

MORPHOLOGICAL CHARACTERISTICS AND KEY TO GENERA OF FAMILY MENISPERMACEAE IN VIETNAM

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Menispermaceae is represented by about 70 genera and approximately 520 species. In Vietnam, it is represented by 19 genera, 50 species and two varieties, of which six species are endemic. Most species are dioecious climbers, rarely trees, shrubs, or herbs and distributed in tropical region, sometimes subtropical regions and warm temperate zones.

I. MATERIALS AND METHODS

This study of family Menispermaceae from Vietnam was based on field observations, laboratory and library work.

II. RESULTS AND DISCUSSION

Large woody vines (Fig. 1): They are usually 10 - 40 m long, and about 0.7 - 5 cm in diameter. *Tinomiscium*, *Albertisia*, *Lamicia*, *Pycnarrhena*, *Pachygone*, *Coscinium*, *Anamirta*, *Arcangelisia*, *Fibraurea*, *Diploclisia*, *Hypserpa* (Fig. 1). **Small woody vines**: 5 - 8 m, *Parabaena*, *Tiliacora*, *Tinospora*. **Herbaceous vines**: 1 - 4 m, *Cyclea*, *Cissampelos*, *Cucculus*, *Pericampylus* (Fig 1d). (Fig. 1b). *Stephania* is the only genus of the family having tuberous rootstock.

Leaves (Fig. 2): Stipules usually absent; Petiole often with proximal and distal pulvinus. Petiole vascular bundle transection annular. Leaf venation is usually palmatinerved, but few genera have pinnate venation. Leaves are typically more or less subpeltate, with the insertion of the petiole being scarcely in from the margin of the lamina, but few taxa have peltate leaves.

Inflorescence: The inflorescences of Menispermaceae are usually determinate, axillary or borne on defoliate branches (ramiflorous) or old wood (cauliflorous), rarely terminal, solitary or fasciculate; most often in racemes, cymes, or thyrses, sometimes in panicles or cymose heads, rarely reduced to solitary.

Flowers usually unisexual, small, inconspicuous, mostly pedicellate.



Fig. 1: Pictures of habit types of
Menispermaceae in Vietnam

a. erect shrubs: *Cocculus laurifolius*; b. woody climber: *Fibraurea recisa*; c. woody vines: *Cocculus orbiculatus*; d. Tuberous: *Stephania rotunda*. (Photographed by Vu Tien Chinh and Phan Ke Loc)

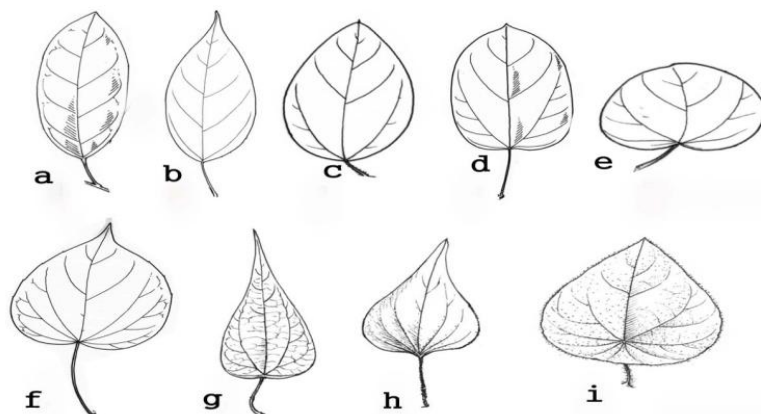


Fig. 2: **Leaf blade**; a. *Pycnarrhena lucida*; b. *Pycnarrhena poilanei*; c. *Cocculus orbiculatus*; d. *Tinomiscium petiolare*; e. *Cissampelos pareira*; f. *Parabaena sagittata*; g. *Cyclea sutchuensis*; h. *Cyclea tonkinensis*; i. *Cyclea barbata* (Vu Tien Chinh 2009).

Margin: entire (*Cyclea*, *Stephania*, *Tinospora*), serrate or lobed (*Parabaena sagittata*); Venation: palmate (*Anamirta*, *Arcangelisia*, *Cissampelos*, *Cocculus*, *Coscinium*, *Diploclisia*, *Fibraurea*, *Hypserpa*, *Parabaena*, *Pericampylus*, *Tiliacora*, *Tinospora*, and), pinnate (*Albertisia*, *Limacia*, *Pycnarrhena* and *Pachygone*)

Sepals: often (6-)-9(-12) in number in whorls of (2 or) 3(or 4), rarely reduced to 1 (in female flowers of *Stephania* and *Cyclea*), sometimes spirally arranged (*Hypserpa*), free or less often connate (*Cyclea*, *Cissampelos*), imbricate or valvate. Sepals are usually 3 - 6 in *Cissampelos*, *Cocculus*, *Cyclea* and *Stephania*. Sepals are usually cyclic in whorls of 3 or 6, 9 and free in *Albertisia*, *Limacia*, *Pachygone*, *Parabaena*, *Pericampylus*, *Pycnarrhena*, *Tinomiscium*, *Tinospora* and *Tiliacora*. Sepals are connate in genera *Cyclea* and *Cissampelos*.

Petal: absent in *Anmirta* *Arcangelisia*, *Coscinium*, *Fibraurea* and, *Pycnarrhena*. Petals are free in genera *Albertisia*, *Diploclisia*, *Limacia*, *Stephania*, *Pachygone*, *Tiliacora*, *Parabaena*, *Tinospora*, *Tinomiscium*, *Stephania*, *Tiliacora*. Petal apex 2-lobed or divaricate in *Cocculus*. Petals connate, sometimes sometimes free: *Cyclea*, *Cissampelos*.

Stamens: Mostly free in genera *Coscinium*, *Cocculus*, *Diploclisia*, *Fibraurea*, *Hypserpa*, *Limacia*, *Pachygone*, *Tiliacora*, *Tinomiscium* and *Tinospora*. Stamens are connate and form a synandrium in genera *Anamirta*, *Arcangelisia*, *Albertisia*, *Cyclea*, *Cissampelos*, *Parabaena*, *Pycnarrhena*, *Stephania*..

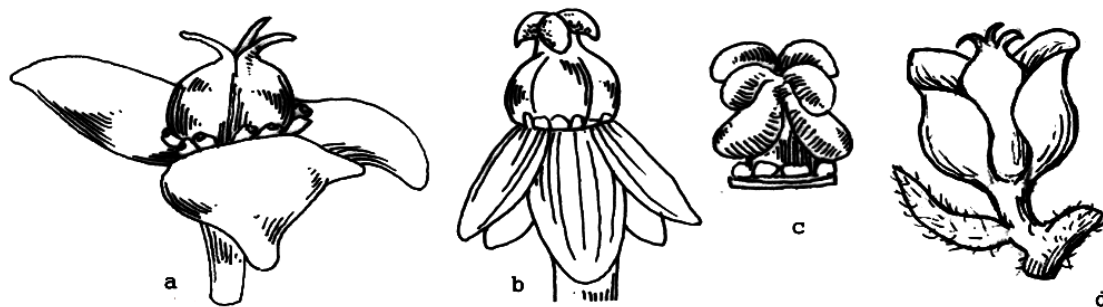


Fig 3: **The Carpels in Menispermaceae**
a. *Cocculus laurifolius*; b.c. *Anamirta cocculus*; *Cyclea tonkinensis*

Carpels (Fig. 3): Usually 3–6, Carpels are free in genera *Albertisia*, *Anamirta*, *Arcangelisia*, *Coscinium*, *Cocculus*, *Diploclisia*, *Fibraurea*, *Limacia*, *Pericampylus*, *Pycnarrhena*, *Tinomiscium*, *Tinospora*, *Parabaena*, *Tiliacora*, *Hypserpa* and *Pachygonos* (Fig. 3a –c). Usually one: *Cissamoelos*, *Cyclea*, *Stephania* (Fig. 3d).

Fruit (Fig. 4): An assemblage of single-seeded stipitate drupes that may be globose, discoid, columnar or branched carpophore, often flattened or strongly curved. Exocarp thin or leathery. Mesocarp fleshy to fibrous, sometimes sclerified.

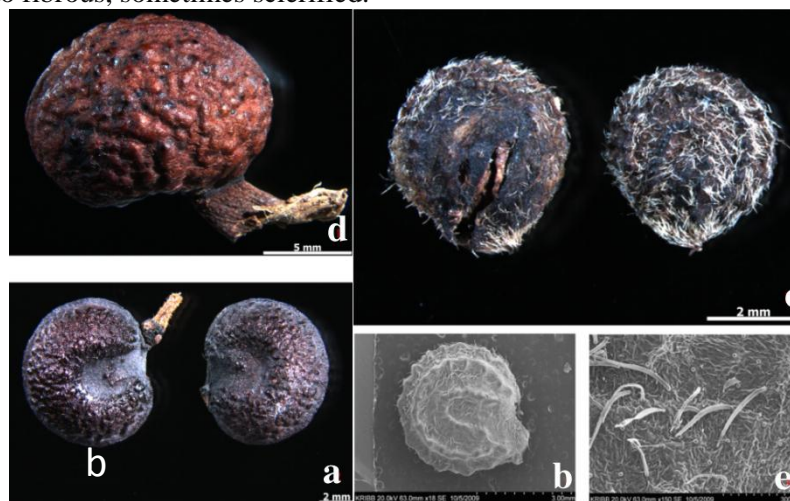


Fig. 4: Drupes in Menispermaceae

a. *Anamirta cocculus*; b. *Pachygone odorifera*; c,d,e *Cyclea tonkinensis*
(Photographed by Vu Tien Chinh)

Fruits in Menispermaceae are always apocarpous, they are more or less stipitate drupes. Their size varies considerably within the family; drupes can be globose (Fig. 4a,b), or hairy (Fig. 4c,d,e). The drupes of some *Cocculus* spp. are only 0.5 cm in diameter, but in genera *Abetisia* sp. up to 2 - 3 cm.

Seed (Fig. 4): The classification of Menispermaceae is principally based on the fruit (Diels 1910). It is always drupaceous, but with many variations in the shape of the endocarp. With the curving of the seed the result is the curving of the embryo. However, the endocarp is variously ornamented and provides important taxonomic distinguishing characters for distinguishing between and within genera.

Seed with prominent crest abaxially and two rows of spines on each surface: *Parabaena* (Fig. 5a).

Seed often horseshoe-shaped, sometimes curved; *Cissampelos*, *Cocculus*, *Cyclea*, *Hypserpa*, *Pericampylus*, *Diploclisia*, *Limacia*, *Tiliacora* and *Stephania*, (Fig. 5b). Seed often elliptic or rotund: *Albertisia*, *Anmirta*, *Coscinium*, *Fibraurea*, *Pycnarrhena*, *Tinospora*, *Tinomiscium*. Seed condyle perforate: *Stephania*. Endosperm usually copious (sometimes partially or entirely ruminant in *Tinosporaceae*; absent in most genera of *Abetisia*, *Pachygone*, *Pycnarrhena*), oily. Embryo small to large, straight or curved. Cotyledons usually thin, flat or terete, often fleshy (Fig. 5).

Typus: *Menispermum* L. 1753. Sp. Pl. 1031.

70 genera 520 species, distributed in mostly confined to the tropical lowland of both the Old and New World; 19 genera 55 species and two varieties in Vietnam.

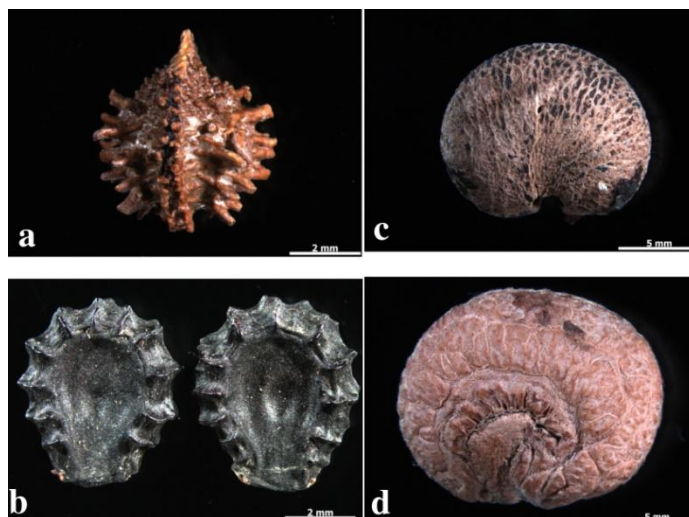


Fig. 5: Seeds in Menispermaceae

a. *Parabaena sagittata*; b. *Stephania* sp; c. *Pycnarrhena lucida*; d. *Pachygone valida*.
(Photographed by Vu Tien Chinh)

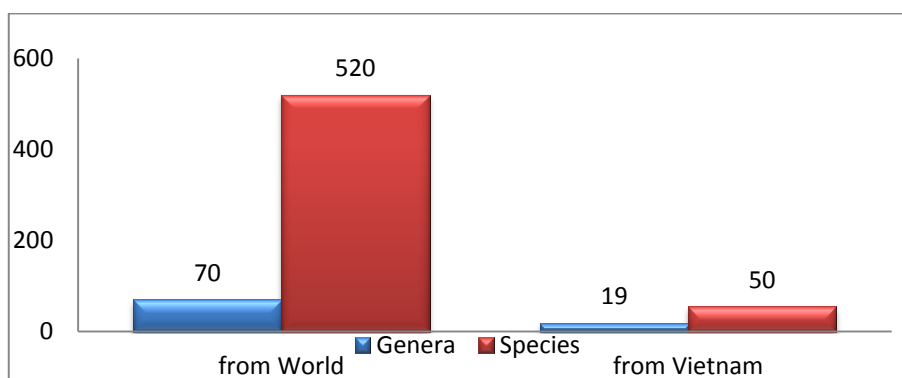


Fig. 6: Numbers of the genera and species
(Watson & Dallwitz 1992, Vu Tien Chinh 2014).

Kessler (1993), based on the literature and herbarium specimens, proposed a new system of *Menispermaceae*. He divided the family into 5 tribes *Pachygoneae* Miers, *Anomospermeae* Miers, *Tinosporeae* Hook. f. Thomson, *Fibraureae* Diels & *Menispermaea*. His classification system is as follows:

Key to the Tribes (modified from Kessler 1993)

- 1A. Endosperm absent**1. Pachygoneae**
- 1B. Endosperm present.
 - 2A. Endosperm ruminant.
 - 2B. Endosperm not ruminant.
 - 3A. Endosperm weakly ruminant, cotyledons not foliaceous, appressed**2. Anomospermeae**
 - 3B. Endosperm weakly ruminant, cotyledons foliaceous, divaricate..... **3. Tinosporeae**
 - 4A. Cotyledons thin, foliaceous, divaricate.....**4. Fibraureae**
 - 4B. Cotyledons subcarnose, not foliaceous, appressed **5. Menispermeae**

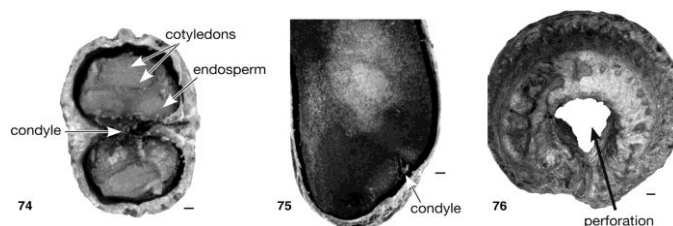


Fig. 7: *Tiliacora triandra*, endocarp, transverse section, showing condyle and incumbent cotyledons embedded in endosperm

Key to the genera:

- 1A. Large woody vines.
 - 2A. Upper surface of leaves very finely and closely striate **1. *Tinomiscium***
 - 2B. Upper surface of leaves not striate.
 - 3A. Leaf blade venation pinnate, with main lateral veins inserted distinctly above base, not peltate; petiole scars conspicuously discoid or cuplike.
 - 4A. Drupes 1 - 2cm.
 - 5A. Male flower inner whorls connate. Drupes hirsute **2. *Albertisia***
 - 5B. Male flower inner whorls free. Drupes glabrous **3. *Limicia***
 - 4B. Drupes 0.5 - 0.9 mm.
 - 6A. Flower petals 2 to 5 free **4. *Pycnarrhena***
 - 6B. Flower petals 6 **5. *Pachygone***
 - 3B. Leaf blade venation palmate, with lowermost lateral veins inserted at base of blade or at petiole insertion if peltate, usually more prominent than other lateral veins; petiole scars not conspicuous.
 - 7A. Male flowers: Petals absent.
 - 8A. Stamens connate.
 - 9A. Inflorescences a racemosa of peduncle balls of flowers. Stamen 6, the outer 3 free and the inner 3 joined **6. *Coscinium***
 - 9B. Inflorescence panicle, cyme or fascicle. Stamens 6, connate.
 - 10A. Sepals 8, 2 whorls. Female flower, sepals 8; stamens 30 - 35 **7. *Anamirta***
 - 10B. Sepals 9, in 3 whorls. Female flower, sepals 9; Stamens 9 - 12 **8. *Arcangelisia***
 - 8B. Stamens 3 - 6, free **9. *Fibraurea***
 - 7B. Male flowers petals 6 **10. *Diploclisia***
 - 11A. Male flower; sepal 6 - 12.
 - 12A. Inflorescence axillary or cauliflorous, pseudo-racemosa **11. *Tiliacora***
 - 12B. Inflorescence axillary or supra-axillary cymose or thyrsoïd **12. *Hypserpa***
 - 11B. Male flower; sepals 6; petals 6.
 - 13A. Leaves often cordiform or hastate, margin entire of repand-dentate. Inflorescences axillary, cymose or thyrsoïd. Stamens connate **13. *Parabaena***
 - 13B. Leaves often cordate, margin usually entire, not repand-dentate. Inflorescences pseudoracemose, not appearing with the leaves. Stamens free **14. *Tinospora***
- 1B. Herbaceous or woody vines.
 - 14A. Male flower; staminodes connate into a synandrium. Carpels 1.
 - 15A. Rootstock often tuberous. Female flower Sepals 6 or 8 in 2 whorls. Condyle perforate **15. *Stephania***
 - 15B. Not tuberous. Sepal ≤ 6 . Condyle not perforate.
 - 16A. Male flower- sepals 4 or 5 connate, apex 4 or 5-lobed divaricate **16. *Cyclea***

- 16B. Male flower- sepals 4 free..... **17. *Cissampelos***
14B. Male flower. staminodes free. Carpels 3 or 6.
17A. Flower; sepals 6, 2 whorls; Petals 6, apex 2-lobed divaricate..... **18. *Cocculus***
17B. Flower; sepals 9, 3 whorls; Petals 6, apex connate..... **19. *Pericampylus***

III. CONCLUSION

In Vietnam, there are 19 genera and 50 species and two varieties known, of which six species are endemic. Most species are dioecious climbers, rarely trees, shrubs, or herbs.

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ĐẶC ĐIỂM HÌNH THÁI VÀ KHÓA PHÂN LOẠI CÁC CHI TRONG HỌ TIẾT DÊ (MENISPERMACEAE) Ở VIỆT NAM

VŨ TIẾN CHÍNH, BÙI HỒNG QUANG, TRẦN THỊ PHƯƠNG ANH
TÓM TẮT

Họ Tiết dê Menispermaceae được biết 70 chi và khoảng 520 loài trên thế giới. Ở Việt Nam, nó được biết 19 chi và 50 loài cùng 2 var. các loài trong họ chủ yếu là dây leo đơn tính khác gốc, rất hiếm khi cây bụi (*Cocculus laurifolius*). Trong họ tiết dê (Menispermaceae) phân bố rộng ở vùng nhiệt đới hay ôn đới, ở Việt Nam chúng phân bố rộng trên khắp cả nước. Bài báo này chúng tôi xây dựng khóa phân loại của các chi trong họ (Menispermaceae), cùng một số đặc điểm khác biệt của các loài và chi.