

## **The Araliaceae of Thailand**

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**ABSTRACT.** A revision of Araliaceae for the Flora of Thailand has recently been completed. 53 species in 12 genera were recognized. There are six species endemic to Thailand. Two new species were found during the studies, and three new records for Thailand. Seven new synonyms were proposed. Keys to the genera are provided in this paper. Several of the genera are discussed briefly, and a few open taxonomic problems mentioned.

**KEY WORDS:** Araliaceae, taxonomy, Thailand.

### **INTRODUCTION**

The Araliaceae are a family of predominantly woody plants. They mostly have compound leaves with various kinds of division. Sometimes a leaf dimorphism is present, so that younger leaves are significantly different from those associated with flowers. Very typical are the stipules, which are partly or completely connate and form a sheath at the petiole base with or without free lobes. These stipules usually allow for recognition of the family in sterile condition. Flowers and fruits are always grouped in umbels, which can be united into larger compound inflorescences. Flowers are usually 5-merous, with an inferior ovary. Each carpel bears two ovules, of which always one aborts. Fruits are drupes with very often five carpels, seeds and stigmas. Different numbers are often diagnostically important.

The family has ca 50 genera and 1,400 species, mostly tropical but with several species in temperate areas up to Siberia. Oceania and E and SE Asia have the largest generic diversity. The taxonomy has recently been updated in the World Checklist of Araliaceae (Frodin & Govaerts, 2003). According to recent studies of molecular phylogenies, subfamily Hydrocotyloideae Link, formerly placed in Apiaceae, is now part of Araliaceae. The Hydrocotyloideae have already been published in the Flora of Thailand as part of the Apiaceae (Hedge & Lamond, 1992). The Araliaceae will therefore been treated here and in the Flora of Thailand treatment without this subfamily.

### **RESULTS**

Table 1 gives an overview of the taxonomic diversity of the Araliaceae in Thailand. It shows that there are no endemic genera, and six endemic species out of the total of 53. The genera can be distinguished with the following three keys:

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## KEY TO THE GENERA (FLOWERING PLANTS)

1. Petals imbricate, always 5
  2. Plant a rhizomatous herb **Panax**
  2. Plant a woody shrub or climber without notable rhizome **Aralia**
1. Petals valvate, sometimes fused into a calyptra, (4–)5 to many
  3. Pedicel distinctly articulated immediately below the ovary
    4. Petiole base long-sheathing, leaves 2–3-pinnate (cultivated) **Polyscias**
    4. Petiole base not long-sheathing, leaves digitately compound (indigenous) **Macropanax**
  3. Pedicel not articulated below the ovary, apically continuous
    5. Styles separate, divergent at apex **Schefflera**
    6. Styles 5 or more **Heteropanax**
    6. Styles 2 **Eleutherococcus**
    7. Plant not spiny. Leaves pinnate
    7. Plant spiny. Leaves digitately compound
  5. Styles united into a single column
  8. Locules 2–(3) **Brassaiopsis**
  8. Locules 1, (4–)5 or more
    9. Locule 1. Leaves opposite in flowering shoots **Arthrophyllum**
    9. Locules (4–)5 or more. Leaves all alternate
      10. Leaves simple, sometimes lobed
        11. Plant a shrub or tree, glabrous **Dendropanax**
        11. Plant a climber, pubescent **Hedera**
      10. Leaves palmately lobed or compound
        12. Plant not spiny. Petiolules free at base **Schefflera**
        12. Plant spiny. Petiolules connected by laminal tissue at base **Trevesia**

## KEY TO THE GENERA (FRUITING PLANTS)

1. Stigmas sessile, or styles fused, forming a single spike or stylopodium
  2. Pedicel distinctly articulated immediately below the ovary
    3. Leaves digitate. Fruits with 2 locules and seeds or, if 5-locular, seeds over 15 mm long **Macropanax**
    3. Leaves pinnate (rarely simple). Fruits with 2–5 locules and seeds less than 15 mm long
      4. Plant glabrous, not spiny. Cultivated **Polyscias**
      4. Plant pubescent, spiny or not. Native **Aralia**
  2. Pedicel continuous, not articulated below the ovary
    5. Lower leaves pinnate, upper leaves simple and opposite. Fruits with 1 locule and seed **Arthrophyllum**
    5. Leaves simple or palmately lobed or digitately compound, alternate. Fruits with 2 or more locules and seeds
      6. Fruit with 2–(3) locules and seeds **Brassaiopsis**
      6. Fruit with 5 or more locules and seeds
        7. Leaves simple to very slightly lobed
          8. Plant a shrub or tree, glabrous **Dendropanax**
          8. Plant a climber, pubescent **Hedera**
        7. Leaves strongly lobed to digitately compound
          9. Plants not spiny. Leaflets with petiolules free at the base **Schefflera**
          9. Plants spiny. Leaflets with petiolules joined by laminal tissue at the base **Trevesia**
  1. Styles 2 or more, divergent at least at apex
    10. Styles, locules and seeds 2
      11. Plant not spiny. Leaves pinnate. Fruits distinctly flattened **Heteropanax**
      11. Plant spiny. Leaves digitately compound. Fruits not distinctly flattened **Eleutherococcus**
    10. Styles, locules and seeds 5 or more
      12. Plant a rhizomatous herb, the leaves in a single whorl **Panax**
      12. Plant a woody climber, shrub or tree, the leaves alternate
        13. Plant glabrous. Leaves simple. Umbels 1–6, without a main axis **Dendropanax**
        13. Plant pubescent to rarely glabrous. Leaves compound. Umbels numerous (more than 6), along a main axis, or more rarely 1–6 and without a main axis
          14. Leaves pinnate **Aralia**
          14. Leaves digitately compound **Schefflera**

## KEY TO THE GENERA (VEGETATIVE CHARACTERS)

- 1. A rhizomatous herb, the leaves in a single whorl **Panax**
- 1. A shrub, climber or tree, the leaves alternate to opposite
  - 2. Leaves simple to lobed but not digitately or pinnately compound
    - 3. Leaves opposite (flowering shoots only) **Arthrophyllum**
    - 3. Leaves alternate
      - 4. Leaves ovate or elliptic (see also *Polyscias*)
        - 5. Plant a climber, pubescent **Hedera**
        - 5. Plant a shrub or tall tree, glabrous **Dendropanax**
      - 4. Leaves palmately lobed
        - 6. Plant a climber, not spiny **Hedera**
        - 6. Plant a shrub or tree, spiny **Brassaiopsis** or **Trevesia**
  - 2. Leaves digitately or pinnately compound
    - 7. Leaves digitately compound
      - 8. Plants not spiny **Macropanax** or **Schefflera**
      - 8. Plants spiny
        - 9. Leaflets sessile **Eleutherococcus**
        - 9. Leaflets with petiolules
          - 10. Base of petiolules free (rarely webbed) **Brassaiopsis**
          - 10. Base of petiolules webbed **Trevesia**
    - 7. Leaves pinnately compound
      - 11. Leaves once pinnate or trifoliolate
        - 12. Shrubs **Aralia** (sect. **Pentapanax**)
        - 12. Trees **Arthrophyllum**
      - 11. Leaves twice or more pinnate
        - 13. Plants spiny **Aralia** (sect. **Dimorphanthus**)
        - 13. Plants not spiny
          - 14. Leaflets serrate to irregularly lacinate **Polyscias**
          - 14. Leaflets entire **Heteropanax**

Table 1. Taxonomic diversity of Thai *Araliaceae*, genera sorted according to Thai species numbers

Genus	Thai spp.	Thai endemics	Overall species
<i>Schefflera</i>	20	3	> 1,000
<i>Aralia</i>	8	-	ca 60
<i>Brassaiopsis</i>	6	-	ca 25
<i>Trevesia</i>	4	1	7
<i>Arthrophyllum</i>	3	2	30-40
<i>Macropanax</i>	3	-	17
<i>Polyscias</i>	3	-	116
<i>Dendropanax</i>	2	-	ca 100
<i>Eleutherococcus</i>	1	-	38
<i>Hedera</i>	1	-	15
<i>Heteropanax</i>	1	-	5
<i>Panax</i>	1	-	10
total	53	6	-

Several of the genera are discussed briefly below.

## DISCUSSION

*Aralia* L. has pinnately compound leaves. The Thai species can be grouped into two distinct groups, that are sometimes treated as separate genera but as subgenera of *Aralia* here: sect. *Pentapanax* (Seem.) J.Wen, non-spiny shrubs with the leaves once pinnate to trifoliolate and smaller, usually simple inflorescences and sect. *Dimorphanthus* (Miq.) Miq., spiny and often climbing shrubs with large, at least twice pinnate leaves and large compound inflorescences. The Thai species of sect. *Pentapanax* are often rare and in montane forests; some of the species of sect. *Dimorphanthus* are quite widespread in various and often disturbed forests.

*Arthrophyllum* Blume is a predominantly Malesian genus of forest trees that have a unique architecture. Vegetative leaves are large, alternate and pinnately compound with numerous opposite leaflets. The leaves of fertile shoots, however, are small, simple and opposite, each leaf often very similar to a leaflet of lower leaves. A complete modern revision of this genus has never been published (the revisions of Philipson, 1977, 1979, are only tentative and incomplete), and because of the large pinnate leaves complete collections are rare. There are three Thai species, known from few localities in Peninsular and SE Thailand only. Two of them are endemic (*A. ferrugineum* Craib, *A. meliifolium* Craib). The third one is called *A. diversifolium* Blume here, but further studies are needed to establish the correct taxonomy of this complex species with a type from Java; therefore, the name is applied here with some doubts. Two new synonyms were proposed while uniting some of Craib's species.

*Dendropanax* Decne. & Planch. occurs in the Neotropics and E Asia, with few species reaching SE Asia. The genus is very similar to *Hedera* L. (ivy), and both share simple leaves and simple umbels as inflorescences. In contrast to the climbing and pubescent *Hedera*, *Dendropanax* grows as non-climbing shrubs and trees and is glabrous. There are two rare species in Thailand, *D. lancifolius* (Ridl.) Ridl. (Yala Province), and *D. maingayi* King (Chanthaburi Province). One new synonym was established. It is remarkable that both species have not been re-collected since Kerr.

*Macropanax* Miq. includes 17 species in total, 12 of which are local endemics in Vietnam and China. The three Thai taxa are the most widespread ones in the genus, and are not rare. The genus has digitately compound leaves and compound inflorescences. It is similar to *Schefflera* and often confused with it. The genera may be difficult to distinguish when sterile, but when in flower then *Macropanax* has very typical flowers and fruits with a distinct articulation along the pedicel, which is supported by a tissue ring that often appears like a small second calyx.

*Panax* L. is of course an important genus of medicinal plants, and comprises the only araliaceous herbs in Thailand. Many taxonomically important characters are provided by the underground organs that are used medicinally ('ginseng roots') but are often not collected for herbarium specimens. Therefore, the only species in Thailand has been cited under three different names in recent literature. It was treated, provisionally, under *Panax pseudoginseng* Wall. var. *angustifolius* (Burkill) H.L.Li.

Three species of *Polyscias* J.R. & G.Forst. are cultivated in Thailand; they probably originate from the Pacific Islands. These species are widely cultivated because of the beautifully coloured leaves with unusual divisions. The taxonomy of these anthropogenic cultigens was quite confused in the past, but was clarified recently by Lowry *et al.* (1989).

*Schefflera* J.R. & G.Forst. is by far the largest genus in the family and in Thailand and has a worldwide distribution. Several genera have been separated from *Schefflera* by various authors in the past (such as *Tupidanthus* Hook.f.); *Schefflera* will, however, be treated in a wide sense here and in the Flora of Thailand treatment. There are 20 known species in Thailand. *Schefflera elliptica* (Blume) Harms is the only species of the family that is known from all parts of Thailand. Six species are known from one or two Thai collections only. The plants are often epilithic or epiphytic; they are never spiny and have digitately compound leaves and compound inflorescences. The plants can be glabrous or pubescent, and the hairs are never reddish-brown in Thailand (in contrast to *Brassaiopsis* Decne. & Planch.). The genus is taxonomically difficult, because of the large number of taxa and synonyms involved, and because a complete revision is missing (*Schefflera* was omitted from the Flora Malesiana treatment of the family published so far; Philipson, 1979). In particular the two most common and similar species, *S. bengalensis* Gamble and *S. elliptica* (Blume) Harms are part of larger species complex that is still insufficiently understood. We nevertheless felt confident enough to propose two new synonyms for the Flora of Thailand account not yet included in the World Checklist (Frodin & Govaerts, 2003). Two species are new records for Thailand. One undescribed species was collected only very recently by R. Pooma in the Umphang Wildlife Sanctuary, Tak province, and will be described separately.

*Trevesia* Vis. and *Brassaiopsis* Decne. & Planch. are similar SE Asian genera that show a leaf shape unique in flowering plants, at least in some of their species. The often large, palmately divided leaf blades have their lobes often constricted to the midveins near their base to form a pseudopetiolule ('webbed' or 'pseudocompound' leaves). *Trevesia* and *Brassaiopsis* also share a typical reddish-brown pubescence on leaves and flowers, and distinct spines on the stems and twigs. *Trevesia* is separated from *Brassaiopsis* by polymorous flowers (in contrast to 5-merous flowers with only 2–3 carpels in *Brassaiopsis*). The genus has seven species, and is the only one in the family that has the majority of the species (four) in Thailand. One new endemic species (*T. rufosetosa* Jebb) was discovered during these studies, and described from northern Thailand (Jebb, 1998). In the similar *Brassaiopsis*, one new record for Thailand was found, and one species may still prove to be new to science. *Brassaiopsis* can also have truly compound leaves similar to *Macropanax* and *Schefflera*, but can then be distinguished easily by the reddish-brown pubescence and the presence of spines.

The revision of Araliaceae for the Flora of Thailand showed that species limits are usually sufficiently clear cut. Most of the taxonomic problems could be solved. Only in *Arthrophyllum* and *Schefflera* few open problems remain that need to be solved in a monographic approach, for which reason a few names applied in the Flora treatment are only preliminary. In particular in *Schefflera*, additional new Thai records can be expected.

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