (GH, US), *1617* (GH, US), *1694* (US), *S. Waas & D. B. Sumithraarachchi 267* (US), *N. Wirawan 10* (GH).

This very interesting species is the only one of the genus in Sri Lanka having thick, rigid coriaceous leaves, the margin entire and revolute.

114. *Euonymus salicifolia* LOES., Bot. Jahrb. Syst. 30: 458. 1902. TYPE: CHINA. Yunnan: ad Szemao juxta Mengtze, alt. 1670 m, *A. Henry 11718* (A! MO! NY!). [Fig. 70]

= *E. lawsonii* C. B. CLARKE ex PRAIN var. *salicifolia* (LOES.) BLAKELOCK, Kew Bull. 1951: 242. 1951.

= *E. georgei* COMBER, Notes Roy. Bot. Gard. Edinburgh 18: 242. 1934. TYPE: CHINA. Yunnan: Shweli-Salwin divide, lat. 25.00 N, alt. 9,000 ft, Apr. 1918, *G. Forrest 16241* (not seen).



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

Evergreen shrub, 2-3 m tall; branches terete, sturdy, twigs green to light green, with several striations. Leaves coriaceous, long lanceolate, 10-15 x c. 3 cm, apex acuminate, base cuneate or attenuate, margin remotely serrulate, lateral veins 10-12; petiole sturdy, 6-10 mm long. Peduncle c. 3 cm long, with several flowers; pedicel c. 5 mm long. Flower 4-merous (not seen). Capsule obovate, with 4 angles and somewhat deep grooves, brown or yellow-brown to red-brown, c. 1.5 cm in diam., c. 10 mm long, opening into 4 lobes at maturity; seeds ovoid, dark brown, covered by orange-red aril.

Phenology. Flowering: Unknown; Fruiting: December.

Distribution: China (Yunnan). Vietnam; in mixed forests; rare.

SPECIMENS EXAMINED: **CHINA:** YUNNAN: Sichou, C. W. Wang 85672 (PE), Szemao [Simao], A. Henry 11718a (US), 11718b (A). **VIETNAM:** E. Poilane 29892 (BM).

The species is similar to *E. lawsonii*, but the capsule is much smaller than in the latter, and the leaves are coriaceous and narrower, not papyraceous and wide as in the latter.

115. *Euonymus semenovii* REGEL & HERDER, Bull. Soc. Imp. Naturalistes Moscou 39 (1): 557. 1866. TYPE: CENTRAL ASIA. In Alatau transiliensis, M. S. Semenov s.n. (US!). [Fig. 71]

= *E. przewalskii* MAXIM., Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 451. 1881. TYPE: CHINA. Kansu: N. M. Przewalski s.n. (not seen, merotype A!, photo A!).

Deciduous shrub, 2-3 m tall; branches and twigs gray-green to gray-brown, with corky wings or striations, sometimes terete. Leaves papyraceous, ovate-lanceolate, 3.5-5 x 1-1.5 (2.5) cm, apex acuminate or acute, base suborbicular or attenuate, margin crenulate, lateral veins 4-6 pairs, slightly curving forward and disappearing before reaching the margin; petiole 3-5 mm long. Peduncle slender, 1.8-2.5 cm long, with 1-2 dichotomous branches and several flowers; pedicel 10-15 mm long. Flower 4-merous. Sepals semiorbicular. Petals dark red, oblong, 6-9 mm in diam. when fully open. Capsule subglobose, 4-angled, base attenuate, brown or yellow-brown to red-brown, 9-10 mm in diam., 8 mm long, opening into 4 lobes at maturity; seed subglobose, dark brown or black, partly covered by orange aril.

Phenology. Flowering: May to July; Fruiting: August to October.

Distribution: China (Gansu, Hebei, Henan, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Xinjiang, Yunnan), C Asia; alt. 1,000-3,200 m, in woodlands and mixed forests; common.

SPECIMENS EXAMINED: **CHINA:** GANSU: Choni [Zuoni], R. C. Ching 962 (A, GH, US), W. Y. Hsia 8420 (PE), 8460 (PE), Hezheng, R. N. Zhao 85039 (PE), Komangssu, J. F. Rock 13311 (A); Lintan, W. Y. Hsia 8650 (PE), Lungte, T. P. Wang 13094 (PE), Pingfan, R. C. Ching 574 (A, US), South Minchow, Wm. Purdom 1050 (US), Tao River, J.

F. Rock 12820 (A), Tschinglungshan [Xinglongshan], G. Fenzel 2113 (A), Yuzhong, Yellow River Exped. 3086 (KUN, PE), Zhangxian, Yellow River Exped. 4918 (PE), without location, T. P. Wang 5272 (PE), 5309 (PE 2 sheets), Yellow River Exped. 3637 (PE), 3744 (PE); HEBEI: Baihuashan, W. Y. Hsia 2203 (NY, PE 2 sheets), W. T. Wang 677 (PE), Chechang, J. W. Feng 151 (KUN, PE), Hsiaowutaishan [Xiaowutaishan], H. W. Kung 325 (PE), 1282 (NY, PE 2 sheets), C. W. Wang 60254 (PE), 62414 (A, PE), 62509 (PE), T. P. Wang 693 (PE), Wu & Yang 37006 (PE), Huailai, PE Team 2025 (PE), 2377 (PE), Weixian, K. M. Liou 2408 (PE), PE Team 2533 (PE), 2631 (PE), Xiaowutaishan, Qinhua Univ. Team 37206 (PE), Yuxian, PE Team 518 (PE 2 sheets); QINGHAI: Datong, P. C. Kuo 6634 (KUN), 9562 (KUN), W. Y. Hsia 846 (PE), Huangyuan, P. C. Tsoong 8873 (KUN, PE), Menyuan, P. C. Tsoong 2645 (PE), 2669 (PE); SHAANXI: Taipaishan [Taibaishan], T. P. Wang 6472 (PE); SHANXI: Chiao Cheng [Jiaocheng], H. Smith 7064 (A), Chiehhsiu [Jiexiu], H. Smith 5818 (A, MO), 7870 (A), Fangshan, J. Hers 2698 (A), T. Tang 1494 (A), Huo Hsien [Huoxian], T. Tang 1025 (A, NAS, PE), Jiaocheng, X. Y. Liu 21357 (PE), Ningwu, Shanxi Exped. 189 (PE 2 sheets), 454 (PE), 1745 (PE), 1848 (PE), Qinyuan, K. M. Liu 1378 (PE), Wuchai [Wuzhai], J. Hers 2103 (A), Wutaishan, Shanxi Exped. 715 (PE 2 sheets), Wuzhai, Yellow River Exped. 1628 (PE), Zhongyang, Yellow River Exped. 1980 (PE); SICHUAN: Barkam, W. C. Cheng 5699 (PE), K. Y. Lang et al. 2117 (KUN, PE 2 sheets), X. Li 70380 (PE, SZ), 70806 (KUN, PE), 71558 (KUN, PE), 72286 (PE), 72413 (PE), 72417 (KUN, NAS, PE), 72607 (IBSC), 72718 (PE), 74848 (KUN, NAS, PE), 74937 (KUN, PE), 77453 (PE), T. Y. Chang & C. F. Chow 22081 (KUN, PE), 22230 (PE), 22331 (NAS, PE 2 sheets), 22369 (KUN, PE), 23158 (KUN, NAS, PE), 23737 (KUN, PE), C. L. Wu 32056 (PE), 32068 (PE), 32283 (PE), Dajin, X. Li 77643 (PE), 78587 (PE), 78651 (PE), Fupien [Fubian], F. T. Wang 21326 (A, KUN, PE), Heishui, X. Li 73196 (PE), 73453 (PE), Northwest Agri. Bureau Team 116 (PE), Kangding, Z. P. Huang et al. 1327 (PE), H. L. Tsiang 36648 (PE), 36738 (PE), 36774 (PE), 36788 (PE), 36920 (PE), 36949 (PE), 36975 (PE), West Sichuan Exped. 303 (PE), Kangting [Kangding], W. P. Fang 3577 (A), 36016 (PE), H. Smith 11285 (MO), Lifan [Lixian], F. T. Wang 21666 (A, KUN, NAS, PE 2 sheets), Lixian, T. He & Z. L. Zhou 12983 (PE), X. Li 74237 (PE), 74997 (PE), no collector 8900 (PE); Muli, G. Forrest 21338 (A, PE, US), T. T. Yu 5572 (KUN 2 sheets, PE 2 sheets), 6072 (A, KUN 2 sheets, PE), 6627 (KUN, PE 2 sheets), Muli to Yungning [Ningliang], H. Handel-Mazzetti 7356 (A, WU), Shimian, C. J. Xie 40154 (IBSC, SZ), 41250 (SZ), Sungfan [Songfan], H. Smith 2759 (A, MO), Tachienlu [Kangding], E. H. Wilson 3126 (A, MO, US), Taofu [Daofu], H. Smith 12366 (MO), Sikang, Y. W. Tsui 5892 (KUN), Xiaojin, S. S. Chang & Y. X. Ren 6005 (PE), 6277 (PE), Zamtang, no collector 9389 (PE); XINJIANG: Gongliu, Forestry Exped. 292 (PE), Y. R. Ling 74327 (PE 2 sheets), 74430 (PE 2 sheets), Xinjiang Exped. 2836 (PE), 10294 (PE), Huocheng, A. R. Li & J. R. Zhu 10379 (PE), Nilka, C. Y. Yang 741310 (PE 2 sheets), Qapqal, Xinjiang College Team 112 (PE), Xinyuan, K. C. Kuan 3742 (PE 2 sheets), Yili, Forestry 721 Class 37 (PE), s. n. (PE), K. C. Kuan 3203 (PE 2 sheets); XIZANG: Bomi, T. S. Ying & D. Y. Hong 650340 (PE 3 sheets), Kongbo, F. Ludlow & G. Sherriff 13695 (E), Kyimdong Dzong [Nangxian], F. K. Ward 11990 (BM), F. Ludlow et al. 7198 (A, BM), Mainling, Qinghai-Xizang Exped. (Suppl.) 750887 (KUN, PE), Xiang Drug Exped. 3848 (PE), 3937 (PE); Takpo, F. Ludlow et al. 13312 (BM), without location, G. X. Fu 560 (PE); YUNNAN: Weixi, K. M. Feng 4586 (PE). **C. ASIA:** Tianschan, M. Popov & E. Moreeva s.n. (A), V. Vasak s.n. (NY). **KHAZAKSTAN:** Alama-Ata, I. Roldugin s.n. (A), A. K. Skvortsov s. n. (US). **KIRGHIZIA:** A. K. Skvortsov s.n. (A). **TURKEY:** Ama Sinka, A. Regel s.n. (WU).

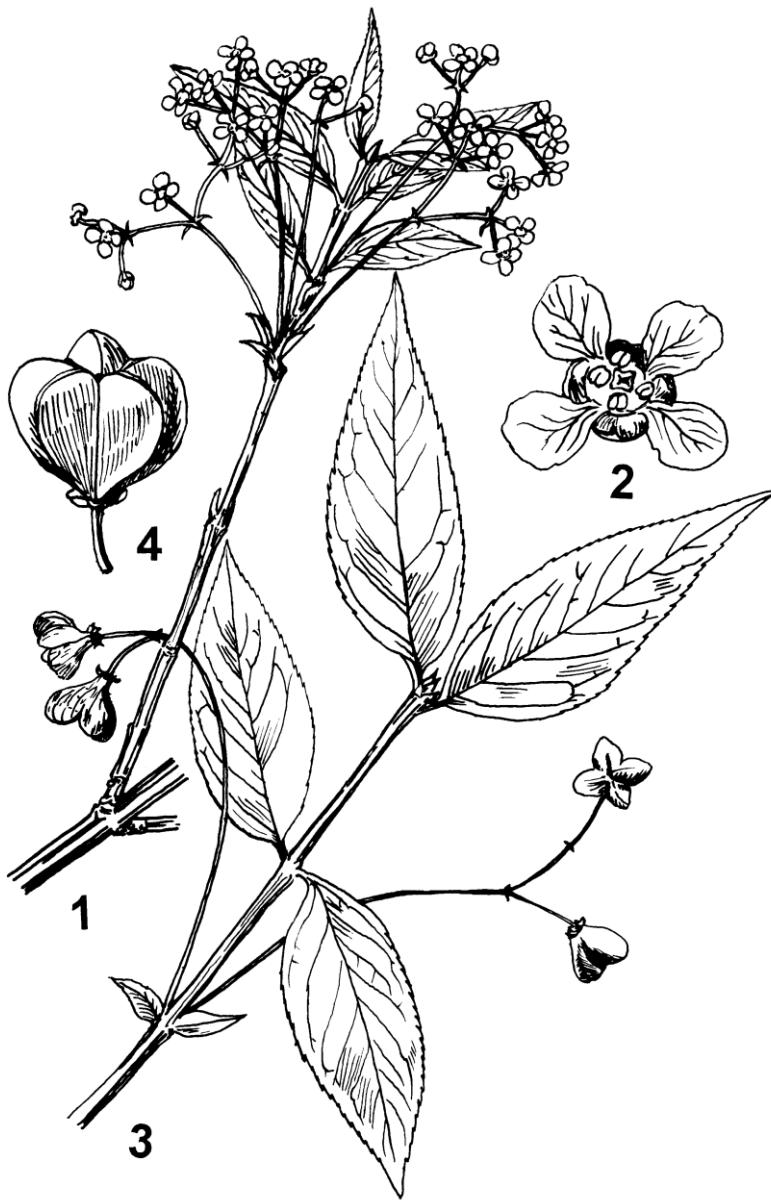


Fig. 71. *Euonymus semenovii* REGEL & HERDER – 1. flower branch; 2. flower; 3. fruit branch; 4. fruit.

The leaves on specimens from N, NW and SW China seem to be smaller and narrower than those from C Asia, which were attributed to *E. przewalskii*, but they are exactly the same in fruit and flower characteristics, and there are no discontinuities in the distribution, so there is no reason to separate them as different species.

116. *Euonymus serratifolia* BEDD., For. Man. Bot. 64. 1870. TYPE: INDIA. Nilgiris (not seen).

Evergreen shrub, c. 2 m tall; branches terete, sturdy, twigs green to light green, terete, with striations. Leaves papyraceous, long lanceolate, 15-22 x 3-5.5 cm, apex acuminate or caudate, base suborbicular, margin remotely serrate with large teeth, lateral veins 12-15 pairs, webbing and disappearing before reaching the margin; petiole sturdy, 6-10 mm long. Peduncle slender, 2-5 cm long, with several flowers; pedicel 6-8 mm long. Flower 5-merous, 7-9 mm in diam., purple. Capsule obpyramid, with 5 angles and deep grooves, brown or yellow-brown to red-brown, c. 2.5 cm in diam., c. 3 cm long, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, covered by orange-red aril.

Phenology. Flowering: May to August; Fruiting: August to November.

Distribution: China (Guangxi, Yunnan), India; alt. c. 1,800 m, in woodlands and forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Tiane, Z. D. Li 601425 (KUN); YUNNAN: Lungling [Longling], H. T. Tsai 55712 (A).

This species with serrate, large-toothed leaves is a very distinctive in the genus, and can be easily recognized even without flower and fruit. The original description is from S Indian material. However, a few records were found from SW China for the first time in this work.

117. *Euonymus tenuiserrata* C.Y.CHENG ex J. S. MA, Harvard Pap. Bot. 3(2): 232, fig. 3. 1998. TYPE: CHINA. Yunnan: Kien-shui [Jianshui], H. T. Tsai 53318 (Holotype: A!, Isotypes: NAS! SZ!). [Fig. 72]

Evergreen shrub, c. 3 m tall; branches terete, sturdy, twigs green to pale green, terete, with striations. Leaves papyraceous, ovate to ovate-elliptic, 6-10 x 2-5.5 cm, apex caudate, base suborbicular, margin ciliate to sharply and finely toothed, lateral veins c. 8 pairs, webbing and disappearing before reaching the margin; petiole sturdy, 6-10 mm long. Peduncle slender, 2-3 cm long, with several flowers; pedicel 6-8 mm long. Flower 4-merous, 7-9 mm in diam., green. Capsule not seen.

Phenology. Flowering: May; Fruiting: Unknown.

Distribution: China (Yunnan); alt. c. 2,000 m, in woods; rare.



Fig. 72. *Euonymus tenuiserrata* J. S. MA – 1. flower branch; 2. flower.

The species is very similar to *E. serratifolia* as to leaf margin, but differs from it by the 4-merous green flowers, and ovate to ovate-elliptic, small leaves. So far, it is known from the type only, and further research and collections are required.

118. *Euonymus ternifolia* HAND.-MAZZ., Symb. Sin. 7: 659, tab. 9, abb. 9. 1933. TYPE: CHINA. Sichuan: Woloho zwischen Yenyuen und Yungning, alt. 2800 m, 14 July 1914, *H. Handel-Mazzetti* 3018 (A! WU!).

Deciduous dwarflike, many branched shrub, c. 1 m tall; branches and twigs gray, terete, sturdy. Leaves thickly papyraceous, beltshaped-linear, 1.8-2.3 x c. 0.3 cm, apex obtuse, base subattenuate, margin seemingly entire but minutely crenulate, lateral veins invisible; petiole very short to absent. Peduncles few from the upper branches or twigs, mostly only with several flowers; pedicel 5-10 mm long. Flower 4-merous. Sepals semiorbicular. Petals pale-yellow, suborbicular, 9-10 mm in diam. when fully open. Capsule not seen.

Phenology. Flowering: May to June; Fruiting: Unknown.

Distribution: China (Sichuan); alt. 2,800-3,000 m, in thickets or forests; rare.

SPECIMENS EXAMINED: **CHINA:** SICHUAN: austr., prope Kuapil, *C. Schneider* 3555 (A, E, GH).

So far there are only a few specimens available for this study, and the type is only a flowering specimen at A and GH, which looks like a dwarf alpine shrub; leaves seem to be clustered on the young twigs but opposite, and flowers larger than the other small *Euonymus* species; flowers are pale yellow, which is also different from the others. However, further collections of fruiting material are still needed. The type was from between Yenyuen (i.e., Yanyuan, Sichuan) and Yungning (i.e., Ningliang in Yunnan), but only plants from the Sichuan side were used in both Handel-Mazzetti's description and the type record.

119. *Euonymus tingens* WALL. in ROXB., Fl. Ind. 2: 406. 1824. TYPE: INDIA. Newar: *Kasoovi s.n.* (not seen). [Fig. 73]

Evergreen shrub to small tree, 2-8 m tall; branches gray-black to gray-brown, terete, sturdy, twigs greenish, with striations. Leaves thickly coriaceous, elliptic or oblong-elliptic, 4-6 x 2-2.5 cm, apex obtuse or acute, base cuneate or suborbicular, margin crenulate, lateral veins 8-12 pairs, curving forward and disappearing before reaching the margin; petiole 3-5 (8) mm long. Peduncles many, 1.5-3.5 cm long, with 1-3 dichotomous branches and several flowers; pedicel 5-20 mm long. Flower 5-merous. Sepals semiorbicular. Petals creamy-white with purplish veining around the edges, orbicular to obovate, c. 1.5 cm in diam. when fully open. Capsule obovoid-globose, 5-angled, pinkish or reddish when fresh, brown or yellow-brown to red-brown when dry, 1.2-1.4 (1.5) cm in diam., 1.2-1.3 cm long, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, partly covered by orange aril.

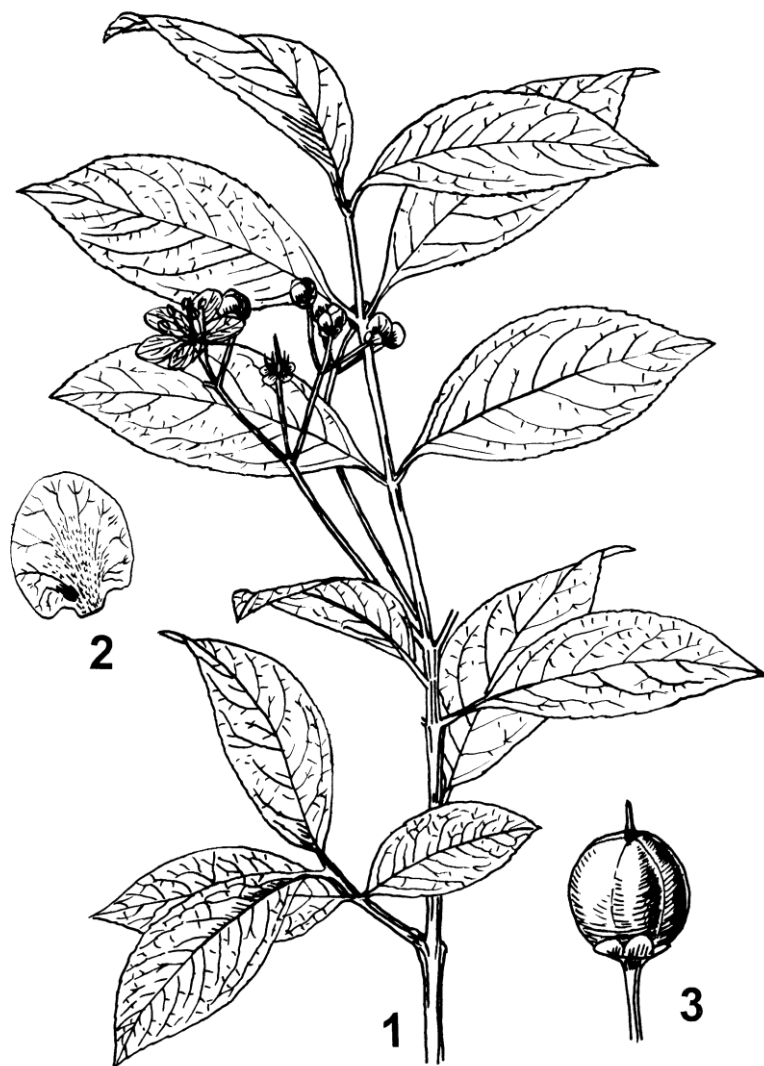


Fig. 73. *Euonymus tingens* WALL. – 1. flower branch; 2. petal; 3. fruit.

Phenology. Flowering: May to August; Fruiting: July to November.

Distribution: Bhutan, China (Guizhou, Sichuan, Yunnan, Xizang), India, Myanmar, Nepal, Sikkim; alt. 1,350-3,700 m, in woodlands and forests; very common.

SPECIMENS EXAMINED: **CHINA:** SICHUAN: Daocheng, *Daocheng Exped.* 2348 (KUN), Dukou, *Qinghai-Xizang Exped.* 11698 (KUN 2 sheets, PE), Gibboh Mt., *J. F.*

Rock 24588 (A), Huidong, *Sichuan Economic Pl. Exped.* (59) 770 (KUN), Mianning, *Nanshuibeidiao Exped.* 4732 (PE), Miyi, *Qinghai-Xizang Exped.* 11881 (KUN 3 sheets, PE 2 sheets), Muli, *G. Forrest* 20433 (A 2 sheets, US), *Qinghai-Xizang Exped.* 12383 (PE), 14170 (KUN 2 sheets, PE 2 sheets), 14273 (KUN, PE 2 sheets), T. T. Yu 5669 (KUN 2 sheets, PE 2 sheets), 5797 (A 2 sheets, KUN 2 sheets, PE 2 sheets), 7464 (KUN 2 sheets, PE 2 sheets), 7720 (KUN 2 sheets, PE 2 sheets), Nanchuan, *K. F. Li* 63034 (KUN, SZ), Tchenkeou [Chengkou], *M. Farges s.n.* (P), Tongqian, *A. L. Zhang* 101048 (KUN), Tsawarung, *J. F. Rock* 22343 (A 2 sheets, NY), 22976 (A, KUN, NY), 23567 (A), *C. W. Wang* 65473 (A, PE 2 sheets), 65475 (A), 66105 (A, KUN, PE 2 sheets), Yanyuan, *Qinghai-Xizang Exped.* 12827 (KUN 2 sheets, PE 2 sheets), 12880 (KUN 2 sheets, PE 2 sheets), Yuexi, *Sichuan Economic Pl. Exped.* (59) 3905 (PE 2 sheets); XIZANG: Bomi, T. S. Ying & D. Y. Hong 650120 (PE 2 sheets), Gyirong, *C. C. Ni et al.* 2352 (PE 2 sheets), *Qinghai-Xizang Exped.* 6375 (KUN 2 sheets, PE 2 sheets), *C. Y. Wu et al.* 75-557 (KUN 2 sheets, PE 2 sheets), *Xizang Drug Exped.* 77 (PE), 390 (PE), Yadong, *G. X. Fu* 449 (PE), *Qinghai-Xizang Exped.* 74-2292 (KUN 2 sheets, PE 2 sheets), 74-2483 (KUN, PE 2 sheets), *Qinghai-Xizang Exped.* (Suppl.) 750121 (KUN 2 sheets, PE 2 sheets), *Xizang Exped.* 61 (PE), Zayu, *Qinghai-Xizang Exped.* 9996 (KUN, PE), 10737 (KUN, PE), 10794 (KUN, PE); YUNNAN: Atungze [Degen], *K. M. Feng* 4047 (KUN), 5478 (KUN 2 sheets), 5638 (KUN 2 sheets, PE 2 sheets), 6164 (KUN 2 sheets, PE 2 sheets), 6336 (KUN 2 sheets, PE 2 sheets), 8857 (KUN, PE 2 sheets), 23971 (KUN 3 sheets), 23863 (KUN 2 sheets), T. T. Yu 7844 (A 2 sheets, KUN, PE), 9912 (KUN 2 sheets), 10487 (A 2 sheets, KUN, PE), Beima Shan, *G. Forrest* 13846 (A), Binchuan, *W. T. Wang* 644 (KUN 2 sheets), Chienchuan [Jianchuan]-Mekong divide, *G. Forrest* 21503 (A 2 sheets, US), 23084 (PE 2 sheets), Chungtien [Zhongdian], *R. C. Ching* 20070 (A, KUN 2 sheets), 21835 (A, KUN), 23060 (KUN 2 sheets), *K. M. Feng* 1203 (A, KUN 2 sheets, PE), 1814 (A, KUN 2 sheets, PE), 2313 (A, KUN 2 sheets, PE), 21039 (KUN, PE), *G. Forrest* 12626 (PE), *H. Handel-Mazzetti* 6850 (A WU 2 sheets, US), *J. F. Rock* 17287 (A 2 sheets, NY), T. T. Yu 13552 (A 2 sheets, PE), 13573 (A 2 sheets, KUN 2 sheets, PE), 13578 (PE), 13952 (KUN 2 sheets), 14918 (A 2 sheets, KUN, PE), Degen, *K. M. Feng* 8837 (KUN), 22363 (KUN 3 sheets), *Qinghai-Xizang Exped.* 3598 (KUN 2 sheets, PE 2 sheets), *Yunnan Tropical Resource Exped.* 23971 (PE), Dongchuan, *Northeast Yunnan Exped.* 589 (KUN), 590 (KUN), Fumin, *P. Y. Chiu* 58779 (KUN), Gongshan, *K. M. Feng* 6913 (KUN 2 sheets, PE 2 sheets), 24683 (KUN 2 sheets), 24678 (KUN 2 sheets), *Qinghai-Xizang Exped.* 7521 (KUN 2 sheets, PE 2 sheets), 9984 (KUN 2 sheets, PE), *Yunnan Tropical Resource Exped.* 24678 (PE 2 sheets), Heqing, *R. C. Ching* 24185 (KUN, PE 2 sheets), Kunming, *R. S. Ferris & Y. C. Hsu* 12119 (MO), Lijiang, *Hengduan Mt. Exped.* 2421 (PE 2 sheets), *Sino-Brit.* 1985 *Exped.* 462 (KUN), 585 (KUN), *Q. E. Yang* 86264 (KUN), *S. W. Yu* 22819 (KUN), 25315 (KUN), 22744 (KUN), *S. W. Yu & A. L. Zhang* 100409 (KUN 2 sheets), 100408 (KUN 2 sheets), 100807 (KUN 2 sheets), *Yunnan Tropical Resources Exped.* 22744 (KUN, PE 2 sheets), Likiang [Lijiang], *K. M. Feng* 270 (A 2 sheets, KUN), 21634 (KUN, PE), *C. W. Wang* 71385 (A, KUN, PE 2 sheets), Luchuan [Luquan], *Y. P. Chang* 548 (PE), Mekong-Salwin divide, *G. Forrest* 11108 (A), 14346 (A), 16946 (A), 19498 (A), 20624 (A), T. T. Yu 23162 (A 2 sheets, PE 2 sheets), Salween & Irrawadi Valley, *H. Handel-Mazzetti* 9118 (WU), Tengchuan [Dengchuan], *C. Schneider* 2684 (A 2 sheets, GH 2 sheets), Weisi [Weixi], *K. M. Feng* 4303 (KUN 3 sheets, PE), 4070 (KUN 2 sheets, PE 2 sheets), 8839 (KUN), *C. W. Wang* 68217 (A, PE 2 sheets), Weixi, *P. I. Mao* 177 (KUN 2 sheets, PE), 821 (KUN 2 sheets, PE), without location, *G. Forrest* 19122 (A 2 sheets), *H. Handel-Mazzetti* 6406 (WU), *E. E. Maire* 522 (A), *P. S. Ten s.n.* (P), *H. T. Tsai* 57383 (A 2 sheets), T. T. Yu 7467 (IBSC), Zhongdian, *W. T. Wang* 288 (KUN 2 sheets), *Zhongdian Exped.* 1983 (KUN 2 sheets, PE), 2345

(KUN 2 sheets), 2514 (KUN 2 sheets). **HIMALAYAS:** Without location, *T. Thomson* s.n. (GH), *W. Koelz* 3189 (A, US), *R. R. Stewart* 15913 (A, US), 16643 (US). **INDIA:** Chamba, *R. N. Parker* s.n. (A), Darjeeling, *H. Kanai et al.* 721442 (A 2 sheets, NA), Dehra Dun, *R. M. Fleming* 438 (A), Kanjilal, *C. S. Rawat* 24 (A), 25 (A), Kumaon, *R. Strachey & J. E. Winterbottom* 6 (GH), *T. Thomson* 663 (BM), Nainital, *P. N. Patel* s.n. (NA), Punjab, *W. Koelz* 4859 (A, US), Simla, *R. N. Parker* 2993 (A), s.n. (A), Tehri, *W. Koelz* 22208 (NA). **MYANMAR:** *F. K. Ward* 9327 (A). **NEPAL:** *J. L. Creech & F. de Vos* 1140 (NA), 1260 (NA), 1294 (NA), *H. Hara et al.* 6300410 (A), *D. H. Nicolson* 2559 (US), 3370 (US), *H. Ohba et al.* 8310025 (A), *N. V. Polunin et al.* 1009 (A), 2164 (A 2 sheets), 4195 (A). **SIKKIM:** *G. A. Gammie* s.n. (A).

This is a very distinctive species with strong characters in the leaves, flowers and fruit which easily separate it from the others, and no synonyms are extant for it. The report of this species from Guangxi (Flora of Sichuan 4: 274. 1988 and Vascular Plants of the Mt. Hengduan 1: 1101. 1993) cannot be corroborated in the present work.

120. *Euonymus tsoi* MERR., *Sunyatsenia* 1(4): 198. 1934. TYPE: CHINA. Kwangtung: Lokchong, May 29, 1929, *C. L. Tso* 20824 (A!).

- = *E. longifolia* CHAMP. ex BENTH., *Hooker's J. Bot. Kew Gard. Misc.* 3: 332. 1851, non Medic. 1782, nom. illegit. superfl. TYPE: CHINA. Hongkong: *C. L. Champion* s.n. (not seen, photo A!).
- = *E. kwangtungensis* C. Y. CHENG, *Icon. Cormphyt. Sin. Suppl.* 2: 226. 1983, nom. nov.

Evergreen shrub, 1-5 m tall; branches terete, sturdy, twigs gray to light green-gray, with several striations on young branches. Leaves coriaceous, long lanceolate or elliptic-lanceolate, 13-18.5 x c. 3 cm, apex acuminate, base cuneate or attenuate, margin remotely serrulate, lateral veins 10-12; petiole sturdy, 6-14 mm long. Peduncle 3-7 cm long, with several flowers; pedicel c. 5 mm long. Flower 4-merous, dark. Capsule obovate, with 5 angles and slightly deep grooves, brown or yellow-brown to red-brown, 1.0-1.4 cm in diam., c. 10 mm long, opening into 4 lobes at maturity; seeds ovoid, dark brown, covered by orange-red aril.

Phenology. Flowering: April to July; Fruiting: August to December.

Distribution: China (Guangdong, Guangxi); alt. 60-1150 m, in densely mixed forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGDONG: Deqing, *Y. G. Liu* 982 (IBSC, MO); Dinghu, *K. C. Ting & G. L. Shi* 288 (MO), Enping, *M. X. Huang* 110517 (MO), Fengkai, *Fengkai Exped.* 4749 (MO), Gaopeng, *M. X. Huang* 110689 (MO), Gaoyao, *Y. G. Liu* 1670 (MO), Gaozhou, *P. C. Zhou* 82306 (MO), Hongkong, *S. Y. Hu* 10897 (A, PE, US), *Rev. J. Lamont* 124 (BM), *C. Wang* 32384 (A), Huiji, *Y. G. Liu* 3034 (IBSC, MO, PE), Lianping, *Y. G. Liu* 228 (IBSC, MO), Maoming, *N. Liu et al.* 1048 (MO), *L. Deng* 2136 (MO), Pan Ling Tsze, *W. Y. Chun* 5864 (A), Renhua, *L. Deng* 7309 (MO), Ruyuan, *Y. G.*

Liu 310 (MO), Yunfu, C. Wang 37024 (MO); GUANGXI: Damiaoshan, T. C. Chen 290 (MO), S. H. Chun 15868 (MO), 16881 (MO).

121. *Euonymus verrucosa* SCOP., Fl. Carniol. ed 2, 1: 166. 1772. TYPE: EUROPE. S. Europe (not seen). [Fig. 74]

- = *E. europaea* L. var. *leprosa* L. fil., Suppl. Pl. 154. 1781.
- = *E. pannonica* SCOP. ex C. F. LUDWIG, Neu Wilde Baumz. 19. 1783.
- = *E. verrucosa* SCOP. f. *laevifolia* BECK., Ann. K. K. Naturhist. Hoffmus. 2: 87. 1887.
- = *E. voitii* MILL., Graebn. & fil., Beitr. Naurdenkmapfl. 10: 225. 1925.
- = *E. pauciflora* MAXIM., Prim. Fl. Amur. 74. 1859. TYPE: CHINA. Mandshuria: ad fl. Amur, 1855, A. G. Schrenk s.n. (A! GH!).
 - ≡ *E. verrucosa* SCOP. var. *pauciflora* (MAXIM.) REGEL, Fl. Ussur. 41. 1861.
- = *E. verrucosa* SCOP. var. *chinensis* MAXIM., Mem. Acad. Sci. St. Petersburg. 74. 1859. SYNTYPES: CHINA. Kansu: G. N. Potanin s.n. (not seen); Shaanxi: G. Giraldi 228 (not seen).
 - ≡ *E. pauciflora* MAXIM. var. *chinensis* (MAX.) REHDER, J. Arnold Arbor. 7: 204. 1926.
- = *E. verrucosa* SCOP. var. *angustifolia* SYR., Bjull. Moskovsk. Obsc. Isp. Prir., Otd. Biol. 40: 48. 1931.
- = *E. oligosperma* OHWI, Acta Phytotax. Geobot. 5: 185. 1936. TYPE: JAPAN. Hondo: D. Hoshi s.n. (not seen).
- = *E. pauciflora* MAXIM. var. *japonica* KOIDEZ. ex OHWI, Acta Phyt. Geobot. 5: 155. 1936.
- = *E. verrucosa* SCOP. f. *transsilvanica* KÁRPÁTI, Borbasia 1:100. 1939.
- = *E. integerrima* PROKH., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 14: 240. 1951. TYPE: CHINA. Kansu (parte orientali): trajectu inter pagos. Meping et Wuping, 3 July 1885, G. N. Potanin s.n. (LE? not seen).
- *E. verrucosa* SCOP. var. *genuina* SYR., Bjull. Moskovsk. Obsc. Isp. Prir., Otd. Biol. 40: 48. 1931, nom. inval.

Deciduous shrub, several meters tall; branches and twigs gray-green to gray-brown, terete, densely verrucose. Leaves thickly chartaceous, ovate-elliptic or oblong-elliptic, sometimes rhombic, 5-7 x 2-3 cm, apex obtuse or acuminate, base cuneate or attenuate, margin crenulate, slightly pubescent, lateral veins 5-8 pairs, curving forward, disappearing before reaching the margin; petiole very short or blade subsessile, sometimes only 2-3 mm long. Peduncle 2-4 cm long, solitary or several clustered, axillary, with 1-3 dichotomous branches and several flowers, very slender; pedicel 5-10 mm long. Flower 4-merous. Sepals semiround. Petals pinkish to dark red, orbicular, 7-10 mm in diam. when fully open. Capsule subglobose, 4-angled, brown or yellow-brown to red-brown, c. 1.0 cm in diam., 8 mm long, opening into 4 lobes at maturity; seeds ovoid, dark brown, half covered by orange aril.

Phenology. Flowering: May to July; Fruiting: August to November.



Fig. 74. *Euonymus verrucosa* Scop. – 1. flower branch; 2. flower; 3. fruit branch.

Distribution: China (Heilongjiang, Gansu, Jilin, Liaoning, Ningxia, Qinghai, Shanxi); Japan, Korea, Russian (European & Far East), C & N Asia, Europe; alt. 200-1,300 m, in woodland and forests; common.

SPECIMENS EXAMINED: **AUSTRIA:** *A. Rehder s.n.* (A). **BULGARIA:** *A. Biolcheff s.n.* (A). **CAUCASUS:** *L. Plotrikova s.n.* (NA). **CHINA:** HEILONGJIANG: Acheng, *G. Z. Wang et al.* 505 (PE), Dailing, *K. S. Hao* 16165 (PE), *T. N. Liou et al.* 7021 (PE), Hsiaoling [Xiaoling], *A. K. Skvortsov s.n.* (A), Maoershan, *G. Z. Wang et al.* 57 (PE 2 sheets), Media, *S. Korshinsky s.n.* (A), *C. J. I. Maximowicz s.n.* (A); Raohe, *G. Z. Wang et al.* 636 (PE), Shangzhi, *Y. C. Chu* 133 (PE), *T. N. Liou et al.* 7416 (PE), *G. Z. Wang et al.* 232 (PE), Shidaohe, *K. S. Hao* 16042 (PE), 16057 (PE 2 sheets), 16096 (PE), Yichun, *T. N. Liou et al.* 2987 (PE), 7122 (PE); JILIN: Antu, *P. Y. Fu et al.* 1283 (PE), *T. N. Liou* 3995 (PE), *Yanbian Second Group* 40 (PE), 194 (PE), Changbaishan, *J. J. Chien et al.* 739 (PE), *T. N. Liou et al.* 1717 (PE), *Yanbian First Group* 305 (PE), Fusong, *T. N. Liou* 1368 (KUN), *Y. L. Chou et al.* 1357 (PE), 1368 (PE), *Tonghua Group* 254 (PE 2 sheets), Helong, *Yanbian Second Group* 786 (PE), 888 (PE), *C. S. Wang* 2531 (PE), Jilin, *Forestry College* 85 Grade 8 (MO), 19 (MO), 40 (MO), 137 (MO), *Y. C. Ma* 10218 (PE), Hunchun, *P. Y. Fu et al.* 683 (PE), Linjiang, *S. X. Li et al.* 1070 (PE), *T. N. Liou* 781 (KUN, PE 2 sheets), Tonghua [Tonghua], *F. H. Chen* 622 (A); LIAONING: Benxi, *C. Wang et al.* 1341 (PE), 1522 (PE), Huanren, *S. C. Cui & Y. C. Chu* 90 (PE); NORTH CHINA: without location, *Wm. Purdom* 5 (A); NORTHEAST CHINA: without location, *P. H. & J. H. Dorsett* 5999 (PE, US), *H. W. Kung* 1795 (NY), *V. L. Komarov* 1039 (A), *N. Dalezenski* 1039 (NY); SHANXI: Lungchow, *J. Hers* 2355 (A), Lu See, *G. Giraldo s.n.* (A). **KOREA:** Kangwon-do, *A. Boratynski* 269 (A), 597 (A), Kanrasan, *K. Uno* 23682 (A), Hogen, *N. Kankyo* 8968 (A), *T. Nakai* 2066 (A), *E. H. Wilson* 10398 (A 2 sheets), North Heiano, *E. H. Wilson* 8623 (A), 9137 (A), Ryanggang-do, *A. Boratynski* 680 (A), Seoul, *J. G. Jack s.n.* (A), without location, *Plant Exp. Korea* 204 (NA), *E. H. Wilson* 9474 (US), 10667 (A). **RUSSIA:** Far East, *A. K. Skvortsov s.n.* (A), Primorsk, *N. Palczewsky* 3628 (US). **GERMANY:** *R. Gross* 6880 (US). **HUNGARY:** *O. Leonhardt s.n.* (GH). **LATVIA:** *J. Grentved* 64 (GH). **POLAND:** *A. Jasiewicz* 244 (A). **ROMANIA:** *M. Badea s.n.* (A). **RUSSIA:** *V. V. Makarov s.n.* (A), *A. Sazonov s.n.* (NA). **SILESIA:** *C. Baenitz* 47 (GH). **SLOVAKIA:** *K. Domin & V. Krajina s.n.* (GH). **YUGOSLAVIA:** *E. Murray* 860 (A).

The validity of the two species *E. verrucosa* and *E. pauciflora* has been disputed for a long time. They are not easily separable in the present work, and the only difference so far that seems sensible is that the latter occurs only in the northern part of East Asia, and the former species is found from C China to C Asia and Europe. However, this does not seem to justify them as valid species in terms of this review of the whole genus.

122. *Euonymus viburnoides* PRAIN, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 73(2): 194. 1904. SYNTYPES: SIKKIM. *G. King s.n.* (not seen); Darjeeling: *Gage s.n.* (not seen); Rungyoon: *G. King s.n.* (not seen); Pasheting: *Grieve s.n.* (not seen). [Fig. 75]

= *E. crenata* CHEN H. WANG, *Contr. Bot. Surv. Northw. China* 1: 31. 1939. TYPE: CHINA. Yunnan: on the hills between the Yangpi valley and Taipingpu, alt. 9,000 ft, Jan. 1922, *G. Forrest* 21063 (A! P! PE!).

= *E. saxicola* LOES. & REHDER in SARG., *Pl. Wilson.* 1: 491. 1913. TYPE: CHINA. Western Szechuan: Mupin, alt. 1300-1600 m, Oct. 1910, *E. H. Wilson* 4378 (A! US!).

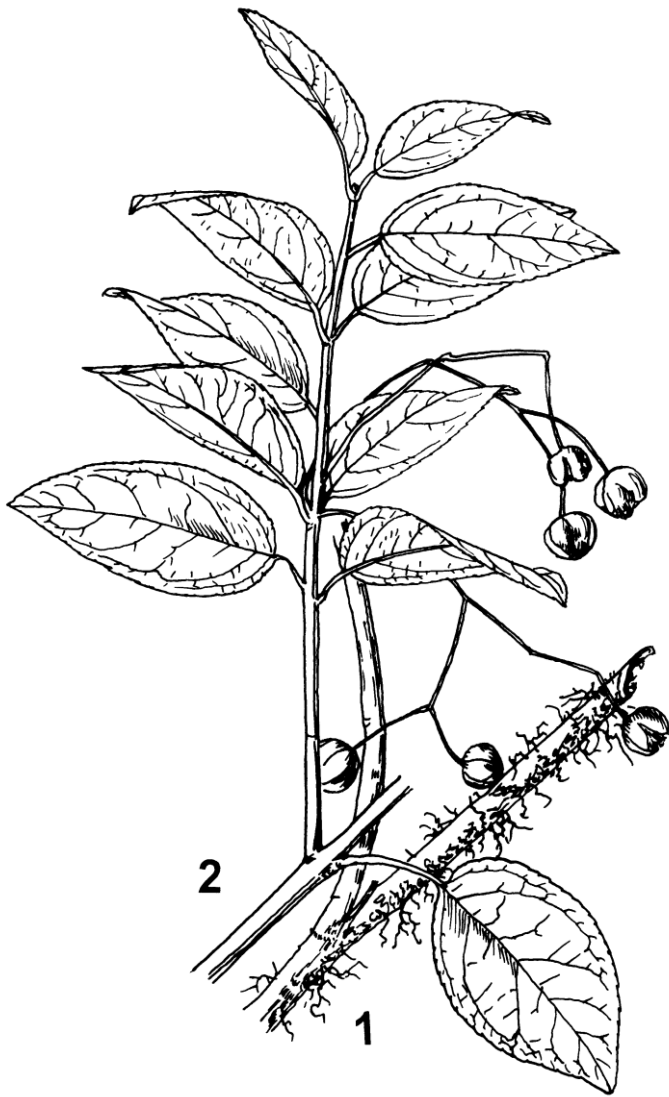


Fig. 75. *Euonymus viburnoides* PRAIN – 1. plant; 2. fruit branch.

= *F. forrestii* COMBER ex HAND.-MAZZ., Symb. Sin. 7: 663. 1933. TYPE: CHINA. Yunnan: Passes Tschiangschel zwischen Salwin und Irrawadi, lat. 27.52 N, alt. 3500-3800 m, 5 July 1916, *H. Handel-Mazzetti* 9388 (A! WU!) et COMBER, Notes Roy. Bot. Gard. Edinburgh. 18: 242. 1934. TYPE: CHINA. Yunnan: the

hills south of Tengyueh, lat. 25.00 N, long. 98.30 E, alt. 7,000 ft, Apr. 1925, G. Forrest 26318 (A! US!).

- = *E. chengkangensis* CHEN H. WANG, Bull. Fan Mem. Inst. Biol. 10: 283. 1941. TYPE: CHINA. Yunnan: Chengkang, C. W. Wang 72472 (A! PE! 4 sheets).
- = *E. leishanensis* Q. H. CHEN, Acta Bot. Yunnan. 21(2): 168, 1999. Type: China: Guizhou, Leishan, Leigongping Mt., under dense forests, alt. 2000 m, 1982-10-19, Y. K. Li et al 11031 (Holotype, HGAS, not seen).
- *E. saxicola* LOES. & REHDER var. *petiolata* C. Y. CHENG, ms., nom. inval. TYPE: CHINA. Sichuan: Huili; no further information.

Deciduous shrub to small tree, 2-6 m tall; branches and twigs gray-green to gray-brown, terete, sturdy, with striations. Leaves thickly chartaceous or thinly coriaceous, ovate, ovate-elliptic or oblong-ovate, highly variable, 6-10 x 2-4 cm, apex obtuse or acute, base cuneate or suborbicular, margin crenulate to crenate, lateral veins 6-8 pairs, curving forward, disappearing before reaching the margin; petiole 4-12 mm long. Peduncle 3-4 cm long, with 1-3 dichotomous branches and several to many flowers; pedicel 5-10 mm long. Flower 4-merous. Sepals semiround. Petals chocolate-red, 5-6 mm in diameter. Capsule subglobose, with 4 small striations or angles, brown or yellow-brown to red-brown, c. 1 cm in diam., 1.0-1.2 cm long, opening into 4 lobes at maturity; seeds 1-2 in each locule, ellipsoid, dark brown, base or whole covered by orange aril.

Phenology. Flowering: May to July; Fruiting: July to November.

Distribution: Bhutan, China (Guizhou, Sichuan, Yunnan), India, Myanmar, Sikkim; alt. 1,300-3,400 m, in woodlands and forests; occasional.

SPECIMENS EXAMINED: **CHINA:** GUIZHOU: Anlong, *Guizhou Exped. 3068* (PE); SICHUAN: Baoxing, Y. Chen 5421 (NAS), M. G. Gao et al. 116422 (PE), K. L. Chu 3222 (PE), T. H. Tu 4992 (PE), 2069 (PE), Huili, C. Schneider 580 (A), T. T. Yu 1511 (A, PE 2 sheets), Meigu, *Sichuan Economic Pl. Exped. (59) 5990* (KUN, PE 2 sheets), Tianquan, *Erlangshan Exped. 402* (SZ 3 sheets); YUNNAN: Dongchuan, E. E. Maire s.n. (A), Huizhe, P. I. Mao 2061 (KUN 2 sheets, PE), Jingdong, S. Y. Bao 360 (KUN 2 sheets), P. Y. Chiu 53811 (KUN 2 sheets, PE 2 sheets), M. K. Li 1263 (KUN 2 sheets, PE), 2057 (KUN 2 sheets), S. G. Xu 4831 (KUN 2 sheets), Q. A. Wu 9336 (KUN 2 sheets), Longling, C. W. Wang 90149 (KUN 2 sheets), Luchun, P. I. Mao 1541 (KUN 2 sheets, PE), 1871 (PE), 1875 (KUN 2 sheets), 1920 (KUN 2 sheets, PE), T. L. Min et al. 23 (KUN), *Qinghai-Xizang Exped. 6341* (KUN 2 sheets, PE 2 sheets), D. D. Tao 802 (KUN 2 sheets, PE), Marlipo [Malipo], K. M. Feng 12847 (A, PE), 13975 (A, KUN 2 sheets, PE); Mengtze [Mengzhi], A. Henry 9414 (A, NY), Pingbian, P. I. Mao 3481 (KUN 2 sheets, PE), Shuangjiang, J. S. Xin 1207 (KUN 2 sheets, PE), Shunning [Fengqing], T. T. Yu 16494 (A, KUN 2 sheets, PE 2 sheets), Weixi [Weixi], K. M. Feng 3538 (KUN 3 sheets, PE), 4161 (KUN 2 sheets, PE), C. W. Wang 68251 (A, PE 2 sheets), 68252 (PE 2 sheets), Wenshan, H. T. Tsai 58-8221 (KUN 2 sheets), Without location, G. Botati 3313 (US), Yangbi, R. C. Ching 25406 (KUN 2 sheets, PE). **INDIA:** Assam, F. K. Ward 11550 (BM). **MYANMAR:** F. K. Ward 8858 (A), 13030 (BM), 13491 (BM), 20866 (A 2 sheets), 21036 (BM). **SIKKIM:** T. Anderson 1014 (GH).

This species develops small leaves at high altitude, and is much different in other locations. However, the flower and capsule is identical with the scope of the species. The reports of the species from Guangxi (Flora of Sichuan 4: 294. 1988 and Vascular Plants of the Mt. Hengduan 1: 1097. 1993) cannot be substantiated in the present work.

123. *Euonymus walkerii* WIGHT, Illustr. Ind. Bot. 1: 178. 1840. SYNTYPES. SRI LANKA. *E. P. Walker s.n.* (GH!), *R. Wight s.n.* (K!).

– *E. zeylanica* MOON, Cat. Pl. Ceyl., in obs. nom. inval.

Shrub, c. 2 m tall; branches terete, sturdy, dark brown to brown, twigs green, with 4 striations. Leaves thinly coriaceous, elliptic or oblong-elliptic, 6.5-7.5 x 2-3 cm, apex acute or acuminate, base cuneate or attenuate, margin mostly entire, remotely crenate above, lateral veins indistinct; blade sessile or subsessile with petiole c. 2 mm long. Peduncle c. 2 cm long, with 1-2 dichotomous branches and several flowers; pedicel 0.5-1.5 cm long. Flower 5-merous (not seen). Capsule obovate, with 5 angles and grooves, red when fresh, brown or yellow-brown when dry, c. 1.1 cm in diam., c. 1 cm long when fully developed, opening into 5 lobes at maturity; seed ellipsoid, dark brown, wholly covered by orange-red aril.

Phenology. Unknown.

Distribution: Sri Lanka; alt. 150-500 m, in wet mixed forests; rare.

SPECIMENS EXAMINED: **SRI LANKA:** Galla, *G. Davidse 7841* (K), Kalutara, *D. B. Sumithraarachchi 1001* (K), Kandy, *M. Jayasuriya et al. 493* (K, US), *502* (US), *S. Wass. 1084* (K, US), *1776* (GH), *1811* (GH), *1872* (GH, US), Niniduma, *A. Kostermans 24944* (US), *25488* (K), without location, *N. Balakrishnan 240* (US), *253* (US), *290* (US), *L. H. Cramer 4298* (US), *G. H. K. Thwaites 478* (US 3 sheets), *S. Waas 215* (US), *R. Wright 478* (GH).

124. *Euonymus wrayi* KING, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65, 2: 344. 1896. SYNTYPES: MALAYA. Perak, *L. Wray s.n.* (not seen); Kota Glangii, *H. N. Ridley s.n.* (not seen).

= *E. rufula* RIDLEY, Journ. As. Soc. Straits 75: 19. 1917.

Evergreen shrub, to 3 m tall; branches terete, dark brown to brown, twigs green, with 4 striations. Leaves thinly coriaceous or thickly papyraceous, elliptic or oblong-elliptic, 7-9.5 x 2.5-3.5 cm, apex acute, acuminate or shortly caudate, base cuneate or attenuate, margin sparsely serrate at apex, entire near base, lateral veins 5-7 pairs, webbing before reaching the margin; petiole 2-3 mm long. Peduncle 2-3 cm long, slender, with 1-2 dichotomous branches and several flowers, pedicel 1-1.5 cm long. Flower 5-merous (not seen). Capsule obovate, with 5 angles and grooves, base attenuate, brown or dark-brown when dry, 1.5-1.8 cm in diam., c. 1.5 cm long when fully developed, opening into 5 lobes at maturity; seeds ellipsoid, dark brown, partly covered by orange aril.

Phenology. Flowering: May; Fruiting: August.

Distribution: Indonesia, Malaysia; in wet peaty soil; rare.

SPECIMENS EXAMINED: **MALAYSIA:** Cameron Highlands, *W. L. Chew 841* (A), North Sumatra, *W. J. J. O. Wide & B. E. E. Wilde-Duyfies 12218* (US), *14356* (US).

This species is very close to *E. indica*, from which it can be distinguished only by the larger fruit and irregularly denticulate petals in the latter.

125. *Euonymus wui* J. S. MA, Harvard Pap. Bot. 10: 97, fig. 13. 1997. TYPE: CHINA, Yunnan: Marlipo, Chungdiza, alt. 1,900-2,100 m, *K. M. Feng 12708* (Holotype: A!, Isotypes: KUN! 2 sheets, PE!); Wenshan, Lao Jun Shan, *K. M. Feng 11214* (A! KUN! NAS!). [Fig. 76]

Deciduous shrub, 2-3 m tall (5-6 ft); branches terete, slender, dark brown to brown, twigs slender, with striations. Leaves coriaceous, elliptic, 5-6 x 1.5-4 cm, apex acute or caudate, base cuneate or attenuate, margin entire, lateral veins invisible; petiole short, 3-4 mm long. Peduncle very short, c. 5 mm long, with 1-2 dichotomous branches and few flowers; pedicel c. 1.5 cm long. Flower 4-merous (not seen). Sepals triangular, persistent. Capsule obovoid, with 4 angles and shallow grooves, red when fresh, brown or yellow-brown when dry, c. 1 cm in diam., 2-2.8 cm long when fully developed, opening into 4 lobes at maturity; seeds 2-3 in each locule, ovoid to globose, dark brown.

Phenology. Flowering: Unknown; Fruiting: August.

Distribution: China (Guangxi, Yunnan); alt. 2,000-2,400 m, in mixed forests; rare.

SPECIMENS EXAMINED: **CHINA:** GUANGXI: Mubian, *Z. D. Li 602179* (IBSC).

126. *Euonymus yunnanensis* FRANCH., Bull. Soc. Bot. France 33: 454. 1886. TYPE: CHINA. Yunnan: in pratis et dumetis as Mochitchin, supra Tapintze, prope Tali, 9 April, 1885, *P. J. M. Delavay 1527* (GH!). [Fig. 77]

= *E. linearifolia* FRANCH., Bull. Soc. Bot. France 33: 455. 1886. SYNTYPES: CHINA. Yunnan: in pratis et dumetis ad Mo-che-tchin supra Tapin-tze, alt. 1,500 m, 15 April. 1885 (ut 1884), *P. J. M. Delavay 921* (not seen, merotype A!, photo A!), *1527* (GH! 2 sheets, photo A!).

= *E. mariei* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 260. 1914, p.p. TYPE: CHINA. Yunnan: Siaohe, *E. E. Maire s.n.* (not seen, merotype A!, photo A!).

= *E. decora* W. W. SM., Notes Roy. Bot. Gard. Edinburgh 10: 32. 1917. TYPE: CHINA. Yunnan: Ghi Shan, east of Tali Lake, Lat. 25.40 N, alt. 7,000 ft, August 1914, *G. Forrest 13529* (PE!).

= *E. pulvinata* CHUN & F. C. HOW, Acta Phytotax. Sin. 7(1): 50, pl. 16. 1958. TYPE: CHINA. Yunnan: Chengkiang, Aug. 9, 1939, *H. Wang 41554* (A!).

– *E. pinchuanensis* LOES., Pflanzenfam. 20B: 121. 1942, nom. nud.



Fig. 76. *Euonymus wui* J. S. MA – 1. fruit branch; 2. fruit in open; 3. seed.

Evergreen shrub, 2-3 m tall; branches terete, sturdy, dark brown to brown, twigs slender, with striations. Leaves coriaceous, linear to elliptic or obovate-elliptic, highly variable, 5-9 x 6-24 mm, apex acute or obtuse, base cuneate or attenuate, margin remotely crenate and revolute, lateral veins invisible; petiole short, 3-5 mm long. Peduncle 2-3.5 cm long, usually only the middle flower developed; pedicel 1.5-2.5 cm long. Flower 5-merous. Sepals triangular,



Fig. 77. *Euonymus yunnanensis* FRANCH. – 1. fruit branch; 2. ovary; 3. cross section of ovary.

persistent. Petals pale green, ovate, 2-2.5 cm in diam., revolute backwards, apex obtuse and entire. Capsule rhombic to obrhombic, with 5 angles and small grooves, red when fresh, brown or yellow-brown when dry, c. 1.2-1.4 cm in diam., 1.5-1.8 cm long when fully developed, opening into 5 lobes at maturity; seeds usually 2, ellipsoid, dark brown, base covered by orange-red aril.

Phenology. Flowering: March to April; Fruiting: May to July.

Distribution: China (Sichuan, Yunnan); alt. 1,700-2,400 m, in woodlands and forests; common.

SPECIMENS EXAMINED: **CHINA:** SICHUAN: Dukou, *Qinghai-Xizang Exped.* 11359 (KUN 2 sheets, PE 2 sheets) Huili, *H. Handel-Mazzetti* 794 (WU), Miyi, *Sichuan Economic Pl. Exped.* (59) 81 (KUN), Yanbian, *S. K. Wu* 217 (KUN, SZ), 455 (KUN), Yanyuan, *Nanshuibeidian Exped.* 6008 (PE); YUNNAN: Binchuan, *Forest Institute Team* 10 (KUN), 22 (KUN), *Jinshajiang Exped.* 63-6634 (KUN 2 sheets, PE 2 sheets), *H. C. Wang* 1804 (KUN), *Wood Oil Plant Team* 65-608 (KUN 2 sheets), 65-662 (KUN 2 sheets), *J. Zhou* 1001 (KUN 2 sheets), Chuxiong, *1984 Sino-Amer. Exped.* 1283 (A, KUN), Eshan, *Eshan Team* 88-03 (KUN 2 sheets), Fumin, *O. Scharlz* 11 (A, US, WU), Huaning, *Y. Tsiang & H. Wang* 16245 (A), 16246 (A), Huaping, *Nanshuibeidiao Exped.* 6276 (PE), Kienshuei [Jianshui], *H. T. Tsai* 53107 (A, KUN, PE), Kunming, *P. Y. Chiu* 57832 (KUN), *T. N. Liou* 16613 (PE), *C. W. Wang* 62847 (A), 62848 (A, KUN, PE 2 sheets), Kunyang, *T. N. Liou* 14796 (PE), Laojianshan, *Sichuang-Yunnan-Guizhou Connection Team* 425 (PE), Lufeng, *Jinshajiang Exped.* 4003 (KUN 2 sheets), *K. G. Limpricht* 848 (WU), Lufong [Lufeng], *H. T. Tsai* 53555 (A, KUN, NAS, PE), Peyen [Dayao], *F. Ducloux* 4746 (P), *P. S. Ten* 44 (A), 381 (A), Pinchuan [Binchuan], *H. T. Tsai* 52938 (A, KUN, PE), 52987 (A, SZ), Shiping, *Y. Tang* 1039 (KUN 2 sheets), Shuangbai, *W. Q. Yin* 639 (KUN 2 sheets, PE), 649 (KUN), 655 (KUN 2 sheets, PE 2 sheets), 673 (KUN 2 sheets, PE), 674 (KUN), 862 (KUN 2 sheets, PE), Yimen, *Sichuang-Yunnan-Guizhou Connection Team* 269 (PE), *W. Q. Yin* 309 (KUN 2 sheets, PE), Yongsheng, *Nanshuibeidiao Exped.* 6293 (KUN, PE), without location, *P. J. M. Delavay* 145 (US), 921 (US), *H. Handel-Mazzetti* 438 (WU), 6170 (WU), *P. S. Ten* s.n. (P), 105 (A), *C. Schneider* 300 (A), 524 (A).

The specimens (duplicates) of *P. J. M. Delavay* 1527 were separated by FRANCHET (1886) in his work and published as two different species. However, the leaves of this species are highly variable, from linear to ovate, while the flower and fruit are always constant, and there is no reason to treat it divided into two species. Another character of the species is the ovule number usually more than 2, but usually only 2 develop into seeds in each locule. The species was reported from Xizang (C. Y. CHANG, *Flora of Sichuan* 4: 285. 1988) and Guizhou (Y. R. LI, *Vascular Plants of the Mt. Hengduan* 1: 1101. 1993), but those reports cannot be verified in the present work.

Note: Species 127-129 are temporarily included in this section.

127. *Euonymus prismatomeridoides* C. Y. WU ex J. S. MA, *Harvard Pap. Bot.* 3(2): 232, fig. 4. 1998. TYPE: CHINA. Yunnan: Xichou Xian, Fa Dou, Cao Guo Shan, alt. 1620 m, May 3, 1964, *S. Z. Wang* 17 (Holotype: KUN!); l.c., Nan Chang Xiang, Leng Shui Gou, alt. 1410 m, May 18, 1964, *S. Z. Wang* 357 (KUN! 2 sheets). [Fig. 78]

Shrub, 2-4 m tall; branches gray-black, terete, glabrous; twigs green to pale brown, 4-angled, glabrous. Leaves long-subulate or broadly linear, to 14 x less than 2 cm, main vein impressed above and prominent below, lateral veins

indistinct and reticulated before reaching the margin, long-attenuate at apex, cuneate at base; with indistinctly and sparsely denticulate margin; petiole c. 5 mm long. Cymes axillary or terminal on young twigs, usually with 3-5 flowers; peduncle less than 3 cm long. Flower 5-merous. Sepals 5, semiorbicular, c. 2 x 2 mm. Petals 5, orbicular, purple-red when fresh, 3-4 x 3-4 mm, shortly attenuate at base, nearly entire or with shortly crenulate, not ciliate. Stamens 5; filament short; anther-sacs two, opened. Ovary and fruit not seen.

Phenology. Flowering: May; Fruiting: Unknown.

Distribution: China (Yunnan); in evergreen broadleaf forests; rare.



Fig. 78. *Euonymus prismatomeridoides* J. S. MA – 1. flower branch; 2. flower.

This species is very similar to *E. laxicymosa* in general, but differs by the short peduncle less than 3 cm long, leaves indistinctly and sparsely serrulate, main vein impressed above and prominent below, lateral veins indistinct and reticulated before reaching the margin, petals purple-red when fresh, orbicular or nearly orbicular, entire, not ciliate.

In my first paper on *Euonymus* (MA 1997), these two specimens (types here) were misidentified as *E. laxicymosa*. After further study (see diagnosis above) the differences between them became evident, and should now be separately treated as different species. The species is described here without fruit, which seems unconventional in the genus. However, considering the entire revision of the genus, this species is undoubtedly very peculiar since its present characters could not be matched by any other so far known in the genus (see the original figure). For these reasons, and since fruit is unavailable, the species is temporarily placed here, but once fruiting material becomes available it will undoubtedly be in agreement with the section *Euonymus*.

128. *Euonymus elaeodendroides* LOES., Notizbl. Bot. Gart. Berlin-Dahlem 13: 580. 1937. SYNTYPES: MADAGASCAR. An Flussufer bei Sakaleony und auf dem Plateau von Ikavo, *E. P. Perrier* 5940 (not seen) und 1775 (US!).

Evergreen tree, 15-20 m tall; branches and twigs gray-green to gray-brown, with striations, nodes prominent. Leaves thickly coriaceous, elliptic or oblong-elliptic, 7-10 x 3-4.5 cm, apex obtuse, base subround, margin remotely crenulate, revolute and rigid, lateral veins 6-14 pairs, indistinct, slightly curving forward and disappearing before reaching the margin; petiole 5-7 mm long, sturdy. Peduncle c. 3 cm long, with 1-2 dichotomous branches and several flowers; pedicel 4-7 mm long. Flower 5-merous, 8-9 mm long. Sepals patelliform. Petals ovate. Capsule (not fully mature) 5-angled.

Phenology. Flowering: September to October.

Distribution: Madagascar; rare.

Specimens Examined: **MADAGASCAR:** Without location, *M. H. Perrier* 1755 (US).

Only limited material is available, and further collections are required, especially of fruiting material.

129. *Euonymus pleurostylioides* (LOES.) HUMBERT, Fl. Madagasc. Fam. 116: 6. 1946. TYPE: see below.

Bas.: *E. elaeodendroides* LOES. var. *pleurostylioides* LOES., Notizbl. Bot. Gart. Berlin-Dahlem 8: 580. 1937. TYPE: MADAGASCAR. In Geholzen bei Monongarivo, *E. P. Perrier* 1656 (not seen).

Similar to *E. elaeodendroides*, but young branches 4-angled; leaves 3.2-5.5 x 1.6-2.5 cm.

Distribution: Madagascar.

There are no materials of this Madagascan plant for the present work, but it is a good species and the original description is followed here, with placement in this section until additional information becomes available.

Excluded names

1. *Euonymus acanthodontus* LOES. = *Brexiella longipes* Perr., Bull. Soc. Bot. France 80: 209. 1933.
2. *Euonymus adenophorus* SCORT ex KING = *Lophopetalum oblongifolium* (KING) LOES., Notizbl. Bot. Gart. Berlin-Dahlem 13: 225. 1936.
3. *Euonymus aquifolium* LOES. & REHDER in Sarg., Pl. Wilson. 1: 484. 1913. Type: China, Szechuan, Wa-shan, alt. 2200 m, Nov. 1908, *E. H. Wilson 1366* (A! MO! US!). = *Glyptopetalum aquifolius* (LOES. & REHDER) C. Y. CHENG & .Q. S. MA, FRPS 45(3): 93. 1999.
4. *Euonymus calocarpus* KURZ. = *Glyptopetalum calocarpum* (KURZ.) PRAIN, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 60(2): 209. 1891.
5. *Euonymus calyptratus* PIERRE = *Glyptopetalum calyptratum* (PIERRE) PIERRE in Lecomte, Fl. Indo-Chine 1: 886. 1911.
6. *Euonymus calzadae* LUNDELL, Phytologia 57: 453. 1985. Type: Mexico, Veracruz, *J. I. Calzada 1724* (Holotype: LL!). From the original description "folia alterna", and from the type having the fruit only partly opened at maturity, it is evidently not a member of the genus *Euonymus*, but is newly referable to *Maytenus calzadae* (LUNDELL) J. S. Ma, **comb. nov.**
7. *Euonymus capillaceus* WALL. = *Microtropis bivalvis* WALL. (Lawson in J. D. Hook., Fl. Brit. India 1: 614. 1875).
8. *Euonymus celebicus* KOORD. = *Lophopetalum celebicum* KOORD., Syst. Verz. Herb. Koord. abt 3: 73. 1910-1913.
9. *Euonymus chaudocensis* PIERRE = *Glyptopetalum chaudocense* PIERRE in Lecomte, Fl. Indo-Chine 1: 865. 1911.
10. *Euonymus chinensis* LOUR. = *Gymnopetalum chinense* (LOUR.) MERR., Philipp. J. Sci. 15: 256. 1919.
11. *Euonymus colpoon* LAM. = *Osyris abyssinica* HOCHST. (Harvey & Sonder, Fl. Cap. 5(2): 208. 1825).
12. *Euonymus colpoon* L. = *Cassine capensis* L. var. *colpoon* DC., Prodr. 2: 12. 1825 (Harvey & Sonder, Fl. Cap. 1: 466. 1859-60).
13. *Euonymus cuneifolius* A. GRAY. Type: Cuba?, *C. Wright 1140* (US) = *Maytenus cuneifolius* GRISEB., Cat. Pl. Cub. 54. 1866.
14. *Euonymus euphlebiphyllus* HAYATA = *Celastrus paniculatus* (HAYATA) MAKINO & NEMOTO, Fl. Jap. 678. 1931.

15. *Euonymus feddei* H. LEV., Fedde Repert. Sp. Nov. Regni. Veg. 13: 260. 1914. Type: China, Kouy- Tchou, Pin-Fa, Avril 1908, *J. Cavalerie* 3353 (A!). = *Glyptopetalum feddei* (H. LEV.) D. HOU, *Blumea* 12(1): 59. 1963.
16. *Euonymus fengii* CHUN & F. C. HOW, *Acta Phytotax. Sin.* 7(1): 44, f. 1. 1958. Type: China, Hainan, Lotung Hsien, Dec. 6, 1936, *S. K. Lau* 27097 (A!). = *Glyptopetalum fengii* (CHUN & F. C. HOW) D. HOU, *Fl. Males. ser. 1*, 5(2): 256. 1963.
17. *Euonymus filiformis* WALL. = *Microtropis filiformis* (WALL.) KING, *J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 65: 342. 1896.
18. *Euonymus fimbriatus* BAILL. ex LANESS. = *Lophopetalum fimbriatum* WIGHT, *Laness., Pl. Util. Colon. France* 312. 1886.
19. *Euonymus garcinifolius* ROXB., *Hort. Beng* 18. 1814; *Fl. Ind.* 2: 403. 1824; *Fl. Ind.* 1: 628. 1832. = *Microtropis discolor* WALL. (Lawson in J. D. Hook., *Fl. Brit. India* 1: 614. 1875).
20. *Euonymus geloniifolia* CHUN & F. C. HOW, *Acta Phytotax. Sin.* 7(1): 45, pl. 15. 1958. Type: China, Hainan, Yai Hsien, Aug. 19, 1933, *C. Wang* 33770 (A!). = *Glyptopetalum geloniifolium* (CHUN & F. C. HOW) C. Y. CHENG, *FRPS* 45(3): 94. 1999.
21. *Euonymus geloniifolia* CHUN & F. C. HOW var. *robusta* CHUN & F. C. HOW, *Acta Phytotax. Sin.* 7(1): 47. 1958. Type: China, Hainan, Yai Hsien, July 16, 1933, *C. Wang* 33101 (A!). = *Glyptopetalum geloniifolium* (CHUN & F. C. HOW) C. Y. CHENG var. *robustum* (CHUN & F. C. HOW) C. Y. CHENG, *FRPS* 45(3): 94. 1999.
22. *Euonymus gibbiflora* MAACK = *Lonicera chrysantha* TURCZ. (Trautv., *Trudy Imp. S.-Peterburgsk. Bot. Sada* 8: 187. 1883; Schneider, *Ill. Handb. Laubh.* 2: 722. 1912).
23. *Euonymus godaverensis* HAINES = *Pleurostyliia wightii* WIGHT & ARN. (Blakelock, *Kew Bull.* 1951: 284. 1951).
24. *Euonymus gracilipes* PIERRE = *Glyptopetalum gracilipes* PIERRE in Lecomte, *Fl. Indo-Chine* 1: 864. 1911.
25. *Euonymus grossus* WALL. = *Elaeodendron glaucum* PERS. (Lawson in J. D. Hook., *Fl. Brit. India* 1: 623. 1875).
26. *Euonymus haberi* LUNDELL, *Phytologia* 48(2): 131. 1981. Type: Costa Rica, Prov. Puntarenas, alt. 1300 m, Apr. 16, 1979, *W. A. Haber* 313 (flower only, LL!). From the type material, this specis with alternate branches does not belong to the genus, and there is no description in the original publication.
27. *Euonymus harmandianus* PIERRE = *Glyptopetalum harmandianum* PIERRE in Lecomte, *Fl. Indo-Chine* 1: 868. 1911.
28. *Euonymus hypoleuca* H. LEV. = *Mallotus philippensis* KARST (Loes., *Ber. Deutsch. Bot. Ges.* 32: 541. 1914).
29. *Euonymus ilicifolium* FRANCH., *Bull. Soc. Bot. France* 33: 453. 1886. Type: China, Yunnan, in silva Ta-long-tan, prope Tapin-tze; 3 Mart. 1886, *P. J. M. Delavay* 1932 (not seen). = *G. ilicifolium* (FRANCH.) C. Y. CHENG & Q. S. MA, *FRPS* 45(3): 92. 1999.

30. *Euonymus inermis* FORSK = *Ochna inermis* (FORSK) SCHWF., Arab. Pfl. Nam. 148. 1912.
31. *Euonymus laetus* WALL. = *Microtropis filiformis* (WALL.) KING, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 342. 1896.
32. *Euonymus longipedicellatum* MERR. & CHUN, Sunyatsenia 2: 36. 1934. Type: China, Hainan, without location, *F. Fenzel* 242; Chun & F. C. How, Acta Phytotax. Sin. 7(1): 49. 1958, ampl. = *Glyptopetalum longipedicellatum* (MERR. & CHUN) C. Y. CHENG, FRPS 45(3): 90. 1999.
33. *Euonymus longipedicellatum* MERR. & CHUN var. *continentalis* CHUN & F. C. HOW, Acta Phytotax. Sin. 7(1): 50. 1958. Type: China, Kwangtung, Ling Hsien, Nov. 21, 1930, *S. P. Ko* 50974 (not seen). = *Glyptopetalum continentalis* (CHUN & F. C. HOW) C. Y. CHENG & Q. S. MA, FRPS 45(3): 92. 1999.
34. *Euonymus marivelensis* ELMER = *Glyptopetalum marivelense* (ELMER) MERR., Philipp. J. Sci. 10: 321. 1915.
35. *Euonymus mammillaris* SCORT. = *Lophopetalum scortechinii* KING, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 65: 350. 1896.
36. *Euonymus michoacanensis* SESSE & MOC., Pl. N. Hispan. ed 1: 39. 1887. Type: Mexico. "Capsulae ad tri, aut quadriculatae, folia alter." does not belong to this genus; syn. *E. lanceolatus* SESSE & MOC., Fl. Mexic. ed. 2: 64. 1894, nom. nov. for above, but used by YATABE 1893.
37. *Euonymus omeiensis* Fang, Acta Sci. Nat. Univ. Szechuan 1: 38, pl. 2. 1955. Type: China, Sichuan, Omei, June 28, 1942, *W. P. Fang* 19010 (not seen). There were no specimens available for this revision, and the data in the original description is only from the type (1 sheet only, SZ); no further materials have become available since publication in the 1980's of a local flora. However, according to the original publication and the description in Flora of Sichuan (4: 272, pl. 71:7-8. 1988), the species should not be a member of the genus because: a) leaves are alternate; b) capsules 1-2 from the apex of new branches; c) pedicel 3-3.5 cm; d) bracts of capsule persistent; and e) no aril was recorded. This combination of characteristics does not match with the genus *Euonymus*.
38. *Euonymus ovatus* WALL. = *Lophopetalum fimbriatum* WIGHT (Lawson in J. D. Hook., Fl. Brit. India 1: 615. 1875).
39. *Euonymus parviflorus* HEMSL. = *Microtropis parviflora* (HEMSL.) SPRAGUE, Kew Bull. 1909: 309. 1909.
40. *Euonymus pinnatus* MILL. = *Trichilia hirta* L. (Fawcett & Rendle, Fl. Jam. 4(2): 210. 1920).
41. *Euonymus provicarii* H. LEV. = *Pittosporum truncatum* E. PRITZEL (Rehder, J. Arnold Arbor. 12: 280. 1931).
42. *Euonymus rhytidophyllum* CHUN & F. C. HOW, Acta Phytotax. Sin. 7(1): 51, pl. 17. 1958. Type: China, Kwangsi, Lungtsing Hsien, Dec. 23, 1935, *H. Y. Liang* 66613 (not seen). = *G. rhytidophyllum* (CHUN & F. C. HOW) C. Y. CHENG, FRPS 45(3): 89. 1999.

43. *Euonymus rigidus* WALP. = *Gymnosporia wallichiana* SPRENG (Lawson in J. D. Hook., Fl. Brit. India 1: 621. 1875).
44. *Euonymus scandens* E.H.L. KRAUSE = *Celastrus scandens* L. (Blakelock, Kew Bull. 1951: 285. 1951).
45. *Euonymus sclerocarpus* KURZ = *Glyptopetalum sclerocarpum* (KURZ) PRAIN, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 60: 210. 1891.
46. *Euonymus spinosus* GRIFF. = *Gymnosporia royleana* WALL. (Blakelock, Kew Bull. 1951: 285. 1951).
47. *Euonymus stixifolius* Pierre = *Glyptopetalum stixifolium* PIERRE in Lecomte, Fl. Indo-Chine 1: 867. 1911.
48. *Euonymus tinus* Buch.-Ham. = *Elaeodendron glaucum* PERS. (Lawson in J. D. Hook., Fl. Brit. India 1: 623. 1875).
49. *Euonymus tobirus* THUNB. ex MURRAY in L., Syst. Veg. ed 14: 238. 1784 = *Pittosporum tobirum* AIT., Hort. Kew ed. 2, 2: 27. 1811.
50. *Euonymus yunnanensis* H. LEV. = *Gymnosporia acuminata* J. D. HOOK. (REHDER, J. Arnold Arbor. 14: 251. 1923).

Nomina nuda

1. *Euonymys ceratophora* LOES., Pflanzenf. 20B: 120. 1942, in obs. Recorded from Yunnan (Index Plants Yunnanensis 1: 762. 1984, specimen *H. T. Tsai* 54462 unavailable for this work), and followed by Y. R. Li (1993): *K. M. Feng* 24307 (KUN!) which is *E. frigida*; see details under the latter species.
2. *Euonymys effusus* VIS., Acta Ist. Ven. Sc. ser. 3, 4: 141. 1858-59, in obs.
3. *Euonymys grandis* PALL., Reise Statth. Russ. Reich 1: 317. 1799, in obs.
4. *Euonymys grosseserratus* HAYATA, in herb. (?)
5. *Euonymys leucocarpus* BOJ., Hort. Maurit. 68. 1837, in obs.
6. *Euonymys longifolius* MEDIC., Beobacht. 311. 1782, in obs.
7. *Euonymys maackioides* NAKAI, in herb. (?)
8. *Euonymys marschallianus* ANDRZ. ex TRAUTV., Trudy Imp. S.-Peterburgsk. Bot. Sada 8: 188. 1883, nomen.
9. *Euonymys myrtoides* BOJ., Hort. Maurit. 68. 1837, in obs.
10. *Euonymys nakamurai* MAKINO, Yagai-Shokub.-Dzufu 4: 291. 1933; cf. Nemoto, Fl. Jap. Supp. 4412. 1936, no descrip.
11. *Euonymys pseudiradicans* NAKAI, in herb. (?)
12. *Euonymys quinquecornutus* EVANS ex HAND.-MAZZ., Symb. Sin. 7: 663. 1933, in obs.
13. *Euonymys schottii* ETTINGSH. ex VIS., Acta Ist. Ven. Sc. ser. 3, 4: 140. 1838-39, in obs.
14. *Euonymys verrucosus* L. ex JACKSON, Index Linn. Herb. 74. 1912, in obs.
15. *Euonymys virginicus* BELLARDI ex COLLA, Herb. Pedem. 2: 3. 1834, in obs.

Unknown or uncertain species

1. *Euonymus auriculatus* CRAIB, Kew Bull. 1922: 170. 1922. Type: Siam, Me Ta, alt. 300 m, *A. F. G. Kerr* 3620 (not seen). From the original description

"stylo trifido saepissime coronatus", it seems not to be a member of the genus.

2. *Euonymus cinereus* LAWSON in J. D. HOOK., Fl. Brit. India 1: 611. 1875. Type: India, Assam, *W. Griffith 1975* (not seen). From the original description and very recent book, Material for Flora of Arunachal Pradesh (1996), this is a member of Sect. *Echinatae*, and it may be conspecific with *E. echinata* in this work. However, without seeing the type material and due to a lack of enough specimens from India and Bangladesh to this revision, this taxon must remain here for the further confirmation.
3. *Euonymus corymbosus* SPRAGUE & BULLOCK in Hooker's Icon. t. 3396. 1939. Syntypes: Mexico, State of Mexico, 14-18 Feb. 1932, *Hinton 244* (not seen), 325 (K, not seen., fragment LL!, flowers only). From the description, this species is similar to *E. costaricensis*, but since fruit was unavailable, the species is placed here for further research.
4. *Euonymus griffithii* KURZ, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 39, 2: 73. 1870. New name for *Hippocratea angulata* GRIFF., Not. Dicot. 473, t.581, f.1. 1854 (flower only). There are no materials available for this work, and further research is necessary.
5. *Euonymus rothschuhii* LOES. in ENGL., Bot. Jahrb. Syst. 23: 125. 1897. Type: Nicaragua, Matagalpa, *E. Rothschuh 358*. (not seen, flower only). This species may be similar to *E. costaricensis*. However, there are no materials available for this revision, and only the flower was described, so the species is placed here until further consideration.
6. *Euonymus sootepensis* CRAIB, Kew Bull. 1912: 147. 1912. Type: Siam, Chiangmai, on Doi Sootep, alt. 900 m, *A. F. G. Kerr 1835* (not seen, flower only).
7. *Euonymus subsulcata* PRAIN, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 73, 2(4): 194. 1904. Type: Burma, Tenasserim, Gallatly. The original description recorded the fruit as subpyriform, distinctly 4-angled. No material has become available for the present work.
8. *Quadripterygium poilanei* TARD., Bull. Soc. Bot. France 95: 1948. Type: Annam: Nord de Ninh hoa, province de Nhatrang (*E. Poilane 6467*, Isotype, P!). D. Hou (1962: 247) reduced this monotypic genus into *Euonymus*, based on his work on SE Asia for Flora Malesiana. However, the original description omits fruit, and the characters described there are shared by several genera in the family. From the limited information of the plate, description and type, this species should be a member of *Euonymus*. However, there are no materials available of flower and fruit, and further investigation is needed.
9. *Euonymus tibeticus* W. W. SM., Rec. Bot. Surv. India 4: 264. 1911. Type: China, Tibet (Xizang), Lhaxhang (Lhokang Xian, Lhaxhang District), *W. L. White 87* (K!), photo (A!, flower buds only). From the limited information available from the type, no exact position could be found for this name because there is no flower or fruit. However, it must be related to *E.*

semenovii or *E. cornuta*, which both are species having similar leaves in the distribution area, but it is difficult to place it in any group without fruit.

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The numbers in parentheses refer to the corresponding species in the text and in the numerical list of species presented above.

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K.** 40165 (106); 40273 (106); 40899 (106); 42027 (96); 42895 (103); 42993 (18); **Chun N. K. & C. L. Tso** 44046 (87); 44215 (51); **Chun N. K. & S. P. Ko** 52914 (41); 53571 (41); **Chun S. H.** 144 (106); 188 (36); 608 (18); 1007 (36); 1359 (36); 2417 (72); 2557 (18); 2777 (103); 2843 (41); 2854 (53); 2888 (51); 2927 (36); 3392 (103); 3409 (17); 3594 (36); 8829 (36); 8885 (96); 9592 (51); 9658 (36); 10001 (96); 10369 (36); 10866 (87); 10921 (87); 11309 (83); 11647 (96); 12181 (96); 12321 (96); 12322 (96); 12745 (96); 13241 (96); 13297 (15); 13346 (58); 13488 (47); 13914 (47); 14256 (51); 14531 (106); 14625 (103); 14713 (19); 14805 (103); 14976 (106); 15082 (34); 15110 (51); 15120 (51); 15138 (18); 15231 (106); 15436 (106); 15549 (103); 15761 (19); 15774 (103); 15868 (120); 15961 (96); 16345 (96); 16554 (96); 16881 (120); 16960 (51); 17118 (17); 17176 (103); **Chun W. Y.** 5051 (96); 5746 (36); 5864 (120); 6220 (96); 7509 (106); 8527 (106); 10768 (37); 10951 (89); 11030 (41); **Chung H. H.** 3287 (51); 3723 (51); 6015 (106); 6671 (51); 6672 (96); 7547 (96); 7566 (28); 8107 (96); **Chung H. H. & S. C. Sun** 356 (72); 365 (51); 419 (35); 529 (35); 575 (89); 597 (72); **Church A. C. et al.** 2246 (73); 2392 (73); 2577 (73); 2817 (73); **Churchill J. R. s.n.** (21, 68); **Clarke C. B.** 6356 (71); 4276a (71); 14274 (71); 14277 (71); 19383 (69); 38248a (88); 43716a (71); 44857f (88); 45280a (71); 45914c (71); **Clausen R. T.** 5410 (21); 5615 (21); 8167 (21); **Clemens J.** 11679a (68); **Clemens J. & M. S. Clemens** 29511 (85); 33904 (85); 34478 (85); **Clokey I. W.** 2415 (68); **Cockburn P. F.** 83301 (73); **Collins J. F. s.n.** (68); 153 (84); 842 (84); **Congdon G.** 470 (92); 585 (92); 921 (92); **Conostantineanu J. C. s.n.** (104); **Coode M. J. E.** 6762 (73); 7834 (73); **Cooley G. R.** 6499 (21); **Cooley G. R. & R. J. Eaton** 6524 (21); **Correll D. S.** 37151 (21); **Correll D. S. & H. B.** 31116 (21); **Cory V. L.** 11259 (21); 23266 (68); **Cowdry N. H.** 566 (35); 589 (51); 1332 (35);

Cramer L. H. 4298 (123); **Creech J. L.** 1477 (28); 1498 (72); 1558 (28); **Creech J. L. & F. de Vos** 1140 (119); 1250 (28); 1260 (119); 1294 (119); **Creek J.** 5279 (68); **Cronquist A.** 5122 (21); **Cui H. L. et al.** 80-395 (14); **Cui S. C. & Y. C. Chu** 90 (121); **Cumming D.** 1552 (92); **Cuming H.** 1552 (75); **Curran H. M.** 10267 (75);

Dai T. L. 100313 (35); 100315 (16); 100317 (35); 100364 (103); 100378 (35); 100700 (16); 100910 (51); 101577 (103); 101608 (35); 101618 (6); 101716 (110); 101797 (89); 101919 (103); 102569 (45); 102900 (103); 103168 (103); 103319 (51); 103363 (45); 104120 (64); 104781 (35); 104806 (45); 104832 (45); 104901 (13); 104924 (45); 105108 (64); 105471 (64); 105534 (13); 105589 (45); 105595 (13); 105871 (13); 106043 (64); 106116 (34); 106242 (27); 106278 (34); 106527 (64); 106557 (64); 106666 (13); 106741 (103); **Dai T. Y. & C. H. Qian** 258 (17); 787 (106); **Dalezensni N.** 1039 (121); **Dang C. Z.** 248 (11); 840 (5); 1169 (34); 80465 (34); **Daochen Exped. (Sichuan)** 2283 (88); 2277 (6); 2348 (119); **Darigo C. E. et al.** 2647 (51); 2928 (51); 2975 (51); 3048 (51); 3050 (51); 3051 (51); **Datta B. C.** 25 (4); **Davidse G.** 7841 (123); **Deam C. C.** s.n. (68); 9171 (21); 13557 (68); 16039 (68); 16130 (68); 16214 (68); 16408 (21); 16625 (68); 16917 (68); 17206 (68); 17373 (68); 17488 (21); 17541 (68); 17771 (21); 17885 (68); 18476 (68); 18878 (68); 19075 (68); 23311 (68); 26471 (68); 37099 (21); **Debreczy Z.** s.n. (81); **Deguchi K.** 5558 (35); 7755 (89); 7559 (10); **Deguchi K. & S. Tsugaru** 4335 (89); **Delavay P. J. M.** 145 (126); 921 (126); 1527 (126); 3923 (1); 3995 (28); 5128 (47); **Demaree D.** 6712 (68); 6777 (68); 11154 (68); 11434 (68); 11754 (68); 16568 (21); 24658 (21); 36194 (21); 36698 (21); 37142 (21); 40502 (21); 40710 (21); 42948 (21); **Deng L.** 38 (36); 178 (37); 407 (87); 812 (36); 977 (37); 1302 (103); 1306 (37); 1308 (36); 1367 (18); 2136 (120); 2678 (83); 2870 (87); 3654 (106); 4064 (36); 4417 (96); 4428 (96); 4732 (106); 4849 (106); 5017 (103); 5319 (87); 5360 (51); 5468 (51); 5538 (41); 5681 (106); 5726 (51); 5762 (72); 6318 (36); 6704 (36); 7179 (51); 7309 (120); 7991 (53); 8083 (106); 8274 (51); 8320 (106); 8347 (96); 8812 (106); 9861 (96); **Deng M. B. & K. Yao** 9134 (36); 79167 (25); **Deng M. B. et al.** 2169 (36); 3449 (98); 3648 (52); 3783 (51); 4399 (72); 4458 (72); 4584 (72); 4785 (72); 4861 (72); 5312 (25); **Deng X. F.** 79-2 (51); **Deramus R.** 344 (21); **Diaoluoshan Exped.** 2406 (40); 2705 (40); 3147 (40); **Dickason F. G.** 4023 (88); **Djou Y. W.** 122 (89); **Dobremez J. F.** 136 (4); 2003 (4); 2255 (4); 2228 (4); **Dodge C. K.** s.n. (68); **Domin K. & V. Krajina** s.n. (121); **Domingo D. C.** 21677 (75); **Dong X. Y.** 93379 (36); **Dorsett P. H.** 1134 (98); 3215 (9); 4247 (98); **Dorsett P. H. & J. H.** 4049 (35); 4136 (35); 4211 (9); 5999 (121); **Dorsett P. H. & W. J. Morse** 511 (9); 524 (89); 536 (89); 566 (100); 786 (89); 991 (89); 992 (89); 1336 (9); 1445 (89); 7153 (98); 7405 (98); **Drake E.** 157 (59); **Dransfield J.** 6723 (73); **Drummond J. R.** 21565 (42); **Ducloux F.** 65 (88); 696 (18); 3187 (60); 4746 (126); 5302 (2); **Dunn S. T.** 2498 (106); 2498a (106); **Duthie J. F.** s.n. (4, 89); 1445 (4); 1447 (4); 13002 (4); 14012 (4);

Eames A. J. & K. M. Wiegand 10247 (68); **Eames E. H.** s.n. (68); 5681 (68); **Earle E. C.** 4236 (21); **East China Station (Academia Sinica)** 1609 (52); 4630 (72); 5928 (35); 5934 (72); 5859 (72); 6033 (89); 6359 (72); 6411 (51); 6532 (51); 6962 (89); **East Hainan Exped.** 445 (87); 611 (106); **Edano G. E.** 154 (85); 3262 (92); 11161 (92); 11456 (92); 13423(92); 48684 (92); **Edano G. E. & H. Gutierrez** 38470 (92); **Edgeworth M. P.** s.n. (42); **Eggleston W. W. & J. W. Kelly** 22921(21); **Ek C. M.** s.n. (21); **Elgincolin V. V.** 27990 (75); **Elias T. et al.** s.n. (35); **Elliott J. C.** 1181 (44); **Ellis R.** s.n. (4); **Elmer A. D. E.** 6462 (75); 7907 (92); 8437 (23); 8729 (23); 9679 (92); 12256 (92); 12485 (92); 13095 (92); 13423 (92); 15265 (92); 15355 (92); 15546 (92); 15648 (92); 17547 (92); 18417 (92); 22055 (75); **Eriksson J.** s.n. (81); **Erlangshan Exped.** 402 (122); 417 (11); 422 (110); **Escritor L.** 20739 (92); **Eshan Team** 88-03 (126); 88-119 (51); 88-154 (51); 88-263 (51); **Esquirol M.** 4287 (103); 4315 (96); 6361 (53); **Everett B.** 14115 (92); 14379 (92);

F. E. N. 392 (110); **Faber E.** s.n. (36); 198 (28); 226 (36); 652 (36); **Fairchild D.** 381 (113); **Falconer** 362 (42); **Fan C. S. & Y. Y. Li** 10 (35); 131 (72); 167 (72); 185 (72); 186 (98); 222 (89); 229 (51); 311 (39); 337 (103); 522 (35); 655 (29); 673 (51); **Fang & Cheng** 18 (51); **Fang D. et al.** 22372 (47); 22374 (47); 36883 (84); **Fang M. Y.** 24550 (18); 24569 (19); 24759 (37); 24972 (51); 25631 (37); 25712 (51); **Fang W. P.** 643 (89); 978 (103); 1138 (89); 1240 (37); 1267 (36); 1951 (89); 2156 (37); 2218 (6); 2264 (106); 2284 (106); 2376 (6); 2398 (6); 2617 (103); 2798 (6); 2909 (2); 3139 (34); 3195 (11); 3197 (103); 3463 (28); 3518 (45); 3577 (115); 3605 (89); 3662 (37); 3783 (27);

4356 (45); 4372 (6); 4386 (110); 4447 (110); 4822 (34); 4895 (36); 5454 (88); 5536 (88); 5582 (88); 5602 (17); 5665 (37); 5783 (17); 5815 (36); 5819 (36); 6813 (88); 6889 (5); 7489 (17); 7609 (103); 7656 (11); 7763 (2); 7832 (103); 7835 (11); 8520 (37); 8635 (37); 8654 (37); 8731 (37); 9032 (45); 10176 (103); 10284 (28); 12396 (16); 12653 (34); 12729 (37); 13603 (88); 15117 (37); 15166 (28); 15223 (37); 15251 (103); 15281 (96); 15344 (28); 15441 (37); 15443 (19); 15478 (28); 15580 (28); 15729 (27); 16075 (11); 16658 (103); 16676 (19); 17054 (16); 17342 (16); 17701 (27); 17748 (103); 17917 (16); 18060 (106); 18387 (103); 18542 (103); 18632 (106); 18871 (1); 18875 (2); 18951 (11); 19213 (88); 19799 (89); 20259 (36); 21415 (6); 23381 (1); 33403 (36); 36016 (115); 52441 (27); 53095 (106); 63775 (36); 64244 (36); **Fang W. P. & Y. X. Tao** 52188 (36); **Fang W. Z.** 8016 (72); **Fang W. Z. et al.** 17 (98); 149 (51); 243 (51); **Fang Y. Y.** s.n. (72); **Farges M.** s.n. (119); **Farges P. G.** s.n. (2, 53); 1180 (2); **Faurie A.** 418 (28); 420 (28); **Faurie U. J.** 77 (72); 518 (51); 1619 (51); 3010 (12); 3124 (12); 6136 (51); 13262 (9); 61795 (51); **Fenix E.** 24946 (75); **Fender F. S.** 1152 (21); **Feng J. W.** 151 (115); **Feng K. M.** 147 (59); 172 (59); 270 (119); 407 (88); 488 (88); 762 (2); 999 (6); 1086 (13); 1089 (88); 1102 (1); 1191 (88); 1203 (119); 1215 (97); 1332 (6); 1386 (95); 1400 (105); 1814 (119); 2313 (119); 2447 (97); 2451 (88); 2949 (13); 2987 (97); 3195 (88); 3228 (54); 3286 (17); 3379 (88); 3538 (122); 3575 (51); 3703 (88); 3752 (51); 3753 (51); 3869 (51); 4047 (119); 4070 (119); 4080 (51); 4161 (122); 4218 (88); 4303 (119); 4318 (88); 4343 (5); 4360 (51); 4397 (51); 4586 (115); 4769 (5); 4887 (54); 5289 (84); 5478 (119); 5638 (119); 5730 (13); 5745 (88); 5945 (88); 6164 (119); 6336 (119); 6913 (119); 6944 (51); 7268 (51); 7287 (51); 7426 (51); 7520 (5); 8142 (5); 8310 (5); 8581 (51); 8702 (51); 8722 (51); 8837 (119); 8839 (119); 8857 (119); 8986 (54); 9018 (28); 9269 (51); 9340 (28); 9969 (13); 10318 (88); 10352 (88); 10694 (88); 11051 (51); 11058 (47); 11077 (88); 11214 (125); 11215 (59); 11225 (96); 11781 (22); 11901 (96); 11927 (51); 11951 (34); 12044 (47); 12134 (22); 12227 (96); 12434 (96); 12502 (47); 12603 (51); 12627 (3); 12708 (125); 12709 (3); 12847 (122); 13027 (88); 13067 (47); 13075 (55); 13119 (19); 13200 (59); 13301 (111); 13483 (103); 13556 (3); 13639 (96); 13706 (96); 13747 (96); 13781 (96); 13963 (96); 13975 (122); 20909 (5); 21039 (119); 21365 (88); 21615 (28); 21634 (119); 22168 (51); 22213 (34); 22252 (47); 22363 (119); 22365 (109); 22337 (51); 22589 (51); 22734 (97); 22765 (54); 23012 (34); 23482 (13); 23483 (13); 23568 (105); 23851 (27); 23863 (119); 23940 (28); 23971 (119); 24122 (5); 24307 (5); 24678 (119); 24683 (119); **Feng K. M. et al.** 73-232 (37); 73-317 (19); 73-352 (37); **Feng S. W.** 401 (11); **Fengkai Exped. (Guangdong)** 4286 (106); 4749 (120); 4878 (106); **Fenzel G.** 170 (35); 255 (35); 1917 (35); 2113 (115); 2756 (110); **Fernandes J.** 968 (75); **Fernald M. L.** 14848 (21); **Fernald M. L. & B. Long** 9976 (21); 13069 (68); 13972 (68); **Fernald M. L. et al.** 4452 (21); 4933 (21); 5356 (21); **Fernandes W. S.** 20 (42); **Ferris R. S. & Y. C. Hsu** 12119 (119); **Fink B.** 157 (68); **Fiori A. & A. Beguinot** 2724 (8); **Fleming R. M.** 413 (42); 438 (119); **Fogg J. M.** 14724 (68); **Forbes H. O.** 827 (92); 831 (92); 833 (92); 1621 (92); 1738a (92); 2115 (92); **Ford C.** s.n. (72); **Forestry 721 Class** s.n. (115); 37 (115); **Forestry Bureau** s.n. (88); 677 (101); 1206 (110); **Forestry College 85 Grade 8** (121); 19 (121); 40 (121); 137 (121); **Forestry Exped.** 292 (115); **Forestry Institute Exped.** 84 (9); 96 (9); **Forest Institute Team 10** (126); 22 (126); **Forrest G.** 2240 (5); 4756 (5); 4798 (5); 5575 (5); 5620 (97); 6496 (88); 7851 (88); 8012 (47); 8961 (5); 9002 (5); 9821 (88); 10196 (6); 10253 (6); 10453 (105); 10458 (105); 10467 (5); 10556 (28); 10753 (13); 10890 (88); 10893 (13); 11108 (119); 11292 (6); 11420 (88); 11851 (96); 11937 (17); 12086 (51); 12540 (93); 12626 (119); 13909 (88); 13451 (13); 13529 (126); 13810 (13); 13846 (119); 13973 (13); 14124 (13); 14207 (63); 14346 (119); 14584 (60); 14878 (88); 15752 (5); 15810 (5); 16646 (45); 16946 (119); 16992 (13); 17234 (63); 17488 (59); 17511 (5); 17584 (60); 17646 (28); 17863 (96); 17890 (60); 17895 (96); 17907 (22); 17989 (5); 18011 (5); 18101 (5); 18104 (63); 18197 (2); 18485 (5); 18532 (88); 18799 (5); 18800 (5); 18880 (45); 18980 (1); 19122 (119); 19356 (2); 19498 (119); 19643 (63); 20100 (17); 20134 (13); 20433 (119); 20624 (119); 20694 (105); 20852 (17); 21063 (122); 21216 (17); 21232 (5); 21240 (5); 21249 (13); 21262 (105); 21338 (115); 21341 (6); 21342 (13); 21503 (119); 21544 (1); 21612 (13); 21614 (5); 21621 (60); 22025 (1); 22346 (6); 22376 (6); 22381 (105); 22412 (17); 22423 (13); 22425 (6); 22497 (88); 22600 (89); 22746 (63); 22945 (5); 23084 (119); 23181 (6); 233426 (1); 23435 (5); 23597 (28); 24025 (53); 24268 (5); 24288 (59); 24292 (2); 24298 (5); 24443 (22); 25214 (53); 25948 (5); 26080 (59); 26244 (2); 26318 (122); 26364 (88); 26701 (63); 26727 (5); 28032 (5); 28371 (88); 28681 (105); 29061 (5); 29096 (88); 29210 (88); 29497 (22); 29594 (59); 29667 (5); 30379 (59); 30405 (59); 30716 (105); **Fortune R.** 46a (51); **Fosberg F. R.** 5268 (107); 15361 (21); 37355 (43); 37571 (51); 37705 (72); 38294 (51); 39697 (92); **Fox R. B.**

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75398 (72); 75430 (72); **Kuan K. C. & W. T. Wang** 2478 (37); **Kudo Y. s.n.** (96); **Kume M. s.n.** (12, 56); **Kung H. W.** 325 (115); 776 (35); 1282 (115); 1795 (121); 2122 (6); 2685 (6); 2717 (6); 2818 (6); 3017 (45); 3112 (101); 3152 (6); 3247 (110); **Kuo C. M.** 51071 (96); **Kuo P. C.** 908 (110); 1358 (6); 1365 (110); 6634 (115); 9562 (115); **Kurata S. & T. Nakaike** 764 (72); 1600 (72); 1608 (51); 10020 (10); **Kurosawa T. et al.** 3505 (100); 3975 (35); 4263 (12); 4398 (9); 4444 (9); 4591 (35); **Kurata S. & T. Nakaike** 1407 (44);

Lace J. H. 81 (4); 384 (4); 1403 (42); 1791 (4); 1966 (42); **Lai S. K.** 601 (106); 672 (36); 683 (72); 1398 (36); 1420 (29); 1894 (36); 2192 (72); 2311 (51); 2501 (72); 2830 (36); 2934 (51); 2945 (51); 2982 (72); 3399 (51); 3455 (106); **Lai S. K. et al.** 418 (51); 478 (28); 1187 (72); 1238 (28); 1606 (36); 1885 (39); 2027 (28); 3734 (51); 4204 (28); 4362 (51); 4543 (51); 5362 (52); **Lai S. K. & M. X. Nie** 3822 (72); 4057 (72); 4354 (72); 4958 (106); 5022 (72); **Lakela O.** 26678 (21); **Lakshnakara M. C.** 907 (75); **Lam H. J.** 3169 (92); **Laman T. G. et al.** 151 (92); 244 (92); **Lamont Rev. J.** 124 (120); **Lancaster C. R.** 42 (4); 242 (4); **Lang K. Y. et al.** 2117 (115); **Lansing O. E.** 3320 (21); 3523 (68); **Lanzhou Medical Univ. Team** 72-451 (110); **Larsen K. et al.** 483 (84); 571 (84); 3399 (84); 43322 (59); 43581 (84); **Larsen K. & S. S.** 32823 (92); **Larsen S. S.** 31329 (75); **Lau S. K.** 140 (83); 205 (83); 416 (83); 481 (83); 663 (96); 1767 (83); 1852 (83); 1924 (83); 2442 (106); 2479 (106); 2599 (51); 2624 (96); 4062 (96); 4068 (36); 4555 (36); 5331 (83); 6293 (40); 20218 (96); 24204 (96); 24536 (53); 24838 (106); 25203 (51); 27245 (106); 28091 (51); 28734 (106); 28747 (106); 25345 (96); 27025 (83); 27376 (96); 27606 (83); 27833 (83); 28075 (96); 28405 (96); 28433 (103); 28438 (96); 28482 (103); 28603 (37); 28663 (103); 28734 (103); 28747 (103); 29073 (37); 29518 (37); **Lau Y. S.** 53 (96); **Law Y. W.** 727 (98); **Lee T. B. et al.** 527 (9); **Lee T. C.** 778 (52); 2305 (52); 2764 (103); 3554 (17); 3623 (103); 3973 (17); 4631 (28); **Lee Y.** 43067 (106); **Leonhardt O. s.n.** (121); **Leopold A. s.n.** (68); **Leu C.** 280 (72); **Leu W. P.** 195 (28); 1169 (28); **Levine C. O.** 561 (51); 1864 (106); 3060 (96); 3464 (51); 3496 (106); **Li A. R. et al.** 108 (72); **Li A. R. & J. R. Zhu** 10379 (115); **Li B. G.** 106 (72); 367 (52); 230311 (72); **Li B. G. et al.** 5412 (37); **Li B. G. & S. B. Wan** 750191 (106); **Li C. F.** 11172 (35); **Li C. G.** 52 (45); **Li C. H.** 96-105 (28); **Li D.** 602364 (34); **Li H. et al.** 631 (88); 1042 (5); **Li H. J.** 436 (13); 534 (28); 953 (37); 1574 (64); 2498 (19); 3112 (18); 4945 (37); 6021 (28); 6079 (36); 6324 (51); 6364 (37); 6698 (27); 6789 (64); 6822 (36); 6870 (39); 7034 (34); 7103 (37); 7215 (106); 7368 (37); 7514 (37); 7521 (27); 7966 (28); 8029 (37); 8159 (37); 8481 (17); 8651 (37); 9381 (36); **Li H. Q.** 40115 (58); 40129 (58); **Li K. F.** 60985 (13); 61014 (13); 61286 (28); 61390 (18); 61532 (13); 61631 (13); 61864 (37); 61943 (13); 61974 (89); 62032 (106); 62289 (51); 62371 (89); 62486 (36); 62572 (51); 62598 (45); 62614 (63); 62979 (37); 63034 (119); 63337 (13); 63397 (13); 63718 (37); 63890 (13); 64126 (28); 64140 (37); 64354 (27); 64451 (51); 64542 (17); 64960 (37); 64987 (37); 74238 (13); **Li K. M.** 2541 (106); 3338 (55); 3390 (55); **Li M. K.** 633 (51); 1263 (122); 2035 (5); 2057 (122); 2670 (51); 2852 (19); **Li M. S. & Z. Y. Li** 5693 (72); **Li N. H.** 41 (106); 112 (96); **Li P. S. et al.** 6484 (63); **Li P. S. & S. Z. Cheng** 1833 (51); 2253 (51); 2734 (51); 3490 (60); 4220 (60); 5221 (5); 5554 (5); **Li P. Y.** 2317 (101); **Li Q. H. & M. Chen** 270 (72); 836 (72); 948 (106); 1063 (72); 1203 (72); 1955 (72); **Li Q. X.** 141 (110); 219 (14); **Li Q. X. & X. C. Zhao** 2382 (88); **Li S. T.** 80380 (88); **Li S. X. et al.** 1070 (121); **Li X.** 70111 (105); 70201 (105); 70380 (115); 70645 (105); 70774 (105); 70806 (115); 71267 (105); 71335 (105); 71558 (115); 72286 (115); 72308 (45); 72334 (45); 72413 (115); 72417 (115); 72511 (45); 72607 (115); 72710 (45); 72714 (6); 72718 (115); 73150 (110); 73196 (115); 73453 (115); 73547 (45); 73609 (45); 73794 (45); 73855 (45); 74237 (115); 74472 (110); 74518 (110); 74848 (115); 74858 (6); 74887 (6); 74892 (6); 74937 (115); 74997 (115); 75359 (45); 75984 (45); 77415 (45); 77453 (115); 77491 (45); 77587 (45); 77643 (115); 78587 (115); 78651 (115); 78657 (45); **Li X. G.** 200119 (106); 200231 (106); 200235 (36); 201158 (103); 201209 (41); 201926 (106); 202115 (96); 202185 (36); 202520 (106); 202717 (28); 202767 (96); 203342 (36); 203619 (103); 203833 (36); 204865 (106); **Li X. W.** 128 (37); 221 (16); 459 (59); **Li Y.** 2180 (36); 15624 (52); **Li Y. H.** 6009 (51); **Li Y. J.** 81 (61); **Li Y. K.** 420 (34); **Li Y. K. & X. Chen** 10016 (34); **Li Z. D.** 82 (64); 601425 (116); 602179 (125); 602244 (106); 602714 (58); 603260 (28); **Li Z. D. & Y. C. Chen** 600005 (28); **Li Z. R.** 24 (18); 1998 (18); 2117 (18); 2684 (36); 2730 (18); **Li Z. T.** 1878 (39); 2677 (39); 2835 (39); **Li Z. X. et al.** 815 (106); 3956 (51); 4244 (40); 4935 (40); **Li Z. Y.** 100 (37); 418 (106); 537 (106); 538 (106); 802 (36); 886 (37); 979 (96); 1436 (37); 1762 (51); 1899 (37); 2117 (28); 3154 (28); **Lian N. et al.** 1079 (87); **Liang C. F.** 30352 (106); 30890 (106); 31127 (111); **Liang H. Y.** 60454 (36); 63454 (106); 63554

(83); 69552 (96); 69760 (111); 69979 (58); 70147 (83); **Liang J. Y.** 615 (96); **Liang K. H.** 111 (51); **Liang P. H.** 83292 (36); 83695 (103); 84653 (36); 85334 (103); 85338 (41); **Liang Guang Exped.** 466 (51); **Liao C. C.** 191 (44); 286 (72); 328 (72); 813 (44); **Liao C. J. et al.** 15171 (96); **Libo Exped. (Guizhou)** 1801 (51); 1813 (51); 2273 (51); **Licent E.** 4281 (13); 10892 (105); 12135 (6); **Lichiang Botanic Garden (Yunnan)** 11001008 (88); **Limpricht K. G.** 848 (126); **Lin Q.** 790924 (93); 791987 (13); **Lin L. Y.** 1905 (74); 1938 (74); **Lin W. J.** 620 (37); **Lin Y.** 646 (51); **Ling K.** 2286 (72); 7903 (98); 9286 (6); 9287 (6); 12278 (35); 12306 (98); **Ling Y.** 3441 (36); 4144 (51); **Ling Y. R.** 74327 (115); 74430 (115); **Liou T. N.** 5 (72); 271 (72); 781 (121); 1124 (16); 1368 (121); 3995 (121); 6617 (98); 6694 (98); 7157 (72); 7163 (52); 7164 (52); 7169 (72); 7174 (96); 7175 (72); 9738 (88); 10743 (6); 10885 (45); 10851 (6); 11221 (51); 11271 (51); 11550 (64); 11591 (64); 11597 (52); 11598 (52); 12328 (17); 12373 (17); 13820 (52); 13957 (88); 14068 (88); 14705 (51); 14796 (126); 15445 (88); 15811 (88); 16073 (88); 16277 (88); 16311 (88); 16322 (88); 16326 (88); 16568 (59); 16578 (51); 16613 (126); 16644 (88); 16861 (88); 16862 (88); 18284 (51); 18562 (59); 18707 (59); 18708 (59); 20602 (88); 20707 (88); 20711 (88); 21225 (5); 21341 (54); 21777 (51); 21830 (51); **Liou T. N. & P. C. Tsoong** 1602 (14); 1603 (14); 1941 (110); 1954 (14); 2114 (110); 3851 (51); 3866 (64); 3868 (64); 4086 (101); 5836 (64); **Liou T. N. & Z. Wang** 880 (28); **Liou T. N. & F. T. Wang** 156 (88); 176 (88); 365 (88); 501 (88); 574 (88); **Liou T. N. et al.** 1717 (121); 2987 (121); 7021 (121); 7122 (121); 7416 (121); **Liou Y.** 13511 (45); **Liou Y. X. & Her Father** 138 (103); 359 (17); 718 (96); 733 (72); **Little E. L.** 3939 (68); 3999 (68); **Liu C. S.** 729 (45); **Liu F. X. et al.** 2318 (72); 2715 (72); 2814 (51); **Liu J. C.** 626 (98); **Liu K. M.** 1378 (115); 2408 (115); 5146 (110); 5291 (6); 8337 (88); 8446 (101); 8853 (14); 8969 (101); 9025 (101); 10149 (6); 10154 (45); 10255 (6); 10361 (45); 10588 (110); 10612 (110); 10999 (45); 11047 (45); **Liu K. R.** 21 (13); 55 (101); 211 (45); 242 (45); 414 (101); 734 (51); **Liu L. H.** 1793 (17); 9172 (37); 9298 (37); 9351 (51); 9471 (106); 9936 (19); 10331 (51); 15027 (62); 15181 (106); 15339 (62); **Liu L. H. & G. Z. He** 16006 (51); 16671 (51); **Liu N. et al.** 41 (37); 1048 (120); 1060 (106); **Liu S. H.** 26 (6); 280 (57); **Liu S. L.** 890372 (36); 890449 (35); **Liu S. L. et al.** 1189 (36); 1269 (25); 1298 (51); 1393 (25); **Liu T. S. et al.** 262 (32); **Liu T. W.** 277 (13); **Liu T. Y.** 290 (72); **Liu T. Z. & P. C. Tsoong** 4132 (51); **Liu X. L.** 362 (72); **Liu X. Y.** 21357 (115); **Liu Y.** 53 (52); **Liu Y. G.** 148 (36); 228 (120); 306 (36); 310 (120); 376 (36); 413 (36); 420 (37); 466 (96); 468 (103); 521 (103); 672 (37); 982 (120); 1670 (120); 3034 (120); **Liu Y. S.** 1432 (103); 1443 (1); 1480 (6); 1490 (34); 1706 (27); 1709 (34); 1775 (11); 2144 (103); 2229 (6); **Liu Z. G.** 4518 (88); **Liu Z. Y.** 5224 (47); **Lloyd C. G.** s.n. (68); **Loher A.** 5132 (51); 5133 (51); 12035 (75); 12597 (75); 13406 (92); **Long B.** 12612 (21); 13496 (68); 16386 (21); 17299 (21); 58921 (21); **Long K.** 12305 (51); **Long R.** 18791 (68); 34608 (68); **Longxishan Exped. (Hunan)** 1181 (36); 1200 (36); 2897 (106); 3136 (106); 3145 (36); 3148 (39); **Lu Q. H.** 106 (106); 2064 (106); 2123 (36); 4155 (106); 4341 (53); **Luang S. A.** 22745 (73); 24145 (73); **Luchun Exped. (Yunnan)** 1626 (96); **Ludlow F.** 25 (4); **Ludlow F. et al.** 7198 (115); 13034 (60); 13312 (115); **Ludlow F. & G. Sherriff** 2222 (1); 13695 (115); 17351 (5); **Ludlow F., Sherriff G. & H. H. Elliot** 13200 (1); 13728 (1); **Ludlow F., Sherriff G. & G. Taylor** 4667 (1); **Lundell C. L.** 11849 (21); 12859 (68); **Lundell C. L. & A. A.** 8550 (68); **Luo P. et al.** 1889 (16); **Luo X. R.** 223 (88); **Luo Z. C.** 735 (36); **Luyuch** 7110 (111); **Lyon S. B.** 3174 (5); 10060 (5);

Ma S. 457 (98); **Ma Y. C.** 10218 (121); **MacGregor D.** s.n. (89); 1908 (35); (1908, 72); **MacGregor R. W.** 200 (71); **MacKlin (Dr.)** 29a (72); **MacMillan H. G. & J. L. Stephens** 45 (98); **Macoun J.** s.n. (21); 34133 (21); 34135 (68); **Main & Aden** 1040 (102); **Maire E. E.** s.n. (1, 36, 37, 53, 122); 175 (88); 413 (88); 414 (88); 439 (5); 522 (119); 2423 (59); 3313 (54); 3872 (88); 10200 (88); 10229 (88); 10230 (88); **Makarov V. V.** s.n. (8, 121); **Manuel F.** 25325 (92); **Mao P. I.** 15 (88); 45 (5); 90 (88); 95 (88); 100 (88); 119 (54); 177 (119); 227 (28); 302 (88); 531 (28); 594 (17); 796 (51); 821 (119); 1541 (122); 1644 (51); 1871 (122); 1875 (122); 1886 (51); 1920 (122); 1952 (51); 1959 (28); 2058 (28); 2061 (122); 3481 (122); **Mao S. H. et al.** 166 (51); 167 (96); 194 (98); **Maowen Exped. (Sichuan)** 2492 (88); 2496 (88); 5234 (45); **Marcan A.** 1373 (75); **March S. G. et al.** 107 (10); **Martinez C. G.** 2217 (26); **Martinez M.** s.n. (30); 100 (30); 4005 (30); **Masamune G.** s.n. (56, 72); **Masteu J.** s.n. (42); **Matsumura J.** s.n. (51); **Matthew K. M.** 16336 (78); 27648 (84); **Matthews O. V.** s.n. (107); **Maximowicz C. J. I.** s.n. (9, 12, 35, 98, 121); s.n. (1861, 10); **Maxwell J. F.** 85-620 (75); 86-478 (75); 87-442 (75); 87-539 (92); 89-885 (75); 90-483 (75); 91-680 (75); 92-586 (75); 93-13 (75); 93-746 (75); 94-476 (75); 94-508 (92); **Mazurenko T.** s.n. (8); **McClure F. A.** 856 (96);

8500 (106); 8579 (83); 8683 (87); 9447 (87); 9531 (87); 13794 (36); 15270 (98); **McCoy T. N.** s.n. (21, 68); **McGregor R. L.** 12620 (68); **McDonald & Ismail** 3876 (91); 3877 (92); 4020 (92); 4130 (92); **McDonald & Sunaryo** 4388 (75); **McLaren H. D.** 58 (5); 78a (59); 114 (34); 116 (60); 160 (59); 166 (A); **McMann H. E.** 190 (107); **McNeilus V. E.** 92-401 (68); **McPherson G.** 16179 (76); **McVaugh R.** 6337 (107); **Meebold A.** 9295 (92); **Meijer W.** 136585 (75); **Mell R. (for H. Handel-Mazzetti)** 545 (106); 594 (106); **Mellinger E. O.** s.n. (21); **Melur. Pr.** 1544 (77); **Mendez Ton A.** 9616 (26); **Mendoza D. & P. Convocar** 10647 (92); 10732 (85); **Menzel R. W.** 303 (21); **Merrill E. D.** 1841 (92); 3064 (75); 3356 (75); 9547 (85); 9644 (75); 10509 (92); 10802 (87); 11275 (98); 11382 (98); 11574 (92); **Merrill G. M.** 49 (21); 1207 (21); 2148 (21); **Meyer F. G.** 22 (10); 41 (98); 126 (98); 379 (98); 397 (98); 930 (98); 1353 (105); 1354 (35); 1435 (51); 1461 (51); 1541 (72); 1935 (89); 1948 (45); 3333 (103); 22995 (35); **Meyer F. G. et al.** 16901 (56); 18933 (9); 18943 (12); 18974 (12); 19008 (12); 19107 (10); 19110 (12); 19206 (89); 19247 (10); 19272 (100); **Miehe G.** 146 (42); 596 (4); 754 (4); **Mi H. Q.** 806 (72); **Migo H.** s.n. (17, 35, 72, 89); **Mimoro K. & S. Tsugaru** 4924 (12); 4925 (12); 5159 (12); 5275 (12); **Min T. L. et al.** 23 (122); **Minkwitz Z.** 1346 (104); **Miyabe K.** s.n. (51); **Mizushima M.** 399 (9); 607 (12); 614 (9); 836 (89); 1101 (100); 1105 (12); 1133 (12); 1835 (89); 1857 (35); 1941 (100); 1956 (10); 2111 (10); 2284 (89); 2340 (10); 2501 (89); 2572 (100); 2838 (10); 2997 (89); 3077 (89); 11706 (100); **Mizushima M. & U. Mizushima** 2066 (35); **Mizushima U.** 1523 (35); **Moffatt W. S.** 1154 (21); **Mohtar A. et al.** 49563 (73); 49569 (73); **Montgomery F. H.** 647 (68); **Moore A. H.** 2517 (68); **Moore H. E.** 1871 (30); 2314 (30); **Moore J. N.** 15757 (68); **Moore J. W. & N. L. Huff** 19237 (68); **Moran R.** 4258 (35); 4333 (35); 5501 (35); **Motozi T.** 1843 (65); **Moulton J. L.** 6765 (73); **Mumoro K. & S. Thugaru** 3190 (10); **Munz P. A.** 8148 (107); **Murata G.** 9726 (10); 27126 (51); 70088 (89); **Murata G. et al.** 201 (65); 630 (48); **Murata G. & F. Konta** 345 (9); **Murata J.** 33 (5); 109 (51); 1927 (35); 2228 (100); 2378 (100); **Murata J. et al.** 15595 (65); 50950 (51); **Murata J. & T. Yahara** 37602 (12); **Muroi H.** 349 (89); 395 (12); 412 (12); 657 (35); 823 (89); 1161 (100); 1258 (98); 1286 (100); 1588 (51); 1731 (35); 1796 (10); 1966 (89); 2028 (35); 2164 (98); 2894 (35); 3561 (35); 3706 (35); 3707 (89); 3728 (51); 3941 (10); 4123 (35); 4252 (35); 4293 (89); 4295 (12); 4512 (10); 4539 (89); 4562 (51); 4573 (35); 4596 (51); 4651 (10); 4746 (51); 4871 (89); 4928 (35); 5021 (51); 5419 (56); 5460 (100); 5469 (89); 5482 (56); 5498 (100); 5697 (56); 5756 (51); 6039 (10); 6110 (51); 6122 (51); 6262 (10); 6506 (35); 6691 (35); 6859 (51); **Murphy J. I. M.** 29 (107); **Murray E.** 860 (121);

Naito T. s.n. (35); **Naito T. et al.** 797 (60); 1014 (60); 1296 (105); **Nakai T.** 2061 (12); 2066 (121); 2070 (98); **Nand K.** 151 (4); 177 (42); 10505 (4); **Nanchuan Exped. (Sichuan)** 1982 (51); **Nanshuibeidiao Exped.** 2360 (45); 4732 (119); 4892 (13); 5431 (106); 6008 (126); 6069 (88); 6276 (126); 6293 (126); 7175 (106); 7423 (88); 8374 (5); 8513 (5); 8709 (5); 9018 (5); 9377 (45); 9687 (54); 10045 (27); 10162 (105); 10253 (105); **Nanzhidi Team** 4976 (34); **Naqin Group** 403 (111); **Naroba S.** s.n. (89); **Nash G. V.** 991 (21); **Native Collector** 321 (75); **Nelson A. & R. & G. J. Goodman** 5541 (21); **Nelson J. C.** 2537 (107); **Nemoto T.** 2352 (35); **Nemoto T. & H. Hoshi** 4543 (35); **Ng F. S. P.** 6094 (92); **Ni C. C. et al.** 2352 (119); **Nicolson D. H.** s.n. (92); 2477 (5); 2559 (119); 2914 (60); 3345 (28); 3370 (119); **Nie M. X.** 2026 (106); 2417 (72); 2533 (106); 2558 (36); 2606 (106); 2900 (106); 2988 (106); 3953 (52); 4022 (106); 4027 (106); 4048 (52); 5537 (106); 5390 (36); 5427 (72); 5601 (36); 5677 (106); 6444 (106); 6701 (51); 7194 (35); 7345 (72); 8689 (36); 92179 (72); **Nie M. X. et al.** 7931 (72); 7932 (51); 8246 (36); 8590 (36); 9143 (36); 9484 (51); 9875 (36); **Nie M. X. & S. K. Lai** 2041 (36); 2161 (36); 2312 (36); 2340 (36); 2347 (36); 2423 (36); 2462 (51); 2522 (36); 2591 (36); 2712 (36); 2714 (36); 2718 (36); 2826 (72); 2871 (51); 2881 (36); 2961 (25); 3139 (36); 3179 (25); 3183 (106); 3395 (36); 3411 (36); 3517 (36); 3567 (36); 3662 (51); 3862 (25); 3954 (51); 4015 (36); 4050 (98); 4059 (25); 4063 (36); 4071 (106); 4101 (36); 4154 (36); 4569 (51); 4744 (36); 5022 (106); 5024 (106); 5526 (51); 5859 (106); **Nimanon B. & S. Phusomsaeng** 255 (92); 283 (75); **Niu Z. B.** s.n. (52); **Nixon E. S.** 11939 (68); **Nizhi** 260 (35); **Nonggang Exped. (Guangxi)** 11940 (51); 12120 (96); **Nooteboom H. P. et al.** 1830 (73); 4262 (73); **North Guizhou Exped.** 394 (7); 659 (7); 1323 (7); 1848 (63); 2455 (36); **Northeast Yunnan Exped.** 101 (16); 265 (27); 589 (119); 590 (119); 697 (16); 780 (51); 848 (36); 858 (88); 875 (19); 1085 (19); 1156 (11); 1208 (19); 1444 (16); 2264 (11); **Northwest Agri. Bureau Team** 116 (115); **Northwest University Team** 4 (6); 151 (6); **Norton J. B.** 61 (68); **Nujiang Exped. (Yunnan)** 1816 (5); **Nuttall L. W.** s.n. (107);

Ogawa S. et al. 263 (89); **Ohara M.** 83-378 (21); **Ohashi H. et al.** 1455 (9); 1615 (51); 3475 (10); 6634 (89); 8784 (35); 9412 (89); 10690 (52); 11094 (35); 21876 (10); 22348 (9); 28198 (9); **Ohba H. et al.** 40213 (4); 8310025 (119); **Ohba H. & S. Akiyama** 1242b (10); **Ohmiya T. et al.** 28001 (10); **Oil Plants Group** 6 (52); 7 (52); **Okada H. et al.** 351 (43); 405 (72); **Okuhara H.** 3148 (100); **Oldham R.** 157 (89); **Ono M. & S. Kobayashi** s.n. (9); 123494 (48); 132958 (12); **Overebo R. T. & R. A. Thompson** W0646 (21);

Paie I. B. 28417 (73); 40859 (85); 40952 (85); **Palczewsky N.** s.n. (12, 35, 98); 3628 (121); **Palmer E. J.** 4253 (68); 4603 (68); 6014 (68); 6782 (21); 7498 (21); 9616 (21); 10517 (21); 12718 (21); 14312 (68); 14892 (68); 15192 (68); 15398 (68); 17456 (21); 17593 (68); 17690 (21); 17816 (68); 18969 (68); 19248 (68); 19351 (21); 19511 (68); 20207 (68); 20698 (21); 20814 (68); 21133 (68); 21856 (68); 22924 (68); 23890 (68); 24301 (21); 24576 (21); 24998 (68); 25121 (21); 25179 (68); 25219 (68); 25380 (68); 25481 (68); 25509 (68); 26361 (68); 26580 (21); 26959 (68); 27896 (68); 28522 (68); 29212 (21); 29999 (68); 31618 (21); 33109 (68); 34711 (68); 34920 (68); 35507 (68); 35770 (68); 35885 (68); 36632 (68); 37942 (107); 39061 (21); 39327 (21); 39539 (21); 42071 (21); 42148 (68); 42246 (21); 45341 (68); **Palmer E. J. & J. A. Steyermark** 41206 (68); 41559 (21); **Pammel L. H.** 62 (68); 445 (68); 567 (68); 921 (68); **Parish S. B. & W. F. Parish** 957 (107); **Parker R. N.** s.n. (4, 8, 28, 89, 119); 2842 (4); 2844 (28); 2993 (119); 3099 (82); **Parkinson C. E.** 3988 (4); **Parmanand N.** 86a (89); **Patel P. N.** s.n. (119); **PE Herb.** 3139 (10); 80924 (32); **PE Team** 518 (115); 2025 (115); 2377 (115); 2533 (115); 2631 (115); **Pease A. S.** 3365 (81); 13027 (21); 17775 (21); **Pei C.** 7780 (74); 10325 (28); **Peng C. I.** 8194 (28); 8679 (96); 11079 (72); 11972 (72); 14052 (96); **Peng K. et al.** 12598 (51); **Peng X. B.** 6116 (27); 6120 (16); **Perdue R. E.** 2088 (68); **Perkins A. E.** 904 (68); **Perrier E. P.** 1775 (128); **Petelot A.** 1782 (96); 2631 (96); 3798 (47); 5870 (96); 5942 (47); 6364 (96); 6677 (61); 6914 (61); 8591 (96); 28593 (61); **Phengkhai C. et al.** 4104 (75); **Phloenchit C.** 452 (75); **Pierre L.** 658 (75); 900 (75); 2793 (75); 2793 (75); 4073 (75); 4074 (75); 4972 (75); **Piper C. V.** 6204 (107); **Plant Exp. Korea** 204 (121); **Plant Resource Exped.** 1351 (72); 1358 (72); **Pleyte D. R.** 208 (92); **Plotrikova L.** s.n. (121); **Poilane E.** s.n. (75); 4424 (96); 6439 (106); 11204 (96); 13483 (92); 15283 (75); 15658 (106); 17287 (58); 20613 (80); 25974 (63); 28617 (88); 28993 (51); 29892 (114); 31177 (84); 32132 (80); **Polunin O.** 749 (5); **Polunin N. V. et al.** 863 (28); 875 (4); 947 (4); 1009 (119); 1891 (4); 1943 (4); 2034 (4); 2064 (4); 2099 (4); 2164 (119); 3162 (5); 3547 (4); 4045 (4); 4195 (119); **Popov M. & E. Moreeva** s.n. (115); **Potantin G. N.** s.n. (13); **Prain D.** s.n. (89); **Prance G. T. et al.** 30690 (73); **Proskuriakova G. & G. Rubinovskaia** s.n. (9, 12); **Purdom W.** 1 (6); 2 (110); 4 (35); 5 (121); 6 (1); 7 (98); 8 (89); 9 (35); 10 (110); 11 (14); 12 (101); 13 (13); 14 (35); 30 (35); 99 (98); 342 (35); 375 (35); 432 (6); 1013 (35); 1043 (110); 1050 (115); **Put L. L.** 356 (28); 1471 (92); 1722 (75); 2895 (84); 4196 (75);

Qian J. J. et al. 650 (9); **Qian M. Z.** 1693 (51); **Qin, Tian, Duan & Wang** 108 (52); **Qin Y. F.** 700085 (106); **Qingchuan Exped. (Sichuan)** 2827 (14); **Qinghai-Gansu Exped.** 1431 (104); 3431 (104); **Qinghai-Xizang Exped.** 249 (97); 255 (54); 328 (51); 1007 (54); 1162 (2); 1196 (13); 1443 (105); 1591 (2); 2165 (5); 2593 (13); 2951 (13); 2999 (45); 3207 (13); 3598 (119); 4140 (13); 5539 (42); 5615 (28); 5990 (13); 6266 (13); 6341 (122); 6375 (119); 6680 (5); 6752 (54); 6818 (54); 6841 (51); 7002 (5); 7023 (13); 7042 (63); 7215 (51); 7120 (5); 7240 (5); 7521 (119); 8053 (51); 8165 (5); 8398 (5); 8480 (5); 8784 (5); 8810 (5); 8937 (5); 9606 (5); 9799 (5); 9984 (119); 9996 (119); 10010 (5); 10737 (119); 10794 (119); 11007 (45); 11015 (101); 11131 (13); 11277 (88); 11359 (126); 11507 (54); 11698 (119); 11881 (119); 12383 (119); 12575 (101); 12827 (119); 12880 (119); 12956 (105); 13277 (88); 13292 (88); 13382 (101); 13386 (88); 14075 (88); 14135 (13); 14170 (119); 14273 (119); 14679 (13); **Qinghai-Xizang Exped.** 73-46 (13); 73-332 (13); 73-380 (13); 74-2205 (13); 74-2292 (119); 74-2483 (119); 74-3835 (5); 74-3930 (5); 74-3956 (5); 74-4959 (63); **Qinghai-Xizang Exped. (Suppl.)** 750121 (119); 750871 (13); 750887 (115); 751851 (5); **Qinghai-Xizang Vegetation Exped.** 3724 (42); **Qinghua Univ. Team** 37206 (115); **Qinling Exped.** 329 (6); **Qiu P. X.** 1959 (106); 2110 (106); **Quishumbing E.** s.n. (92); 192 (92);

Radford A. E. 45400 (68); **Rafael B. & S. S. Ponce** 20743 (92); **Raj H.** s.n. (42); **Ram B.** 441 (28); 446 (42); **Ramamoorthy T. P.** s.n. (92); **Ramos M.** 1037 (75); 1078 (75); 1897 (75); 2037 (75);

4612 (75); 5779 (51); 13319 (92); 13793 (92); 15195 (92); 22113 (92); 23661 (92); **Ramos M. & G. Edano** 26322 (75); 37947 (23); 40721 (92); 43988 (75); 48335 (75); **Randolph L. F. & F. R.** 936 (21); **Rao T. A.** 9466 (89); **Rau M. A.** 10108 (28); **Raven P. H.** 27259 (68); **Raven P. H. & R. Snow** 13668 (107); **Rawat C. S.** 24 (119); 25 (119); **Ray J. D.** 5405 (21); **Rea L. et al.** s.n. (107); **Rechinger K. H.** 853 (8); 6643 (8); **Reeves** s.n. (87); **Regel A.** s.n. (115); **Rehder A.** s.n. (81, 121); **Ren C. T.** 12589 (98); **Renwudui** 1394 (52); **Reverchons E.** 18 (8); **Richardson H.** s.n. (21); **Ridsdale C. E.** 253 (67); 896 (92); 950 (92); 1704 (92); **Robinson C. B.** 9681 (92); **Rock J. F.** 258 (75); 383 (75); 385 (75); 447 (75); 3049 (88); 3296 (88); 3580 (6); 3625 (88); 3641 (97); 3731 (89); 3741 (6); 4077 (97); 4185 (88); 4685 (6); 4710 (54); 5091 (88); 5193 (6); 5643 (97); 6070 (6); 6784 (6); 6788 (89); 6812 (89); 7276 (96); 7356 (22); 7547 (47); 8323 (88); 8479 (88); 8597 (1); 8637 (2); 8808 (1); 8891 (13); 8900 (88); 8969 (17); 8953 (60); 9164 (1); 9535 (60); 9552 (6); 9610 (54); 9793 (17); 10298 (45); 11551 (88); 11626 (54); 11649 (45); 11652 (53); 12498 (6); 12626 (110); 12670 (105); 12747 (6); 12820 (115); 12822 (110); 12961 (6); 13173 (6); 13311 (115); 13521 (110); 13554 (105); 13569 (6); 14695 (6); 14749 (105); 14759 (6); 14843 (6); 14872 (110); 14955 (105); 14978 (45); 15072 (110); 16030 (88); 16134 (88); 17232 (6); 17287 (119); 17591 (6); 20867 (54); 22076 (60); 22127 (5); 22281 (63); 22285 (1); 22343 (119); 22613 (54); 22976 (119); 23159 (1); 23181 (13); 23195 (45); 23567 (119); 23894 (6); 23902 (105); 24134 (88); 24430 (1); 24435 (105); 24578 (88); 24588 (119); 24724 (105); 25275 (105); **Rogers K. E. & L.** 44864 (21); **Roen P. V. & H. Sleumer** 6735 (75); **Roldugin I.** s.n. (115); **Royen P. V.** 5256 (92); 5473 (75); 7678 (92); **Royle Hb.** s.n. (42); **Ruyao Team** 312 (106); 415 (36); 731 (89); **Ruse L. F.** 53 (60); 56 (88); 121 (71); **Ruth A.** s.n. (68);

Saito S. 6078 (12); **Sakurai K.** s.n. (35, 100); **Saldanha C. J.** 13008 (92); 13137 (92); 13670 (92); 14412 (92); 16175 (92); **Salleh K. H.** 32322 (92); **Sands M. J. S.** 208 (75); 250 (75); **Santiago S. C.** 1430 (26); **Santisuk T.** 1246 (75); **Sargent C. S.** s.n. (9, 12, 51, 69, 92, 98); 5 (106); 22 (89); **Savatier M.** s.n. (9); **Sawada T.** 2109 (100); **Sawatagu** s.n. (100); **Sazonov A.** s.n. (121); **Schallert P. O.** s.n. (21); **Scharlz. O.** 11 (126); **Schneider C.** 300 (126); 524 (126); 580 (122); 627 (81); 840 (88); 966 (105); 1015 (54); 1251 (105); 1645 (105); 2684 (119); 2722 (1); 3077 (6); 3102 (88); 3103 (88); 3192 (88); 3555 (118); 4157 (88); **Schoch O.** 12 (88); **Schrend L.** s.n. (9); **Schrenk G.** s.n. (98, 121); **Schulz A.** 597 (81); **Scientific Exped.** 1566 (5); **Seed Collection Team** 182 (51); 189 (51); 227 (6); 231 (110); **Semenov M. S.** s.n. (115); **Sha F. H.** 368 (52); **Shacklette H. T.** 72 (21); **Shan R. H. et al.** 812 (103); 5682 (72); **Shanks R. E.** 22262 (21); **Shanxi Exped.** 189 (115); 454 (115); 715 (115); 1745 (115); 1848 (115); **Sharp A. J.** 45239 (50); 46220 (30); **Sheh M. L.** 24695 (106); **Shen B. A.** 170 (72); 488 (51); **Shen H. Y.** 633 (44); **Shen K. F.** 2404 (51); **Shen S. J.** 396 (72); 517 (36); 585 (72); 723 (10); **Shen S. Q. & P. L. Yang** 140 (6); **Shengnongjia Exped. (Hubei)** 22495 (34); **Shi G. L.** 119 (96); 225 (106); **Shik K. Y.** s.n. (89); **Shimizu T. et al.** 18096 (84); **Shimizu Y.** 77-167 (48); **Shiota K.** 138 (89); 141 (51); 144 (100); 145 (100); 3073 (56); 4937 (35); 5854 (51); 6616 (9); 6792 (51); 9647 (35); **Shizong Team** 191 (88); **Short C. W.** s.n. (21); **Shrestha T. B.** 4060 (4); 4118 (42); **Shukhobodinin J.** s.n. (9); 31a (9); **Sino-Germany Exped.** 1951 (40); **Sichuan Agricultural College Team** 956 (13); **Sichuan-Guizhou Exped.** 1092 (37); 1571 (37); 1601 (37); 1618 (37); 1981 (37); 2144 (37); **Sichuan Economic Pl. Exped.** (59) 57 (106); 81 (126); 105 (16); 154 (16); 188 (11); 243 (106); 279 (37); 311 (16); 421 (110); 485 (37); 519 (37); 533 (37); 583 (106); 657 (106); 670 (37); 689 (16); 718 (37); 730 (37); 731 (37); 746 (37); 769 (37); 770 (119); 985 (16); 1100 (11); 1133 (37); 1152 (37); 1175 (37); 1308 (6); 1514 (14); 1902 (54); 2044 (6); 2263 (110); 2562 (6); 3092 (6); 3905 (119); 5990 (122); 662313 (19); **Sichuan Exped.** 1399 (51); 1692 (14); 2676 (51); **Sichuan-Guizhou Exped.** 674 (28); 1529 (106); 1531 (38); 1775 (19); 2136 (11); **Sichuan University Team** s.n. (19); **Sichuan Vegetation Exped.** 2934 (13); **Sichuan-Yunnan-Guizhou Connection Team** 269 (126); 425 (126); **Siddiqi M. A.** 13 (89); **Silvestri C.** 5077 (103); 5079 (89); **Silvestri R.** 1343 (88); **Silvestri A.** 1357 (13); 1358 (13); 5074 (13); **Sin S. S.** 624 (41); 9365 (36); 9749 (36); 11737 (106); 11827 (103); 52114 (37); **Sinclair J.** 3648 (94); 397517 (92); **Sing K.** 7848 (51); **Sino-Amer. Yuntaishan Exped.** 45247 (98); **Sino-Germ. Exped.** 580 (96); 584 (52); 1208 (96); **Sino-Vietnam Exped.** 869 (84); 1925 (75); 2491 (61); **Sino-USSR Exped.** 756 (47); 775 (58); 971 (47); 1022 (96); 1548 (59); 3032 (47); 3181 (47); 3627 (47); 7099 (51); **Sintenis P.** 3060 (8); **Sizuki S.** 25 (35); **Skutch A. F.** 327 (46); 631 (46); 637 (46); 3588 (49); **Slavin B. H.** s.n. (68); 477 (68); **Skvortov A. K.** s.n. (12,

35, 81, 104, 115, 121); **Skvortzow B. W.** s.n. (9, 35, 35, 98, 98); 9588 (9); **Small J. K.** s.n. (21, 21); **Small J. K. & A. A. Heller** s.n. (21); **Smith A.** 254 (49); 647 (49); 1902 (49); 1926 (49); **Smith H.** 765 (98); 790 (35); 965 (35); 1586 (88); 2069 (27); 2228 (45); 2721 (105); 2759 (115); 3017 (6); 3491 (6); 4029 (110); 4493 (105); 5638 (35); 5791 (13); 5818 (115); 6084 (98); 6744 (35); 7064 (115); 7816 (13); 7870 (115); 10078 (47); 10113 (2); 11285 (115); 12344 (105); 12366 (115); 12599 (5); **Smith H. H.** 5630 (68); 7309 (68); **Smith L. B. & A. R. Hodgdon** 499 (21); 3885 (21); **Smith L. S.** 10746 (86); **Smitinand T.** 190 (75); 10878 (51); 93-624 (75); 93-710 (75); **Smitinand T. & C. Pengklai** 10876 (75); **Smitinand T. & M. Thephasdin** 11492 (75); **Soejarto D. D. et al.** 6932 (92); 7674 (92); 9137 (92); **Soejarto D. D. & D. A. Madulid** 6228 (75); **Soepadmo** 271 (92); 331 (92); **Sohadi Z.** 17936 (92); **Sohmer S. H. & D. B. Sumithraarachchi** 10166 (113); 10177 (113); **Sohmer S. H. & S. Waas** 8661 (113); **Sonohara S.** 10 (43); 66 (106); 99 (72); **Soong T. P.** 38286 (13); 38307 (13); 38856 (13); 39022 (13); 39133 (88); 39314 (88); 39382 (88); **Sorensen Th. et al.** 5734 (A), **Songpan Exped. (Sichuan)** 1733 (28); **Soper J. H.** 2533 (21); **Soper J. H. & H. M. Dale** 4024 (21); **Soulie J. A.** 215 (45); 789 (13); **South China Exped.** 488 (106); 617 (106); **South Guizhou Exped.** 303 (24); 322 (96); 659 (24); 728 (24); 813 (18); 1390 (37); 1699 (51); 1823 (51); 1924 (37); 1974 (106); 2419 (37); 2571 (37); 2809 (37); 3491 (103); 3541 (103); 3663 (103); **Southwest Forestry College Exped.** 3084 (11); **Spongberg S. A. et al.** 223 (51); **Spongberg S. A. & D. E. Boufford** 1735 (21); **Sprague J. A.** 96 (42); **Stainton J. D. A.** 296 (5); 2349 (4); 4248 (5); 4884 (42); 5421 (4); 6277 (42); 6298 (42); 6311 (5); 6572 (42); 6573(5); 7033 (42); **Stainton J. D. A. et al.** 950 (4); 4247 (4); 4830 (4); 4967 (28); 5544 (4); **Standley P. C.** 35546 (49); 42921 (49); 42941 (49); 47524 (49); 62276 (50); 80178 (50); **Standley P. C. & A. M. Torres** 47503 (49); **Starchnoko V. & E. Boyko** 6921 (98); **Steenis C. G. G. J.** 12621 (92); 18264 (51); **Stefanoff B.** s.n. (8); **Stevens G. W.** 1826 (68); **Stevens H.** 30 (6); **Stevens O. A.** 427 (68); **Stevens P. F. et al.** 476 (73); **Stephens S.** 11895 (68); **Steward A. N.** 2019 (98); 2452 (72); 4663 (72); 5475 (51); 9784 (35); 9798 (72); **Steward A. N. et al.** 140 (106); 207 (37); 248 (37); 467 (37); 471 (89); 580 (103); 606 (7); 804 (17); 811 (37); 831 (35); 853 (19); **Steward A. N. & H. C. Cheo** 207 (103); 337 (96); 467 (96); 467b (103); 621 (87); 941 (17); 1046 (96); **Stewart R. R.** 1988 (28); 2886 (4); 6910 (89); 12079 (89); 12361 (42); 13002 (89); 14417 (28); 14971 (28); 15913 (119); 16047 (42); 16643 (119); 17676 (89); 21480 (89); 25495 (4); 25496 (28); **Stewart R. R. & E. Nasir** 25492 (42); 25493 (42); **Steyermark J. A.** 14577 (21); 43495 (50); 43589 (50); 46729 (50); 46758 (50); 47225 (50); 65839 (21); **Stone B. C.** 15875 (92); **Stone H. E.** s.n. (68); **Strachey R. & J. E. Winterbottom** 1 (89); 2 (42); 3 (28); 4 (4); 5 (89); 6 (119); **Su G. X.** 307 (45); **Su H. H.** 67588 (51); **Suin S. C.** 30 (98); **Sulit M. D.** 3613 (92); **Summers B.** 5314 (51); **Summers B. & D.** 7285 (51); **Summers B. & J. Ryan** 4389 (51); **Sumithraarachchi D. B.** 1001 (123); **Sun B. X. et al.** 422 (37); 544 (34); 625 (37); 657 (34); **Sun B. Y.** s.n. (35); **Sun C. L.** 484 (47); **Sun H. F.** 2321 (69); **Sun S. C.** 1074 (35); 1369 (72); 1407 (72); **Sun S. L.** 41 (106); 170 (34); 197 (11); 466 (16); 484 (28); 532 (28); 561 (37); 663 (11); 719 (37); 742 (37); 902 (11); 2035 (37); 2215 (106); 2311 (28); 2509 (28); 2596 (16); 3357 (11); 3449 (16); 3621 (11); 3980 (11); 17842 (11); 23273 (37); **Sun Y. Z.** 1725 (52); **Sunnett** 683 (75); 912 (75); **Suzuki S.** s.n. (32, 89, 100); 89 (10); 1327 (35); **Suzuki T.** 19695 (44); **Svenson H. K.** 376 (21); 334 (21); 9347 (21); **Swingle W. T.** 10802 (96);

Taam Y. W. 9 (96); 74 (36); 153 (51); 191 (96); 195 (106); 364 (106); 582 (106); 744 (106); 749 (106); 787 (106); 1145 (96); 1178 (18); 1206 (106); 1746 (106); 1878 (51); 1944 (106); 1951 (106); 1953 (106); 29799 (106); **Tagawa M.** 10964 (35); **Tai L. Y.** 177 (103); **Tak L.** 11807 (106); **Takahashi A. & F. Konta** 11002 (10); **Takahashi H. et al.** 2525 (12); 2602 (9); 5657 (51); 6241 (89); 8547 (9); 8565 (12); 6602 (12); **Takahashi H. & C. S. Chang** 433 (12); 6395 (9); 6492 (9); 6533 (10); 6537 (10); **Takahasi H. & S. Uematsu** 8462 (12); **Takahashi M.** 1036 (51); 1788 (35); 1854 (35); 1918 (10); 1919 (35); **Takahashi T.** 2021 (10); 6891 (10); **Talbot W. A.** s.n. (92); **Tamayose K.** s.n. (72); **Tam P. C.** 57422 (58); 57518 (96); 58013 (36); 58349 (103); 59020 (103); 59120 (36); 59208 (37); 59448 (96); 59806 (37); 59883 (96); 59978 (36); 60165 (106); 60378 (53); 60400 (103); 60874 (36); 61477 (106); 61508 (36); 62100 (103); 62187 (103); 62608 (106); 62645 (103); 62786 (96); 62905 (106); 63583 (10); 63660 (106); 63729 (103); **Tan C. M.** 89186 (98); 90040 (72); 92133 (106); 92135 (36); 92271 (51); **Tan P. X.** 58994 (51); **Tan S. X.** 98 (47); 312 (45); **Tan Y. F. et al.** 70006 (89); 70184 (89); 70397 (89); 70870 (89); **Tanahashi H. et al.** 8547 (10); **Tang C. L.** 764 (45); 794 (64); 1040 (89); 1300 (51); 1319 (103); **Tang H. C.** 414 (96); 505

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D. et al.** 12445 (21); **Thompson J. W.** 4279 (107); **Thomson T. s.n.** (119); 640 (42); 663 (119); **Thorel M. D. s.n.** (75); 2080 (75); 9080 (75); **Thorne R. F. & W. C. Muenscher** 8566 (68); **Thwaites G. H. K. s.n.** (78); 171 (78); 478 (123); **Tidestrom I.** 13437 (81); **Ting C. C. et al.** 1358 (103); **Ting K. C.** 2441 (72); 10332 (61); **Ting K. C. & G. L. Shi** 288 (120); 786 (51); **Tirvengadam D. D. & L. H. Cramer** 273 (113); **To P. et al.** 2652 (87); **Togashi M. s.n.** (9, 35, 100); 20 (9); 478 (100); 715 (51); 1506 (35); 9767 (35); 10647 (12); **Togashi T. et al.** 28 (10); **Tohda K. et al.** 1179 (10); **Tokubuchi K. s.n.** (9); **Ton A. S.** 3992 (26); **Tonghua Group (Jilin)** 254 (121); **Torri K. s.n.** (10); **Traverse** 323 (68); **Tripathi N. K.** 27 (42); **Tsai H. T.** 35600 (88); 50934 (18); 50973 (16); 51114 (89); 51258 (27); 51625 (96); 51655 (96); 51692 (96); 51727 (96); 51741 (96); 51750 (34); 51791 (96); 51828 (84); 52063 (16); 52107 (5); 52290 (89); 52309 (37); 52326 (37); 52554 (96); 52751 (18); 52752 (89); 52938 (126); 52987 (126); 53107 (126); 53127 (88); 53318 (117); 53396 (88); 53555 (126); 54005 (2); 54010 (88); 54201 (108); 54516 (5); 54558 (33); 54593 (96); 55016 (60); 55328 (47); 55345 (47); 55652 (55); 55712 (116); 55952 (96); 55992 (96); 55997 (22); 56292 (2); 56329 (60); 56476 (60); 57005 (60); 57015 (96); 57023 (60); 57038 (88); 57337 (60); 57374 (5); 57383 (119); 57445 (5); 57819 (2); 58089 (5); 58128 (37); 58350 (2); 58375 (60); 58424 (2); 58559 (60); 58699 (60); 58725 (5); 58765 (60); 59072 (5); 59674 (1); 59679 (1); 59716 (1); 59829 (88); 59927 (88); 59929 (88); 59958 (88); 60197 (47); 60567 (22); 60762 (22); 60967 (47); 61020 (47); 61395 (47); 61423 (96); 61615 (84); 61744 (47); 61788 (47); 61888 (34); 62102 (51); 62135 (96); 62208 (51); 62281 (60); 62466 (47); 62476 (34); 62504 (59); 62517 (108); 62655 (34); 62733 (96); 62838 (96); 63068 (1); 58-8178 (111); 58-8221 (122); 58-8376 (51); 58-8621 (51); 59-10545 (59); **Tsang W. T. s.n.** (106); 1616 (36); 3038 (36); 10560 (36); 16497 (106); 20188 (36); 20297 (106); 20348 (51); 20367 (106); 20636 (106); 20716 (103); 20921 (51); 20936 (103); 21095 (106); 21652 (96); 22005 (106); 22384 (87); 22618 (106); 22782 (51); 23362 (36); 23490 (36); 23574 (19); 23679 (36); 23774 (36); 24271 (87); 24393 (17); 24459 (79); 24466 (51); 24683 (106); 24812 (96); 25104 (106); 25171 (106); 25233 (51); 25317 (106); 25320 (36); 26291 (103); 26368 (36); 26610 (96); 26916 (95); 27165 (111); 27563 (36); 27583 (106); 27626 (106); 27654 (17); 27685 (103); 27798 (37); 28229 (103); 28282 (17); 28383 (103); 28731 (36); **Tsang W. T. & L. U. Fung** 565 (96); 18099 (96); **Tsang W. T. & K. C. Wong** 3131 (37); **Tschronoski T. s.n.** (12); **Tschronoski T. & T. Leoviobi** 2487 (12); **Tsi Z. H.** 91-360 (18); **Tsiang H. L.** 2950 (89); 5121 (11); 9029 (11); 11116 (106); 33705 (11); 33790 (34); 33974 (11); 34563 (89); 35315 (16); 36648 (115); 36738 (115); 36774 (115); 36788 (115); 36920 (115); 36949 (115); 36975 (115); 37838 (5); 52290 (89); **Tsiang H. L. & S. S. Chang** 30133 (106); **Tsiang Y.** 184 (106); 1318 (106); 1635 (106); 1712 (106); 1864 (106); 2274 (96); 4139 (103); 4352 (96); 4579 (106); 4600 (17); 4658 (37); 4662 (103); 4667 (96); 4906 (28); 5171 (37); 5353 (51); 5625 (96); 5658 (106); 5761 (17); 5781 (35); 5841 (28); 5871 (37); 6387 (103); 6749 (19); 7274 (111); 7370 (89); 7462 (106); 7513 (36); 7535 (103); 7595 (19); 7601 (106); 7611 (103); 7613 (37); 7692 (28); 7699 (37); 7782 (106); 7817 (103); 7838 (17); 7909 (19); 8430 (89); 8488 (38); 8513 (28); 8579 (37); 8599 (35); 8692 (106); 8940 (17); 9124 (88); 9133 (88); 9168 (34); 9357 (34); 9462 (17); 9508 (89); 9515 (103); 10065 (28); 10310 (96); 10604 (72); 11790 (88); 12414 (58); 12951 (51); 13014 (51); **Tsiang Y. & H. Wang** 16245 (126); 16246 (126); 16247 (88); 16248 (88); 16492 (88); **Tsien C. P. et al.** 696 (36); 757 (59); 50255 (96); 51361 (37); 50216 (37); 50815 (37); 50729 (37); 61294 (51); 400675 (51); 400809 (10); 400864 (39); 400945 (10); **Tso C. L.** 843 (35); 1185 (98); 1719 (98); 20487(36); 20597 (36); 20650 (18); 20751 (106); 20824 (120); 21113 (106); 21874 (96); 23582 (95); 44311 (40); **Tsoong C. H.** 808411 (28); 81717 (89); 81733 (96); 81934 (103); 81970 (96); 83626 (37); 83818 (18); 85038 (36); 91017 (106); 91036 (84); **Tsoong P. C.** 294 (37); 553 (72); 705 (106); 832 (37); 1046 (88); 1113 (52); 1656 (106); 1800 (34); 2193 (110); 2417 (45); 2645 (115); 2669 (115); 3158 (45); 3268

(45); 4032 (110); 6210 (51); 8873 (115); **Tsoong P. C. & K. C. Kuan** 355 (111); **Tsoong K. K.** 3160 (17); **Tsugaru S. et al.** 13214 (35); 13232 (35); 13263 (10); 20149 (89); **Tsugaru S. & T. Takahashi** 19336 (35); 22778 (10); **Tsui H. P.** 30 (52); **Tsui T. M.** 105 (106); 185 (106); 216 (106); 781 (106); **Tsui Y. W.** 819 (96); 2900 (105); 5106 (13); 5829 (13); 5864 (13); 5892 (115); 10241 (110); 10243 (45); 10249 (45); 10279 (98); **Tu T. H.** 243 (27); 271 (106); 393 (103); 416 (34); 725 (27); 831 (103); 2069 (122); 2499 (19); 4985 (27); 4992 (122); **Tucker G. C.** 3314 (51); 4530 (68);

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