

Infrageneric Classification of the Genus *Eleutherococcus* Maxim. (Araliaceae) with a New Section *Cissifolius*

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The genus *Eleutherococcus* Maxim. is divided into five sections based on the morphology; *Eleutherococcus*, *Cissifolius* C.H. Kim and B.-Y. Sun (sect. nov.), *Acanthopanax* (Decne. & Planch.) H. Ohashi, *Cephalopanax* (Baill.) H. Ohashi and *Zanthoxylopanax* (Harms) H. Ohashi. Section *Acanthopanax* is further divided into two subsections; *Acanthopanax* and *Ionostachyae* (Nakai) C.H. Kim & B.-Y. Sun (comb. nov.). The new sect. *Cissifolius* is distinguished from others in having five fused carpels with free styles, solitary umbels at the end of branches, dioecious sexuality, and absence of tufted hairs in abaxial surface of leaf veins. The new section is most closely related to *Acanthopanax* in having free styles, solitary umbels, and dioecious sexuality. It is also related to *Eleutherococcus* in having five carpels and lacking tufted hairs on abaxial surface of leaves. Section *Cephalopanax* shares all characteristics other than the number of carpels with *Eleutherococcus*. Section *Zanthoxylopanax* is closely related to *Acanthopanax* in having two carpels with free styles, while it is also related to *Cephalopanax* by having bisexual flowers and umbels arranged in a simple cyme. Considering the evolutionary trend in the family Araliaceae, five-carpellate sections *Eleutherococcus* and *Cissifolius* are more primitive than two-carpellate sections *Acanthopanax*, *Cephalopanax*, and *Zanthoxylopanax*. Section *Zanthoxylopanax* seems to be intermediate between *Acanthopanax* and *Cephalopanax*.

Keywords: *Eleutherococcus*, *Acanthopanax*, *Cissifolius*, *Zanthoxylopanax*, *Cephalopanax*, phylogenetic relationship

The genus *Eleutherococcus* Maxim. comprises 48 taxa, containing important medicinal plants, distributed mainly in the far east of Asia including China, Korea, and Japan with some members extending to the southwestern region of Asia such as India, Indonesia, Myanmar, Vietnam, and Malaysia (Kim, 1997). Members of *Eleutherococcus* are shrubs and well characterized by the presence of prickles, palmately compound leaves with three to five leaflets, umbels either borne solitarily or arranged into simple cyme at the end of branch, and five-merous flowers with two to five fused carpels (Kim and Sun, 2000).

The genus *Eleutherococcus* was first established by Maximowicz (1859) based on a five-carpellate *Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim. as a type. Harms (1894) erroneously designated *Acanthopanax* (Decne. & Planch.) Witte as the generic name for the combination of *Eleutherococcus* and *Acanthopanax*, which was initially recognized as a subgenus of *Panax* L. by Decaisne & Planchon (1854) and raised to generic rank by Witte (1861). Harms (1894) recognized two sections *Acanthopanax* and *Eleutherococ-*

cus (Maxim.) Harms within the genus based on the number of carpels. Later, Harms (1918) proposed a more elaborate classification system by dividing the genus *Acanthopanax* into seven sections on the basis of the presence of prickles, the shape of leaf, the number of carpels, the extent of fusion of styles, the pattern of inflorescence: *Acanthopanax*, *Eleutherococcus*, *Cephalopanax* (Baill.) Harms, *Zanthoxylopanax* Harms, *Sciadophylloides* Harms, *Evodiopanax* Harms, and *Kalopanax* (Miq.) Harms (Table 1).

Nakai (1924) divided *Eleutherococcus sensu* Harms into four genera including *Eleutherococcus*, *Acanthopanax*, *Evodiopanax* (Harms) Nakai, and *Kalopanax* Miq. and further divided the genus *Acanthopanax* into three sections; *Acanthopanax* (= *Orthacanthopanax*), *Cephalopanax*, and *Sciadophylloides*. He also distinguished three subsections within sect. *Acanthopanax*, two of which were recognized as sections of the genus *Eleutherococcus sensu* Harms; *Acanthopanax* (= *Euacanthopanax*), *Zanthoxylopanax* (Harms) Nakai, and *Ionostachyae* Nakai.

Since Nakai's treatment of *Eleutherococcus sensu* Harms in 1924, most botanists agreed to recognize *Kalopanax* and *Evodiopanax* as distinct genera (Li, 1942; Ohwi, 1984; Shang, 1985; Ohashi, 1987). Moreover, Shang and Huang (1993) raised sect. *Scia-*

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Table 1. Comparison of classification systems of *Eleutherococcus* and related genera. The number in parentheses indicates the number of species included.

Harms (1918)	Nakai (1924)	Present study
Genus <i>Acanthopanax</i> sect. <i>Sciadophylloides</i>	Genus <i>Acanthopanax</i> sect. <i>Sciadophylloides</i>	Genus <i>Chengiopanax</i> (2)
sect. <i>Cephalopanax</i>	sect. <i>Cephalopanax</i>	Genus <i>Eleutherococcus</i> sect. <i>Cephalopanax</i> (3)
sect. <i>Zanthoxylopanax</i>	sect. <i>Orthacanthopanax</i> subsect. <i>Zanthoxylopanax</i>	sect. <i>Zanthoxylopanax</i> (3)
sect. <i>Euacanthopanax</i>	subsect. <i>Euacanthopanax</i>	sect. <i>Acanthopanax</i> subsect. <i>Acanthopanax</i> (6)
	subsect. <i>Ionostachyae</i>	subsect. <i>Ionostachyae</i> (1)
	Genus <i>Eleutherococcus</i>	sect. <i>Cissifolius</i> (11)
sect. <i>Eleutherococcus</i>		sect. <i>Eleutherococcus</i> (10)
sect. <i>Evodiopanax</i>	Genus <i>Evodiopanax</i>	Genus <i>Gamblea</i> (4) (<i>Evodiopanax</i>)
sect. <i>Kalopanax</i>	Genus <i>Kalopanax</i>	Genus <i>Kalopanax</i> (1)

dophylloides to a new genus *Chengiopanax* C.B. Shang & J.Y. Huang, which was supported by a recent monographic study on the genus *Eleutherococcus sensu* Harms (Kim, 1997; Table 1).

In this study, we proposed a new infrageneric classification system and provided the identification key to the subdivisions of the genus *Eleutherococcus*. Section *Cissifolius* C.H. Kim and B.-Y. Sun was newly described and phylogenetic relationships among the subgroups in the genus.

MATERIALS AND METHODS

Descriptions were made by field observations as well as the examination of herbarium materials. Herbarium materials were loaned from various herbaria (A, AAUF, ANSP, B, BM, C, E, FI, IBK, K, KUN, KYO, L, LINN, MAK, MAH, MO, NAS, NY, P, PE, PNH, S, SING, SNU, SNUA, TI, U, UC, and US). Field observations were made from a number of wild populations in Korea, Japan, and China. Voucher specimens collected from wild populations were deposited in Chonbuk National University Herbarium (JNU).

About 2,500 specimens including type materials were examined in this study. Morphological characters including the characteristics of twigs, leaves, inflorescences, flowers, and sexuality were directly assessed or measured referring type specimen and original description of each taxon.

RESULTS AND DISCUSSION

Infrageneric Relationships

The newly proposed sect. *Cissifolius* is well distinguished from other sections by five fused carpels with free styles (Fig. 2), solitary umbels at the end of branches (Fig. 3), dioecious sexuality (Fig. 4), and the absence of tufted hairs on veins of abaxial side of leaves (Fig. 1). Previously, members of sect. *Cissifolius* were included either in sect. *Acanthopanax* by Harms (1918), who emphasized the degree of fusion of styles to recognize the sections, or in the genus *Eleutherococcus sensu* Nakai (1924) by Nakai (1924, 1927), who emphasized the number of carpels as a diagnostic character at generic level.

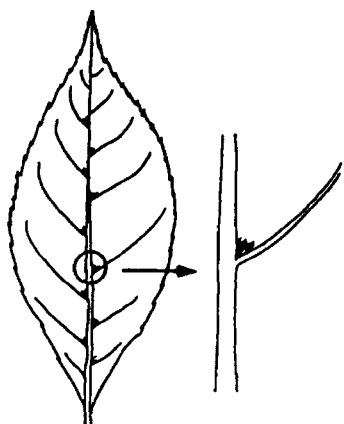


Figure 1. Tufted hairs in the axil of vein on the lower surface of leaflet present in sect. *Acanthopanax* and some taxa of sect. *Zanthoxylopanax*. They are absent in sections *Eleutherococcus*, *Cissifolius*, *Cephalopanax*, and some taxa of sect. *Zanthoxylopanax*.

Section *Cissifolius* seems to be closely related to sect. *Acanthopanax* in having free styles, solitary umbels, and dioecious sexuality, but it is well distin-

guished by having five fused carpels with free styles and lacking abaxial tufted hairs in the leaves. The section is also similar to sect. *Eleutherococcus* in having five carpels and lacking abaxial tufted hairs in leaves, but readily distinguished by its free styles and solitary umbels. Section *Eleutherococcus* usually has fused styles and umbels arranged in a simple cyme at the end of current year's long shoots. Two-carpellate sect. *Cephalopanax*, little in common with sect. *Cissifolius*, is closely related to five-carpellate sect. *Eleutherococcus* in all characteristics, including fused styles, umbels arranged in a simple cyme, the absence of abaxial tufted hairs, and bisexual flowers, with the exception of the number of carpels. Section *Zanthoxylopanax* is not only closely related to sect. *Acanthopanax* in having two carpels with free styles but also related to sect. *Cephalopanax* by having umbels arranged in a simple cyme and bisexual flowers. Considering the evolutionary trends to the direction of reduction and fusion of floral parts occurred in the family Araliaceae (Li, 1942; Hoo, 1961; Eyde and Tseng, 1971), it appears that five-carpellate sects. *Eleutherococcus* and *Cissifolius* are relatively primitive than two-carpellate sects. *Acanthopanax*, *Cephalopanax*, and *Zan-*

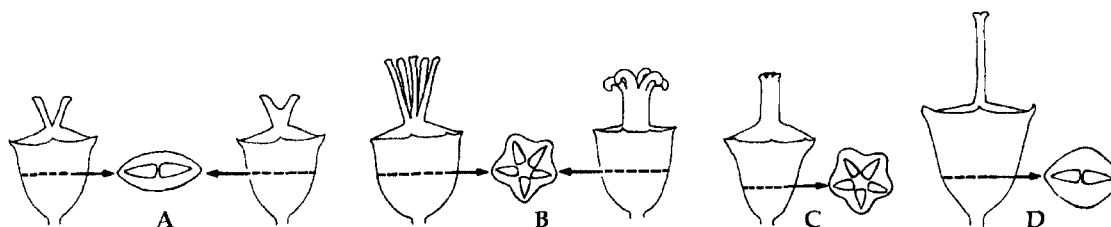


Figure 2. Schematic diagrams of number of carpels and styles in *Eleutherococcus*; A, two carpels with free styles and partially united styles of sect. *Acanthopanax* and sect. *Zanthoxylopanax*; B, five carpels with free styles and partially united styles of sect. *Cissifolius*; C, five carpels with one united style of sect. *Eleutherococcus*; D, two carpels with one united style of sect. *Cephalopanax*.

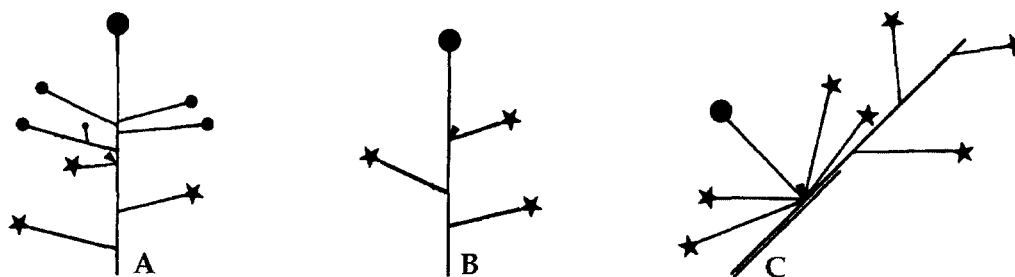


Figure 3. Schematic diagrams of occurrence and morphology of inflorescence in *Eleutherococcus*; A, simple cyme appeared in sects. *Eleutherococcus*, *Cephalopanax*, *Zanthoxylopanax*, and rarely in sect. *Cissifolius*; B, solitary umbel at apex of long branches in *Acanthopanax* subsect. *lonostachyae* and some taxa of sect. *Cissifolius*; C, solitary umbel at apex of short branches in *Acanthopanax* subsect. *Acanthopanax* and some taxa of sect. *Cissifolius*. Stars indicate palmately compound leaves. Circles indicate simple umbel and the size of circles indicates flowering sequence as large one opens earlier. Triangles indicate pseudoterminia buds.

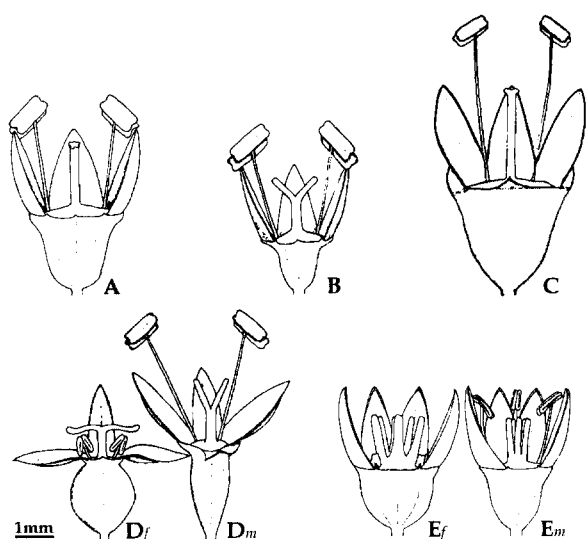


Figure 4. Sexual differentiation in *Eleutherococcus*; A, B, C, bisexual flowers of sect. *Eleutherococcus* (A), sect. *Zanthoxylopanax* (B), and sect. *Cephaloanpanax* (C); D_f, pistillate flower, D_m, staminate flower of sect. *Acanthoanpanax*; E_f, pistillate flower, E_m, staminate flower of sect. *Cissifolius*.

thoxylopanax. Section *Zanthoxylopanax* seems to be placed intermediate between sects. *Acanthoanpanax* and *Cephaloanpanax*.

Taxonomic Synopsis

Key to the sections of *Eleutherococcus*

- 1. Carpels five 2
- Carpels two 3
- 2. Hermaphroditic; umbels arrange simple cyme in a long branch; one connated style with five-lobed stigmas I. sect. *Eleutherococcus*
- Dioecious, rarely polygamous; umbel largely solitary in a long or a short branch; five free styles, connate at base or to middle, rarely up to top 2/3 of style V. sect. *Cissifolius*
- 3. Dioecious; umbel solitary in a long or short branch; two free styles II. sect. *Acanthoanpanax*
- Hermaphroditic; umbels arrange simple cyme in a long branch; one connated style or two free styles 4
- 4. One connated style with two-lobed stigmas III. sect. *Cephaloanpanax*
- Two free styles, connate at base or to middle, rarely up to top 2/3 of style IV. sect. *Zanthoxylopanax*

Genus *Eleutherococcus* Maxim. Mem. Acad. Imp. Sci. St.-Petersbourg Divers Savans. 9: 132. 1859.

- Type: *E. senticosus* (Rupr. & Maxim.) Maxim (*Hedera senticosa* Rupr. & Maxim.).

Acanthoanpanax (Decne. & Planch.) Witte, Ann. Hort. Bot. 4: 89. 1861. - *Panax* L. subgen. *Acanthoanpanax* Decne. & Planch., Rev. Hort. 4: 105. 1854. - Type: *A. spinosus* (L. f.) Miq. (*E. spinosus* (L.f.) S.Y. Hu).

I. Sect. *Eleutherococcus* - *Acanthoanpanax* sect. *Eleutherococcus* (Maxim.) Harms in Engler & Prantl, Nat. Pflanzenfam. 3: 49. 1894. - Type as above.

Plants hermaphroditic. Umbels arranged in a simple cyme at apex of long branches; carpels 5 (3-8); styles united to apex into a single column, 5 (3-8)-fid only at top.

Taxa included:

- 1. *Eleutherococcus baoxinensis* (X.P Fang & C.K. Hsieh) P.S. Hsu & S.L. Pan
Distribution: China (Sichuan).
- 2. *Eleutherococcus brachypus* (Harms) Nakai var. *brachypus*
Distribution: China (Gansu, Shanxi, Shaanxi).
- 2¹. *Eleutherococcus brachypus* (Harms) Nakai var. *omeiensis* C.H. Kim & B.-Y. Sun
Distribution: China (Sichuan).
- 3. *Eleutherococcus cuspidatus* (G. Hoo) H. Ohashi
Distribution: China (Sichuan).
- 4. *Eleutherococcus henryi* Oliv.
Distribution: China (Gansu, Henan, Hubei, Shanxi, Shaanxi, Zhejiang).
- 5. *Eleutherococcus huangshanensis* C.H. Kim & B.-Y. Sun
Distribution: China (Anhui).
- 6. *Eleutherococcus hypoleucus* (Makino) Nakai
Distribution: Japan (Honshu, Kyushu, Shikoku).
- 7. *Eleutherococcus leucorrhizus* Oliv. var. *leucorrhizus*
Distribution: Bhutan, China (Gansu, Hubei, Sichuan, Yunnan).
- 7¹. *Eleutherococcus leucorrhizus* Oliv. var. *fulvescens* (Harms & Rehder) Nakai
Distribution: China (Hubei, Shaanxi, Sichuan, Yunnan).
- 8. *Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim.
Distribution: China (Hebei, Heilongjiang, Inner Mongolia, Jilin, Liaoning), Japan (Hokkaido), Korea (Gangwon, Gyungbuk, Gyunggi, Hambuk, Hamnam, Jeonbuk, Pyungbuk, Pyungnam), Russia (Amur, Primorsk, Sakhalin).
- 9. *Eleutherococcus setchuenensis* (Harms) Nakai
Distribution: China (Gansu, Guizhou, Hubei,

Shanxi, Shaanxi, Sichuan).

10. *Eleutherococcus simonii* (C.K. Schneid.) Hesse

Distribution: China (Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang).

II. Sect. *Acanthopanax* (Decne. & Planch.) H. Ohashi, J. Jap. Bot. 62: 355. 1987. - *Panax* subgen. *Acanthopanax* Decne. & Planch., Rev. Hort. 4: 105. 1854. pro parte. - *Acanthopanax* sect. *Euacanthopanax* (Decne. & Planch.) Harms in Engler & Prantl, Nat. Pflanzenfam. 3: 50. 1894. pro parte. - *Acanthopanax* sect. *Orthacanthopanax* Nakai, J. Arnold Arb. 5: 1. 1924. excl. subsect. *Zanthoxylopanax* (Harms) Nakai - Type: *E. spinosus* (Decne. & Planch.) S.Y. Hu

Plants dioecious. Leaflets with tufted hairs in vein axils on lower surface. Umbel solitary at apex of long (subsect. *lonostachyae*) and short branches (subsect. *Acanthopanax*); carpels 2 (3); styles free, 2 (3), united at base (subsect. *lonostachyae*) and to middle part (subsect. *Acanthopanax*).

II-1. Subsect. *Acanthopanax* - Type and description as above.

Taxa included:

11. *Eleutherococcus gracilistylus* (W.W. Sm.) S.Y. Hu var. *gracilistylus*

Distribution: China (Anhui, Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, Zhejiang), Korea (Jeju).

11¹. *Eleutherococcus gracilistylus* (W.W. Sm.) S.Y. Hu var. *trifoliatus* (C.B. Shang) H. Ohashi

Distribution: China (Anhui, Fujian, Jiangxi, Zhejiang).

12. *Eleutherococcus japonicus* (Franch. & Sav.) Nakai
Distribution: Japan (Honshu, Kyushu, Shikoku).

13. *Eleutherococcus nikaianus* (Koidz.) H. Ohashi
Distribution: Japan (Honshu, Kyushu, Shikoku).

14. *Eleutherococcus nodiflorus* (Dunn) S.Y. Hu
Distribution: China (Guangdong, Guangxi, Sichuan).

15. *Eleutherococcus pubescens* (Pamp.) C.H. Kim & B.-Y. Sun

Distribution: China (Hubei, Henan, Jiangsu, Shanxi, Sichuan).

16. *Eleutherococcus spinosus* (L.f.) S.Y. Hu

Distribution: Japan (Hokkaido, Honshu, Shikoku).

II-2. Subsect. *lonostachyae* (Nakai) C.H. Kim & B.-Y. Sun, **comb. nov.** - *Acanthopanax* sect. *Orthacanthopanax* subsect. *lonostachyae* Nakai, J. Arnold Arb. 5: 4. 1924. - Type: *E. trichodon* (Franch. & Sav.) H.

Ohashi - Description as above.

Taxon included:

17. *Eleutherococcus trichodon* (Franch. & Sav.) H. Ohashi

Distribution: Japan (Honshu, Shikoku).

III. Sect. *Cephalopanax* (Baill.) H. Ohashi, J. Jap. Bot. 62: 356. 1987. - *Cephalopanax* Baill., Adansonia 12: 149. 1879. - *Acanthopanax* sect. *Cephalopanax* (Baill.) Harms, Mitt. Deutsch. Dendrol. Ges. 27: 14. 1918. - Lectotype: *E. sessiliflorus* (Rupr. & Maxim.) S.Y. Hu (designated by Hoo & Tseng [1965]).

Plants hermaphroditic. Umbels arranged in a simple cyme at apex of long branches; carpels 2 (3); styles united to apex into a single column, 2 (3)-fid only at top.

Taxa included:

18. *Eleutherococcus connatistylus* (S.C. Li & X.M. Liu) C.H. Kim & B.-Y. Sun, **comb. nov.** - *Acanthopanax connatistylus* S.C. Li & X.M. Liu, J. Anhui Agr. Coll. 14: 9. 1987. - Type: China, Anhui, Shitaixian, 21 Sept 1981, C.H. Wu 0005501 (holotype: AAUF!).

Distribution: China (Anhui, Zhejiang).

19. *Eleutherococcus divaricatus* (Siebold & Zucc.) S.Y. Hu var. *divaricatus*

Distribution: China (Henan, Shanxi, Zhejiang), Japan (Hokkaido, Honshu, Kyushu, Shikoku), Korea (Gyungbuk, Gyunggi, Pyungbuk; very rare).

19¹. *Eleutherococcus divaricatus* (Siebold & Zucc.) S.Y. Hu var. *chiisanensis* (Nakai) C.H. Kim & B.-Y. Sun

Distribution: Korea (Chungbuk, Chungnam, Gangwon, Gyungbuk, Gyunggi, Hambuk, Hamnam, Hwanghae, Jeju, Jeonbuk, Jeonnam, Pyungnam, Seoul).

20. *Eleutherococcus sessiliflorus* (Rupr. & Maxim.) S.Y. Hu

Distribution: China (Heilongjiang, Hebei, Inner Mongolia, Jilin, Liaoning, Shanxi), Korea (Chungbuk, Chungnam, Gangwon, Gyungbuk, Gyunggi, Hambuk, Hamnam, Hwanghae, Jeonbuk, Jeonnam, Pyungbuk, Pyungnam), Russia (Amur, Khabarovsk, Primorsk, Sakhalin).

IV. Sect. *Zanthoxylopanax* (Harms) H. Ohashi, J. Jap. Bot. 62: 356. 1987. - *Acanthopanax* sect. *Zanthoxylopanax* Harms, Mitt. Deutsch. Dendrol. Ges. 27: 26. 1918. - *Acanthopanax* sect. *Orthacanthopanax* subsect. *Zanthoxylopanax* (Harms) Nakai, J. Arnold Arbor. 5: 1. 1924. - Type: *E. trifoliatus* (L.) S.Y. Hu

Plants hermaphroditic. Leaflets with tufted hairs in vein axils on lower surface or not. Umbels arranged in a simple cyme at apex of long branches; carpels 2 (3); styles free, 2 (3), united to middle, rarely up to the top 2/3 of the style.

Taxa included:

21. *Eleutherococcus lasiogyne* (Harms) S.Y. Hu var. *lasiogyne*

Distribution: China (Sichuan, Yunnan).

21¹. *Eleutherococcus lasiogyne* (Harms) S.Y. Hu var. *ferrugineus* (Y.R. Li) H. Ohashi

Distribution: China (Xizang).

22. *Eleutherococcus scandens* (G. Hoo) H. Ohashi

Distribution: China (Anhui, Jiangxi, Zhejiang).

23. *Eleutherococcus trifoliatus* (L.) S.Y. Hu var. *trifoliatus*

Distribution: Bangladesh, China (Fujian, Guangdong, Guangxi, Guizhou, Hongkong, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang), India (Assam), north Myanmar, Philippines (Luzon), Taiwan, north Thailand, north Vietnam.

23¹. *Eleutherococcus trifoliatus* (L.) S.Y. Hu var. *setosus* (H.L. Li) H. Ohashi

Distribution: China (Guangdong, Guangxi, Hunan), Taiwan.

V. Sect. *Cissifolius* C.H. Kim & B.-Y. Sun, **sect. nov.**
- Type: *E. cissifolius* (Griff.) Nakai (*A. cissifolia* Griff.).

Acanthopanax sect. *Euacanthopanax* (Decne. & Planch.) Harms in Engler & Prantl, Nat. Pflanzenfam. 3: 50. 1894. 1918. pro parte.

Polygamo-dioici; folia subtus absque tomentosis in axillas costa et vein secundus. Umbella in ramulo abbreviato vel elongato terminalis solitaria raro simplex cymae ordinae; ovarium 5-loculare; stylis 5, fere liberis, basi vel ad medium connatis, fere ad stylis 2/3 connatis.

Plants dioecious, rarely polygamous. Leaflets without tufted hairs in vein axils on lower surface. Umbel solitary, rarely arranged simple cyme at apex of long or short branches; carpels 5; styles free, 5, united at base or to middle, rarely up to the top 2/3 of the style. This section comprises into 11 species and two varieties.

Taxa included:

24. *Eleutherococcus cissifolius* (Griff.) Nakai var. *cissifolius*

Distribution: Bhutan, China (Yunnan), India (Sikkim), Nepal.

24¹. *Eleutherococcus cissifolius* var. *scandens* (Edgew.) Nakai

Distribution: China (Xizang, Yunnan), India (East-northern region), Nepal.

25. *Eleutherococcus girdalii* (Harms) Nakai

Distribution: China (Gansu, Hubei, Shaanxi, Sichuan).

26. *Eleutherococcus nanpingensis* (X.P. Fang & C.K. Hsieh) P.S. Hsu & S.L. Pan

Distribution: China (Sichuan).

27. *Eleutherococcus pilosulus* (Rehder) C.H. Kim & B.-Y. Sun

Distribution: China (Gansu, Qinghai).

28. *Eleutherococcus pseudosetulosus* C.H. Kim & B.-Y. Sun

Distribution: China (Sichuan).

29. *Eleutherococcus rehderianus* (Harms) Nakai var. *rehderianus*

Distribution: China (Hubei).

29¹. *Eleutherococcus rehderianus* (Harms) Nakai var. *longipedunculatus* (G. Hoo) H. Ohashi

Distribution: China (Gansu, Shaanxi, from Hoo & Tseng, 1978).

30. *Eleutherococcus setulosus* (Franch.) S.Y. Hu

Distribution: China (Gansu, Sichuan, Zhejiang).

31. *Eleutherococcus sieboldianus* (Makino) Koidz.

Distribution: China (Shaanxi, Sichuan), Japan, Korea (naturalized).

32. *Eleutherococcus stenophyllus* (Harms) Nakai

Distribution: China (Gansu, Shaanxi, Sichuan).

33. *Eleutherococcus verticillatus* (G. Hoo) H. Ohashi

Distribution: China (Xizang, from Hoo & Tseng, 1978)

34. *Eleutherococcus wilsonii* (Harms) Nakai

Distribution: China (Henan, Hubei, Shanxi, Shaanxi, Sichuan, Xizang, Yunnan).

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