

铁线莲属一新分类系统

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A new system of classification of the genus *Clematis* (Ranunculaceae)

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Abstract A new system of classification of the genus *Clematis* is proposed. The taxonomic history of the genus is briefly reviewed. On the basis of the analyses of various morphological and palynological characters, evolutionary trends of some characters are revealed as follows:

1. Habit: perennial herb $\begin{matrix} \swarrow \text{subshrub} \\ \searrow \text{woody vine} \end{matrix} \rightarrow \text{shrub}.$
2. Seed germination: epigeal hypogeal.
3. Leaf: (a) phyllotaxy: alternate opposite verticillate.
(b) division: simple, palmatifid \rightarrow palmatisect \rightarrow ternate $\begin{matrix} \swarrow \text{binate} \\ \searrow \text{1-3-pinnate} \end{matrix} \rightarrow \text{3-4-pinnatisect}.$
 \swarrow simple, undivided \rightarrow ternate.
- (c) texture: herbaceous papery subcoriaceous or coriaceous.
4. Inflorescence: (a) position: terminal terminal and axillary axillary.
(b) type: pedunculate, bibracteate, several-flowered cyme.
 - (i) 3-4 times branched, 20-35-flowered cyme many-branched ca. 100-flowered panicle.
 - (ii) 1-flowered cyme a single flower, pedicellate, but with peduncle and bracts wanting.
5. Flower: (a) Sexuality: bisexual unisexual.
(b) Posture: erect, with straight pedicel pendulous, with recurved pedicel.
6. Sepal: (a) number per flower: 4 or 5 6-8.
(b) aestivation: valvate imbricate.
(c) colour: white or yellow blue, purple or red.
(d) spreading direction: spreading ascending erect.
(e) texture: herbaceous or papery subcoriaceous or coriaceous.
(f) shape: obovate obovate-oblong, oblanceolate, lanceolate or oblong

narrowly oblong linear.

(g) apex: rounded or obtuse acute acuminate attenuate

(h) margin indumentum: glabrous or puberulous with a narrow velutinous strip.

(i) margin dilation: not dilated dilated.

(j) indumentum of adaxial surface: glabrous puberulous velutinous.

7. Stamen: (a) indumentum: glabrous filament hairy yet anther glabrous both filament and anther hairy.

(b) filament: (i) linear proximally or distally widened, or entirely so.

(ii) flat rugose.

(c) anther: oblong, 0.8–3.5 mm long narrowly oblong, 2–6 mm long linear, up to 7–10 mm long.

(d) connective: not projected apex minutely apiculate, with an apiculum ca. 0.1 mm long apex with a conic or subglobose projection 0.1–0.2 mm long apex with a subulate projection up to 4 mm long or with a narrowly lamellate projection 1–10 mm long.

8. Pollen: 3-colpate $\begin{cases} \swarrow \text{pantocolpate} \rightarrow \text{pantoporate} \\ \searrow \text{pantoporate} \end{cases}$

9. Staminode: (a) absent in bisexual flower present in bisexual flower.

(b) number per pistillate flower: numerous few zero.

10. Style: not elongate elongate and plumose slightly elongate and appressed-puberulous, then tail-like or subulate in shape very short, slightly or not elongate, appressed-puberulous or glabrous.

11. Fruit: not complanate, nor rimmed, nor marginate complanate, narrowly to tumidly rimmed complanate, broadly marginate or winged.

According to the evolutionary trends mentioned above and mainly according to the floral structure, the relationships among the 15 sections of *Clematis* are discussed, and four evolutionary stocks are recognized. Of them, the *C. montana* stock, in which *C. brevipes*, *C. potaninii*, *C. montana* etc., all with spreading, white, obovate sepals and glabrous stamens, are included, is regarded as the primitive group of the genus, whereas the other three, *C. vitalba* stock, *C. connata* stock, and *C. alpina* stock, are regarded as more advanced. All these four stocks might be derived from a putative extinct primitive group of the genus, which might possess the most primitive vegetative and reproductive characters. The four stocks are all treated as subgenera in the present system. Finally, a systematic enumeration of all the infrageneric taxa is presented and their brief diagnoses are given.

Key words *Clematis*, Ranunculaceae, evolutionary trend, relationship, classification.

摘要 提出毛茛科Ranunculaceae铁线莲属*Clematis*一新分类系统。首先,简要回顾了此属的分类学研究历史,继对此属的营养器官和生殖器官的重要形态特征和花粉特征进行了分析,揭示出一系列演化趋势。这些趋势,尤其是萼片和雄蕊的演化趋势说明在现存的铁线莲属植物中,绣球藤*Clematis montana*与其少数近缘种的花构造最接近比铁线莲属原始的银莲花属*Anemone*。因此,包括绣球藤等植物的绣球藤组sect. *Cheirpsis*被认为是铁线莲属的原始群。主要根据花构造对铁线莲属现存的15组的亲缘关系进行了分析,发现它们是在4条演化干(绣球藤干、欧洲铁线莲干、尾叶铁线莲干、长瓣铁线莲干)的演化过程中先后形成的。本文将此4条演化干处理为亚属。最后做出属下各级分类群的系统排列,并给出简要的形态特征。

关键词 铁线莲属; 毛茛科; 演化趋势; 亲缘关系; 分类

1 分类简史*

Linnaeus(1753)建立了铁线莲属 *Clematis* L., 描述了9种, 将这些种分为两类, 第一类为攀援类(*Scandentes*), 包括7种: *Clematis viticella* L., *C. viorna* L., *C. crispa* L., *C. orientalis* L., *C. vitalba* L., *C. cirrhosa* L. 和 *C. flammula* L.; 第二类为直立类(*Erectae*), 包括2种: *C. recta* L. 和 *C. integrifolia* L.。此外, 还建立了长瓣铁线莲属 *Atragene* L., 并描述4种: *Atragene zeylanica* L., *A. alpina* L., *A. sibirica* L. 和 *A. capensis* L.。后来, de Candolle (1818, 见下) 将此属降级作为铁线莲属的一个组 *sect. Atragene* (L.) DC., 这种处理得到以后多数铁线莲属研究者的赞同, 只是在俄国, 长瓣铁线莲属一直得到承认。其第一种 *A. zeylanica* 的花有花瓣, 而与铁线莲属有重要区别, de Candolle(1818)根据此种建立锡兰莲属 *Naravelia* DC., 此种遂即被转移到新属中, 即 *N. zeylanica* (L.) DC.。其第四种 *A. capensis* 为直立草本, 花序具总苞, 应是属于银莲花属 *Anemone* L. 的植物, de Candolle(1818)发现此问题, 遂将此种移至银莲花属中, 做出新组合 *Anemone capensis* (L.) DC.。至于其他具花瓣状退化雄蕊的2种 *Atragene alpina* 和 *A. sibirica* 已由 Miller(1768) 转移到铁线莲属中并做出新组合 *Clematis alpina* (L.) Mill. 和 *C. sibirica* (L.) Mill.。

Moench(1794)承认 Linnaeus 之前的2属 *Clematitiss* Tourn. 和 *Viticella* Dill., 并描述了共5种: *Clematitiss crispa* Moench (= *Clematis crispa* L.), *Clematitiss flava* Moench (= *Clematis orientalis* L.), *Clematitiss integrifolia* Moench (= *Clematis integrifolia* L.), *Clematitiss vitalba* Moench (= *Clematis vitalba* L.) 和 *Viticella deltoidea* Moench (= *Clematis viticella* L.)。

de Candolle(1818)对铁线莲属进行了第一次修订, 收载此属当时已知的85种, 利用总苞、退化雄蕊、花柱等特征将这些种类划分为4组: *sect. Flammula* DC., *sect. Viticella* (Dill. ex Moench) DC. (包括 *C. viticella* 和 *C. florida* Thunb. 等4种)、*sect. Cheiropsis* DC. (包括 *C. cirrhosa* L., *C. napaulensis* DC. 和 *C. montana* Buch.-Ham. ex DC. 等5种) 和 *sect. Atragene* (L.) DC. (包括 *C. alpina* 和 *C. sibirica* 等4种)。他正确地将 *Viticella* 和 *Atragene* 从属级下降作为铁线莲属的两个组处理, 这两组以及他新建立的 *sect. Cheiropsis* 均是自然群, 但是第一组 *sect. Flammula* 包括约70种, 内容混杂, 如具开展萼片、无毛雄蕊的 *C. apiifolia* DC. 和 *C. vitalba*, 单性的 *C. virginiana* L. 等种与具斜升或直立萼片和有毛雄蕊的 *C. brachiata* Thunb., *C. villosa* DC., *C. connata* DC. 以及 *C. viorna* 等种混在一起。

Spach(1839)在关于 *trib. Clematideae* 的报告中承认过去已建立的 *Atragene*, *Viticella* Dill. ex Moench, *Viorna* Reichb. 和 *Clematis* 等4属, 此外还将 *sect. Cheiropsis* DC. 升为属级, 做出新组合 *Cheiropsis* (DC.) Spach, 并根据 *Clematis glauca* Willd. 和 *C. orientalis* 建立新属 *Meclatis* Spach, 但未涉及 *Naravelia* DC.。在他的狭义的 *Clematis* 中, 除承认过去的 *sect. Flammula* DC. 以外, 又建立了2新组: *sect. Vitalba* Spach (包括两性的 *C. vitalba* 和单性的 *C. virginiana*) 和 *sect. Aspidanthera* Spach (包括1种, 即 *C. aristata* R. Br.)。

Baillon(1867–1869)研究铁线莲属时承认 *sect. Atragene* (L.) DC., *sect. Cheiropsis* DC., *sect. Flammula* DC. 和 *sect. Viticella* (Moench) DC. 等4组, 并将 *Naravelia* DC., *Meclatis* Spach 和 *Atragene* subgen. *Viorna* Pers. 降到组的等级。

* 本文 1, 2 两节由王文采、李良千撰写, 3, 4 两节由王文采撰写。

Kuntze(1885)发表了铁线莲属的专著,对此属当时已发表的种类做出了全面整理,承认66种。他对不少种的范围处理过宽,如他将亚洲的*C. gouriana* Roxb. ex DC.、*C. grata* Wall.、*C. brevicaudata* DC.、*C. javana* DC.、*C. subumbellata* Kurz和*C. taurica* Bess.都放在欧洲的*C. vitalba*之下作为亚种处理。关于铁线莲属属下类群的划分,他首先用茎攀援或直立来划分大群,在茎攀援的一类中再用有无芽鳞来划分,这样建立了3个大群:无鳞攀援组sect. 1. *Scandentes eperulatae*,有鳞攀援组sect. 2. *Scandentes perulatae*,非攀援组sect. 3. *Escandentes*。在每组之下大致依次用花柱是否强烈伸长,雄蕊花丝是否有毛,萼片开展方向,花药长度的大小,药隔顶端是否突出,以及花为两性或单性等特征来进行分类。Kuntze发现并利用了上述用于铁线莲属分类和表现演化水平的多数重要形态特征,因此对铁线莲属分类学研究做出了重要贡献。由于利用了上述特征,在多数情况下,Kuntze将亲缘相近的种放在一起,例如将*C. pinnata* Maxim.、*C. tatarinowii* Maxim.、*C. heracleifolia* DC.等3种正确地放在一起,实属难能可贵,因为后来一些学者如Handel-Mazzetti (1939)、丁志遵(1980)、Johnson (1997)、Grey-Wilson (2000)等未能认识到上述植物的相近亲缘关系,均将*C. heracleifolia*和*C. tatarinowii*(实与*C. pinnata*为同一种,见史京华, 2003)归入sect. *Tubulosae*中,并与*C. connata*群(本文系统的sect. *Viorna* subsect. *Connatae*)相联系,另外则将*C. pinnata*放在*C. vitalba*群(本文系统的sect. *Clematis* subsect. *Clematis*)中。Kuntze不承认*Naravelia*属,将此属的植物收入其铁线莲属专著中。

Prantl(1888)对铁线莲属做了全面研究,发表了一个分类系统:

- Sect. 1. *Pseudanemone* Prantl 萼片覆瓦状排列;雄蕊花丝有毛,药隔不突出。
1. *Spathulifoliae* Prantl 叶或小叶宽,不分裂或羽状分裂。包括*C. spatulifolia* Kuntze、*C. chrysocarpa* Welw. ex Oliv.等种。
 2. *Villosae* Prantl 叶三角形,细裂。包括*C. villosa*、*C. anethifolia* Hook.等种。
- Sect. 2. *Viorna* (Reichb.) Prantl 萼片镊合状排列,直立或斜上方开展,稀平展,有狭边缘,雄蕊有毛,药隔不突出。
3. *Crispae* Prantl 叶或小叶全缘;花单生或组成二歧聚伞花序;萼片厚。包括*C. crispae*、*C. integrifolia*等种。
 4. *Tubulosae* (Decne.) Prantl 叶或小叶边缘有齿;花组成二歧聚伞花序或聚伞总状花序;萼片厚。包括*C. heracleifolia*群和*C. connata*群。
 5. *Aragene* (L.) Prantl 单花自腋芽抽出的短枝顶端生出;萼片薄;花丝有毛。包括*C. alpina*、*C. sibirica*等种。
 6. *Cirrhosae* Prantl 单花自腋芽中生出;萼片薄;花丝无毛。包括*C. cirrhosa*、*C. napaulensis*等种。
- Sect. 3. *Viticella* (Moench) DC. 萼片有褶,有宽边缘,平展或斜上展,雄蕊无毛或上部有少数毛,药隔无明显突起。
7. *Euviticellae* Prantl 萼片4,斜上展;花丝比花药短。包括*C. viticella*、*C. campaniflora* Brot.等种。
 8. *Floridae* Prantl 萼片(4-)6-8,平展;花丝多少与花药等长。包括*C. florida*、*C. patens* Morr. & Decne.、*C. lanuginosa* Lindl.等种。

Sect. 4. *Flammula* DC. 萼片镊合状排列,平展;雄蕊无毛或基部有毛,药隔不突起。

9. *Rectae* Prantl 雄蕊无毛;花药长度大于宽度数倍,无突起。包括*C. songarica*、*C. fruticosa* Turcz.、*C. flammula*、*C. meyeniana* Walp.、*C. crassifolia* Benth.、*C. chinensis* Osb.、*C. apiifolia*、*C. montana*等多数种。

10. *Vitalbae* Prantl 雄蕊无毛,花药长度至多大于宽度2倍,无突起。

a. *Euvitalbae* Prantl 花两性;茎不中空。包括*C. vitalba*、*C. gouriana*等种。

b. *Saxicolae* Prantl 花雌雄异株;茎中空。包括*C. saxicola* Hils. & Bojer ex Bail. (= *C. insidiosa*)等种。

c. *Dioicae* Prantl 花雌雄异株;茎不中空。包括*C. virginiana*、*C. dioica* L.、*C. ligusticifolia* Nutt.、*C. brasiliana* DC.、*C. campestris* St. Hil.、*C. lasiantha* Nutt.、*C. pauciflora* Nutt.等种。

d. *Hexapetalae* Prantl 花雌雄异株;萼片远长于雄蕊。包括*C. microphylla* DC.、*C. hexapetala* L. f. (= *C. fosteri* Gmelin)、*C. aphylla* Kuntze (= *C. afoliata* Buchan.)等种。

11. *Aristatae* Prantl 雄蕊无毛;花药长度大于宽度数倍,顶端有长突起。包括*C. gentianoides* DC.、*C. aristata*、*C. clitoroides* DC.等种。

12. *Orientalis* Prantl 雄蕊有毛;叶羽状分裂,裂片全缘。包括*C. orientalis*、*C. glauca*等种。

13. *Wightianae* Prantl 雄蕊有毛;叶为羽状复叶或三出复叶,小叶边缘有齿。包括*C. wightiana*、*C. mauritiana* Lam.、*C. brachiata*等种。

Sect. 5. *Naravelia* (DC.) Prantl 萼片镊合状排列;雄蕊药隔顶端突起,或外方的雄蕊变成蜜叶(花瓣)。包括无蜜叶的*C. smilacina* Bl. (= *C. smilacifolia* Wall.)等种和有蜜叶的*C. zeylanica* (L.) DC.等种。

Prantl已有生物演化的观点,他推测分布于古热带且与银莲花属最为相似的类型可能是铁线莲属的原始群,而sect. *Pseudanemone*(可能由于此组植物的萼片为覆瓦状排列)就最像这个原始群,于是被放在其系统的开始位置。也正由于这点,雄蕊被毛的*C. connata*群和*C. viorna*群等被放在此原始群之后。Prantl用于分类的形态特征更为广泛,除了上述Kuntze利用的之外,又增加了萼片卷叠式、厚度、边缘,花药本身长度与宽度的比例,花药长度与花丝长度的比例等特征,因此划分出更多比较自然的群,所制定的新系统为铁线莲属分类学研究奠定了良好基础,对以后的有关工作产生了较大影响,如Schneider (1906)、Rehder和Wilson (1913)、Handel-Mazzetti (1939)、Rehder (1951)、Eichler (1958)、Tamura (1967)、张美珍等(1980)等学者有关铁线莲属的分类学著作均采用了Prantl系统,但也常做出或多或少的补充或修改。在他建立的属下分类群中有一些混乱或不自然的情况,例如在sect. *Pseudanemone*中混入Sect. *Brachiatae*的二种*C. triloba* Thunb.和*C. commutata* Kuntze; *C. heracleifolia*群与*C. connata*群亲缘关系并不相近,却被同放在sect. *Viorna* 4. *Tubulosae*中;在sect. *Viorna* 5. *Atragene*中混入不具花瓣状退化雄蕊的*C. japonica* Thunb.;不承认雄蕊无毛的sect. *Cheiropsis*, 但根据此组的*C. cirrhosa*等种另立6. *Cirrhosae*放在雄蕊有毛的sect. *Viorna*中,同时将sect. *Cheiropsis*的另一种*C. montana*误置于sect. *Flammula* 9. *Rectae*

中;将雄蕊无毛的直立小灌木 *C. ispanica* Boiss. 误置于雄蕊有毛的 sect. *Flammula* 12. *Orientalis* 中; *C. smilacifolia* 与 *Naravelia zeylanica* 亲缘关系较远, 却被同放在 sect. *Naravelia* 中; de Candolle 建立的 *Naravelia* 属的花有花瓣, 与无花瓣的 *Clematis* 属区别明显, 建立后受到多数学者承认, 只有 Kuntze (1885)、Baillon (1867)、Prantl (1888) 以及最近 Johnson (1997) 均将此属降级作为组处理。本文新系统不赞同这样的处理。Schneider (1906) 将 Prantl 系统中用阿拉伯数字排列的群作为亚组 (subsection) 处理, 将用英文小写字母排列的群作为系 (series) 处理, 本文系统采取他的处理方式。

Hutchinson (1920) 根据特产非洲的 *C. villosa* 群具覆瓦状排列萼片的特征建立了新属 *Clematopsis* (即 Prantl 的 sect. *Pseudanemone*), 并认为此新属的系统位置介于银莲花属和铁线莲属之间。

Tamura (田村道夫) (1955, 1956, 1963, 1967, 1970, 1987, 1995) 自上世纪 50 年代初起对铁线莲属的分类学进行了深入的研究, 认为铁线莲属在中国西部和东喜马拉雅的温暖湿润地区起源于银莲花属, 还认为他建立的具互生叶的单型属 *Archiclematis* (Tamura) Tamura 的演化水平比铁线莲属为低, 与铁线莲属的 sect. *Campanella* (即 *C. connata* 群, 幼苗叶互生, 萼片直立, 雄蕊有毛) 有密切的亲缘关系。他建立了 5 新组: sect. *Archiclematis*、sect. *Campanella*、sect. *Fruticella*、sect. *Lasiantha* 和 sect. *Pterocarpa*。根据 sect. *Cheiropsis* 的 *C. williamsii* Gray 的萼片也是覆瓦状排列 (Tobe, 1980), Tamura (1987) 不承认 Hutchinson 建立的 *Clematopsis* 新属, 恢复了 Prantl 的 sect. *Pseudanemone*。Tamura 1967 年以前的系统, 如前所述, 采用了 Prantl 系统的框架, 而在他 1987 年和 1995 年最后修改的系统, 做了重要变更, 强调了幼苗叶的特征, 此外还根据萼片、雄蕊的特征将铁线莲属分为四亚属, 认为幼苗叶互生的 subgen. *Campanella* (萼片直立, 雄蕊有毛) 和 subgen. *Clematis* (萼片平展, 雄蕊无毛) 是原始群, 从他们分别演化出幼苗叶对生的 subgen. *Viorna* (萼片直立, 雄蕊有毛) 和 subgen. *Flammula* (萼片平展, 雄蕊无毛), 在这四亚属中, 与 *Archiclematis* 相近缘的 subgen. *Campanella* 是铁线莲属的原始群。此系统全貌如下:

Subgen. 1. *Campanella* Tamura

Sect. 1. *Campanella* Tamura 包含 *C. henryi*, *C. acuminata* DC., *C. connata*, *C. aethusifolia* Turcz. 等 40 种。

Sect. 2. *Tubulosae* Decne. 包含 *C. heracleifolia* 等 8 种。

Sect. 3. *Bebaenanthera* Edgew. 包含 *C. barbellata* Edgew., *C. japonica* 等 4 种。

Sect. 4. *Atragene* (L.) DC. 包含 *C. alpina* 等种。

Sect. 5. *Meclatis* (Spach) Tamura 包含亚洲的 *C. orientalis* 等种和非洲的 *C. hirsuta*, *C. brachiata* 等种。

Sect. 6. *Pseudanemone* Prantl 包含 *C. villosa* 等 25 种。

Subgen. 2. *Viorna* (Reichb.) Tamura

Sect. 1. *Viorna* (Reichb.) Prantl 包含 *C. integrifolia*, *C. fusca* Turcz., *C. crispa* 等约 20 种。

Subgen. 3. *Clematis*

Sect. 1. *Clematis* 包含 *C. vitalba*, *C. apiifolia*, *C. javana* 等 25 种。

Sect. 2. *Cheiropsis* DC. 包含 *C. cirrhosa*, *C. montana*, *C. acerifolia* Maxim., *C. williamsii*

等约13种。

Sect. 3. *Naraveliopsis* Hand.-Mazz. 包含*C. smilacifolia*等约13种。

Sect. 4. *Aspidanthera* Spach 包含北美及南美的*C. virginiana*, *C. dioica*, *C. brasiliana*等20种,澳大利亚和新西兰的*C. microphylla*, *C. aristata*, *C. paniculata* Gmelin等15种,以及新几内亚、印度尼西亚等地的*C. papuasica* Merr. & Perry.等10种。

Sect. 5. *Lasiantha* Tamura 包含*C. lasiantha*, *C. pauciflora* 2种。

Subgen. 4. *Flammula* (DC.) Peterm.

Sect. 1. *Flammula* DC.

Subsect. 1. *Crassifoliae* (Tamura) Tamura 含*C. crassifolia* 1种。

Subsect. 2. *Rectae* Prantl ex Rehd. & Wils.

Ser. 1. *Rectae* Prantl ex Rehd. & Wils. 包含*C. recta*, *C. flammula*, *C. meyeniana*, *C. chinensis*等约20种。

Ser. 2. *Uncinatae* Tamura 包含*C. uncinata* Champ. ex Benth.等3种。

Sect. 2. *Angustifoliae* (Tamura) Serov 包含*C. hexapetala* 1种。

Sect. 3. *Fruticella* Tamura 包含*C. fruticosa*, *C. nannophylla* Maxim., *C. songarica*, *C. delavayi* Franch.等约7种。

Sect. 4. *Viticella* (Moench) DC.

Subsect. 1. *Floridae* Prantl 包含*C. viticella*, *C. florida*等8种。

Subsect. 2. *Patentes* Tamura 包含*C. patens*, *C. lanuginosa* 2种。

Sect. 5. *Pterocarpa* Tamura 包含*C. brachyura* Maxim. 1种。

Ziman(1981)根据铁线莲属植物地理分布的统计,认为中国云南和四川及相邻地区是此属的起源和分化中心。对铁线莲属的形态特征进行了全面分析之后,与Tamura一样,Ziman认为直立萼片和被毛雄蕊是原始特征。她还研究了整个铁线莲亚族 subtrib. *Clematidinae*各群的亲缘关系,除铁线莲属外,还承认*Clematopsis*、*Archiclematis*和*Naravelia*等3属,并绘出此亚族的系统发育图(图1)。

Essig(1991)研究了铁线莲属 53 种和 *Clematopsis* (= *Clematis* sect. *Pseudamone*) 2种1变种的幼苗形态,发现幼苗叶可区分为两种类型(表1)。

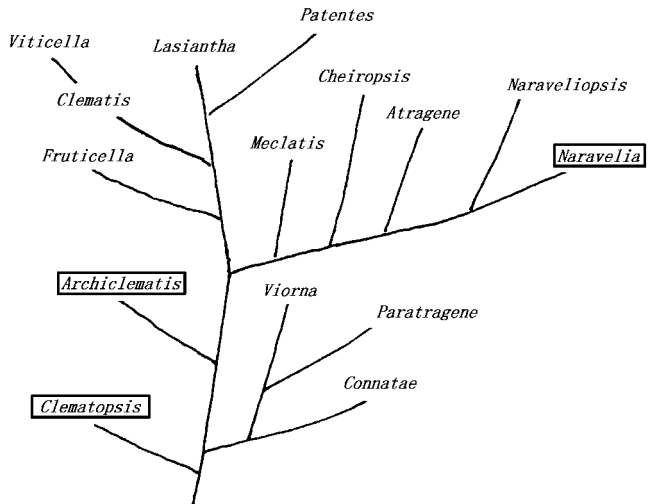


图1 Ziman (1981)推测的铁线莲亚族系统发育图

Fig. 1. Diagram showing the phylogeny of subtribe Clematidinae inferred by Ziman (1981).

表1 铁线莲属植物幼苗类型(Essig, 1991)

Table 1 Two seedling types of *Clematis* (Essig, 1991)

类型1. 幼苗叶互生, 3裂或有齿 Type I Seedling leaves alternate, trifid or serrate	类型2. 幼苗叶对生, 全缘, 稀分裂 Type II Seedling leaves opposite, entire, rarely lobed
Sect. <i>Cheirosia</i> <i>C. chrysocoma</i> Franch.* <i>C. cirrhosa</i> L. <i>C. napaulensis</i> DC.	Sect. <i>Clematis</i> subsect. <i>Rectae</i> <i>C. chinensis</i> Osb. <i>C. flammula</i> L. <i>C. kirilowii</i> Maxim. <i>C. mandshurica</i> Rupr. <i>C. recta</i> L. <i>C. terniflora</i> Thunb.
Sect. <i>Clematis</i> subsect. <i>Clematis</i> <i>C. apiifolia</i> DC. <i>C. grata</i> Wall. <i>C. peterae</i> Hand.-Mazz. <i>C. pierotii</i> Miq. <i>C. vitalba</i> L.	Sect. <i>Aspidanthera</i> subsect. <i>Microphyllae</i> <i>C. microphylla</i> DC.
Sect. <i>Aspidanthera</i> Subsect. <i>Dioicae</i> <i>C. catesbyana</i> Pursh <i>C. denticulata</i> Vell. <i>C. drummondii</i> Torr. & Gray <i>C. ligusticifolia</i> Nutt.	Sect. <i>Viticella</i> <i>C. campaniflora</i> Brot. <i>C. patens</i> Morr. & Decne. <i>C. viticella</i> L.
Subsect. <i>Lasianthae</i> <i>C. lasiantha</i> Nutt.	Sect. <i>Viorna</i> subsect. <i>Crispae</i> <i>C. addisonii</i> Britton <i>C. baldwinii</i> Torr. & Gray <i>C. crispa</i> L. <i>C. fusca</i> Turcz.
Subsect. <i>Aristatae</i> <i>C. aristata</i> R. Br. <i>C. gentianoides</i> DC. <i>C. papuasica</i> Merr. & Perry.	<i>C. glaucophylla</i> Small <i>C. hirsutissima</i> Pursh. <i>C. integrifolia</i> L. <i>C. pitcheri</i> Torr. & Gray <i>C. reticulata</i> Walter <i>C. texensis</i> Buckley <i>C. viorna</i> L.
Sect. <i>Brachiatae</i> <i>C. brachiata</i> Thunb.	
Sect. <i>Pseudanemone</i> <i>C. anethifolia</i> Hook. <i>C. villosa</i> DC. ssp. <i>villosa</i> ssp. <i>kirkii</i> (Oliv.) Brummitt	
Sect. <i>Meclatis</i> <i>C. intricata</i> Bunge <i>C. ladakhiana</i> Grey-Wilson <i>C. orientalis</i> L. <i>C. serratifolia</i> Rehd. <i>C. tangutica</i> (Maxim.) Korsh.	
Sect. <i>Naraveliopsis</i> <i>C. filamentosa</i> Dunn (= <i>C. loureiriana</i> DC.)	
Sect. <i>Tubulosae</i> <i>C. heracleifolia</i> DC.	
Sect. <i>Viorna</i> subsect. <i>Connatae</i> <i>C. buchananiana</i> DC. <i>C. leschenaultiana</i> DC. <i>C. ranunculoides</i> Franch. <i>C. rehderiana</i> Craib subsect. <i>Bebaenantha</i> <i>C. barbellata</i> Edgew.	
Sect. <i>Atragene</i> <i>C. alpina</i> (L.) Mill. <i>C. macropetala</i> Ledeb.	

* 本表中所有种按本文系统排列。The species listed above are arranged according to the present new system of classification of *Clematis*.

表1中类型2中的*C. microphylla*的幼苗叶对生,但分裂,Essig(1991)认为是类型1和类型2的中间类型。他还认为铁线莲属的祖先居群(ancestral population)具有类型1的幼苗叶,其萼片有颜色,直立,雄蕊有毛。他说的祖先居群当是sect. *Viorna* subsect. *Connatae*的植物。Essig还观察到具类型1幼苗叶植物的瘦果多少两侧扁,但不扁平,而具类型2幼苗叶植物的瘦果则强烈两侧扁,扁平,并认为这两种相关特征可以作为在铁线莲属中区分亚属的根据。对此论断,我们不赞同,因为类型2的各群间的亲缘关系相当疏远,其中的sect. *Clematis* subsect. *Rectae*衍生自类型1的sect. *Clematis* subsect. *Clematis*,而sect. *Viorna* subsect. *Crispae*衍生自类型1的sect. *Viorna* subsect. *Connatae* (Tamura, 1995),如按Essig的论点将类型1和类型2的植物各处理为亚属,则类型2亚属必是一个不自然的异质群。

Snoeijer(1992)发表了铁线莲属一新分类系统,其系统与Tamura 1987年的系统非常相似。在subgen. *Campanella*中,根据分布非洲的*C. brachiata*等种建立一新组sect. *Brachiatae*,实等同于1888年建立的sect. *Flammula* subsect. *Wightianae* Prantl。最近,王文采(2004b)承认此新组,并做出包括24种的全面修订。

Johnson(1997)发表了铁线莲属分类学研究巨著,收载此属植物314种,划分为19组,是继de Candolle和Kuntze之后对铁线莲属的第三次全面修订。在其系统中对不少组进行了亚组的划分,全部19组的排列如下:

- Sect. 1. *Archiclematis* Tamura
- Sect. 2. *Pseudanemone* Prantl
- Sect. 3. *Novae-Zealandiae* M. Johnson
- Sect. 4. *Atragene* (L.) DC.
 - Subsect. 1. *Atragene*
 - Subsect. 2. *Brachyblasti* M. Johnson
- Sect. 5. *Naravelia* (DC.) Prantl
- Sect. 6. *Tubulosae* Decne.
- Sect. 7. *Connatae* (Koehne) M. Johnson
- Sect. 8. *Meclatis* (Spach) Tamura
- Sect. 9. *Bebaenanthera* Edgew.
- Sect. 10. *Cheiroopsis* DC.
 - Subsect. 1. *Cheiroopsis*
 - Subsect. 2. *Williamsianae* M. Johnson
 - Subsect. 3. *Montanae* Schneid.
- Sect. 11. *Clematis*
 - Subsect. 1. *Clematis*
 - Subsect. 2. *Pierotianae* (Tamura) Tamura
 - Subsect. 3. *Potaniniana* M. Johnson
 - Subsect. 4. *Africanae* M. Johnson
 - Subsect. 5. *Dioicae* (Prantl) Tamura
- Sect. 12. *Lasiantha* Tamura

Sect. 13. *Aspidanthera* SpachSubsect. 1. *Aspidanthera*Subsect. 2. *Papuasicae* (H. Eichler) M. JohnsonSect. 14. *Naraveliopsis* Hand.-Mazz.Sect. 15. *Viorna* (Reichb) PrantlSubsect. 1. *Viorna*Subsect. 2. *Baldwiniana* Ericks.Subsect. 3. *Crispae* PrantlSubsect. 4. *Hirsutissima* Ericks.Subsect. 5. *Integrifoliae* Ericks. ex M. JohnsonSubsect. 6. *Fuscae* (Tamura) M. JohnsonSect. 16. *Flammula* DC.Subsect. 1. *Flammula*Subsect. 2. *Angustifoliae* (Tamura) M. JohnsonSubsect. 3. *Chinenses* (Tamura) M. JohnsonSubsect. 4. *Crassifoliae* (Tamura) M. JohnsonSubsect. 5. *Fasciculiflorae* (Tamura) M. JohnsonSubsect. 6. *Meyeniana* (Tamura) M. JohnsonSubsect. 7. *Uncinatae* (Tamura) M. JohnsonSect. 17. *Pterocarpa* TamuraSect. 18. *Fruticella* TamuraSubsect. 1. *Fruticella*Subsect. 2. *Ispahanicae* (Serov) M. JohnsonSubsect. 3. *Phlebanthae* M. JohnsonSubsect. 4. *Songaricae* (Serov) M. JohnsonSect. 19. *Viticella* (Moench) DC.Subsect. 1. *Viticella*Subsect. 2. *Floridae* (Prantl) TamuraSubsect. 3. *Lanuginosae* M. JohnsonSubsect. 4. *Patentes* Tamura

Johnson不承认*Archiclematis*属,恢复了其组的等级,并放在其系统的开始位置。他同Tamura一样,也不承认*Clematopsis*属,恢复sect. *Pseudanemone*,并将此组放在其系统第二位的位置上,从这里可以看到Tamura系统和Prantl系统对其系统的影响。其系统主要与Prantl和Tamura的系统相同,把雄蕊被毛的群放在雄蕊无毛的诸群之前,但把花单性,雄蕊无毛,并与sect. *Clematis*近缘的新组sect. *Novae-Zeelandiae*放在雄蕊被毛的诸群之间;还把雄蕊被毛,与sect. *Connatae*近缘的sect. *Viorna*放在雄蕊无毛的诸群之间。如前所述,他同Kuntze、Prantl一样,不承认*Naravelia*属,将其作为组处理。

王文采(1989)在对铁线莲属的研究中揭示了此属萼片由平展到向上直展和雄蕊从无

毛到有毛的演化趋势,并指出具钟状花萼和被毛雄蕊的 *C. connata* 群是相当进化的群。后来,王文采(1998)进一步揭示了铁线莲属花丝和花药形态的演化趋势,并根据上述认识对中国铁线莲属诸组做出了新的排列次序: sect. 1. *Clematis*, sect. 2. *Fruticella*, sect. 3. *Cheiroopsis*, sect. 4. *Viticella*, sect. 5. *Naraveliopsis*, sect. 6. *Meclatis*, sect. 7. *Tubulosae*, sect. 8. *Viorna*, sect. 9. *Atragene*。1999年,王文采在英国邱皇家植物园标本馆(K)和巴黎显花植物研究所标本馆(P)研究了他们收藏的世界各大洲的铁线莲属植物标本之后,肯定了上述演化趋势,并又认识到铁线莲属萼片形状、毛被等方面的演化趋势,以及主要分布于中国西南部的 *C. brevipes* Rehd., *C. potaninii* Maxim., *C. montana*, *C. gracilifolia* Rehd. & Wils., *C. chrysocoma* 和 *C. venusta* M. C. Chang 等种的花构造(萼片平展,白色,倒卵形,雄蕊无毛,花药长圆形或狭长圆形,药隔顶端不突起)与银莲花属最相似,是现存铁线莲属植物中原始的种。他还根据对全属各组亲缘关系的分析,发现此属存在4条演化干,其中原始的是绣球藤干(*C. montana* stock),其他3条进化的是欧洲铁线莲干(*C. vitalba* stock)、尾叶铁线莲干(*C. connata* stock)和长瓣铁线莲干(*C. alpina* stock) (王文采, 2000b, 2002, 2003, 2005)。

Grey-Wilson(2000)继Johnson 3年之后发表了铁线莲属的第四次全面修订,收载297种,划分为9亚属18组:

Subgen. 1. *Clematis*

Sect. 1. *Clematis*

Subsect. 1. *Clematis*

Subsect. 2. *Pierotianae* (Tamura) Tamura

Subsect. 3. *Potaniniana* M. Johnson

Subsect. 4. *Dioicae* (Prantl) Tamura

Sect. 2. *Lasiantha* Tamura

Sect. 3. *Naraveliopsis* Hand.-Mazz.

Sect. 4. *Aspidanthera* Spach

Subsect. 1. *Aspidanthera*

Subsect. 2. *Papuasicae* H. Eichler

Sect. 5. *Novae-Zeelandiae* M. Johnson

Subgen. 2. *Cheiroopsis* (DC.) Peterm.

Sect. 1. *Montanae* (Schneid.) Grey-Wilson

Sect. 2. *Cheiroopsis*

Subsect. 1. *Cheiroopsis*

Subsect. 2. *Williamsianae* M. Johnson

Sect. 3. *Fasciculiflorae* (M. Johnson) Grey-Wilson

Subgen. 3. *Flammula* (DC.) Peterm.

Sect. 1. *Flammula*

Subsect. 1. *Flammula*

Subsect. 2. *Meyeniana* (Tamura) M. Johnson

Subsect. 3. *Chinenses* (Tamura) M. Johnson

- Subsect. 4. *Uncinatae* (Tamura) M. Johnson
- Subsect. 5. *Angustifoliae* Tamura
- Subsect. 6. *Crassifoliae* (Tamura) Tamura
- Sect. 2. *Viticella* (Moench) DC.
 - Subsect. 1. *Viticella*
 - Subsect. 2. *Floridae* (Prantl) Tamura
 - Subsect. 3. *Patentes* Tamura
 - Subsect. 4. *Lanuginosae* M. Johnson
- Sect. 3. *Pterocarpa* Tamura
- Sect. 4. *Fruticella* Tamura
 - Subsect. 1. *Fruticella*
 - Subsect. 2. *Songaricae* Serov
 - Subsect. 3. *Phlebanthae* M. Johnson
- Subgen. 4. *Archiclematis* (Tamura) Grey-Wilson
- Subgen. 5. *Campanella* Tamura
 - Sect. 1. *Campanella* Tamura
 - Sect. 2. *Bebaenanthera* Edgew.
 - Sect. 3. *Meclatis* (Spach) Tamura
 - subsect. 1. *Africanae* M. Johnson
 - Subsect. 2. *Meclatis*
- Subgen. 6. *Atragene* (L.) Grey-Wilson
- Subgen. 7. *Tubulosae* (Decne.) Grey-Wilson
- Subgen. 8. *Pseudanemone* (Prantl) Grey-Wilson
- Subgen. 9. *Viorna* Tamura
 - Sect. 1. *Viorna*
 - Subsect. 1. *Viorna*
 - Subsect. 2. *Crispae* Prantl
 - Subsect. 3. *Fuscae* (Tamura) M. Johnson
 - Sect. 2. *Integrifoliae* Serov
 - Subsect. 1. *Integrifoliae* Ericks. ex M. Johnson
 - Subsect. 2. *Baldwinnae* Ericks. ex M. Johnson
 - Sect. 3. *Hirsutissimae* (Ericks. ex M. Johnson) Grey-Wilson

Grey-Wilson系统将雄蕊无毛的亚属subgen. *Clematis*、*Cheiropsis*、*Flammula*置于雄蕊被毛的亚属之前,这与上述王文采1998年的处理相似;与Tamura一样,不将*Naravelia*降级作为*Clematis*的一个组,同时接受了Tamura的subgen. *Clematis*、*Flammula*、*Campanella*、*Viorna*,但另外又增加了subgen. *Cheiropsis*、*Archiclematis*、*Atragene*、*Tubulosae*、*Pseudanemone*;接受了Johnson系统中有关组的组下分类,但做出了一些重要改正,如将subsect. *Africanae*(实等同于sect. *Flammula* 13. *Wightianae* Prantl及sect. *Brachiatae* Snoeijer)正确地

*Clematis*移到sect. *Meclatis*中,并置于subsect. *Meclatis*之前,再如将subsect. *Fasciculiflorae*正确地 从 sect. *Flammula* 移回 sect. *Cheirosia* 中;此外,还将 Johnson 的新组 sect. *Novae-Zeelandiae*(实等同于sect. *Flammula* 10. *Vitalbae* d. *Hexapetalae* Prantl)正确地 从sect. *Pseudanemone*, sect. *Atragene*附近移至sect. *Aspidanthera*之后;至于Johnson根据属于sect. *Cheirosia*的*C. potaninii*建立subsect. *Potaniniana*并放在sect. *Clematis*中,Grey-Wilson则加以接受,未做修正。

Brandenburg(2000)发表了黄花铁线莲组sect. *Meclatis*研究一书,在此组修订之前,他先对铁线莲属进行了分支系统学(cladistics)研究,对此属的营养器官和生殖器官的形态特征的演化趋势进行了全面分析,正确地揭示了铁线莲属不少形态特征的演化趋势,如habit: perennial 1 subshrub 2 shrub 3; leaf: simple 1 compound 2; inflorescence: flowering on the young wood 1 flowering on the old wood 2; flower: flat, erect 1 broadly campanulate 2 campanulate 3 tubulose, urceolate 4; filament: glabrous 1 ciliate 2; anther: shorter 1 as long as 2 longer than filament 3; connective: not elongate 1 elongate 2。在萼片形状方面,他认为倒卵形萼片为进化特征,系由菱形萼片演化而来,可能与实际情况相悖。根据此项研究,他拟定出铁线莲属的一包括18组的新排列方式,并对其中一组做出组下分类:

- Sect. 1. *Angustifoliae* (Prantl) Brandenb.
- Sect. 2. *Aristatae* (Prantl) Brandenb.
- Sect. 3. *Atragene* (L.) DC.
- Sect. 4. *Bebaenanthera* Edgew.
- Sect. 5. *Cheirosia* DC.
- Sect. 6. *Clematis*
- Sect. 7. *Crassifoliae* (Tamura) Brandenb.
- Sect. 8. *Dioicae* (Prantl) Brandenb.
- Sect. 9. *Fruticella* (Tamura) Brandenb.
- Sect. 10. *Lasiantha* (Tamura) Brandenb.
- Sect. 11. *Meclatis* (Spach) Baill.
- Sect. 12. *Papuasicae* (H. Eichler) Brandenb.
- Sect. 13. *Naraveliopsis* (Hand.-Mazz.) Brandenb.
- Sect. 14. *Pierotianae* (Tamura) Brandenb.
- Sect. 15. *Pterocarpa* (Tamura) Brandenb.
- Sect. 16. *Rectae* (Prantl) Brandenb.
- Sect. 17. *Viorna* (Reichb.) Prantl
 - subsect. 1. *Viorna*
 - subsect. 2. *Connatae* Koehne
 - subsect. 3. *Crispae* (Prantl) Tamura
- Sect. 18. *Viticella* (Moench) DC.

Brandenburg在有关群亲缘关系的讨论中赞同*Clematopsis*作为属从铁线莲属分出,但对*Archiclematis*和*Naravelia*二属从铁线莲属分出表示怀疑,认为应将这二群放在铁线莲属

中。其系统未包括sect. *Tubulosae*, 但将Prantl(1888)建立的subsect. *Aristatae*、Ser. *Dioicae*和subsect. *Rectae*、Eichler(1958)建立的subsect. *Papuasicae*、以及Tamura(1955)建立的subsect. *Angustifoliae*、ser. *Crassifoliae*和ser. *Pierotianae*均提升到组的等级。令人不解的是,在此系统中,不少亲缘关系相近的组被分开不放在一起,如sect. *Clematis*与sect. *Pierotianae*极为相近,但二者却被sect. *Crassifoliae*、sect. *Dioicae*等7个组隔开;再如,具单性花的2组sect. *Dioicae*和sect. *Lasiantha*极为相近,中间却被具两性花的sect. *Fruticella*隔开。再令人奇怪的是,Handel-Mazzetti建立的sect. *Naraveliopsis*、Tamura建立的3个组sections *Lasiantha*、*Pterocarpa*、*Fruticella*,不知为何Brandenburg再做出新组合(*combinatio nova*)(见上表)。

2 形态和花粉特征分析

2.1 习性

铁线莲属植物多为木质藤本,少数为多年生草本、亚灌木或灌木。由于具藤本的习性以及受精后花柱强烈伸长等特化特征,在银莲花族trib. *Anemoneae*中铁线莲属处于进化的地位,可能由此族原始的草本银莲花属演化而来(Hutchinson, 1920; Tamura, 1995)。因此,在铁线莲属,多年生直立草本当是原始的,而直立亚灌木、灌木或木质藤本是后来出现的(Ziman, 1981; Brandenburg, 2000)。但在sect. *Meclatis*中看到上述习性演化趋势逆转现象,此组的*C. tangutica* var. *tangutica*和*C. tibetana* var. *tibetana*均为木质藤本,前者广布于我国青藏高原、新疆及哈萨克斯坦,在青海南部发现一居群为矮小直立灌木;后者分布于尼泊尔,我国西藏西部和新疆西南部,其萼片外面无毛,但在帕米尔高原出现直立矮小、萼片外面被毛灌木的居群。

2.2 发芽

Section *Cheiroopsis*、sect. *Clematis* subsect. *Clematis*、sect. *Pseudanemone*、sect. *Viorna* subsect. *Connatae*、sect. *Archiclematis*的种子出土发芽,而sect. *Clematis* subsect. *Rectae*和sect. *Viorna* subsect. *Crispae*的种子留土发芽。留土发芽可能是适应自温暖地区到寒冷地区的不同气候的结果,是由出土发芽演变而来(Tamura et al., 1977; Ziman, 1981; Tamura, 1995; Grey-Wilson, 2000)。

2.3 叶

铁线莲属中多数群的幼苗叶互生,少数群的幼苗叶对生(Essig, 1991, 见上),成长的茎生叶通常为对生,稀轮生(如在sect. *Pseudanemone*的*C. teuszii* (Kuntze) Engler),而只在单种组sect. *Archiclematis*的*C. alternata* Kitam. & Tamura,所有叶均为互生(Tamura, 1995)。根据毛茛科大多数植物的茎生叶通常互生,铁线莲属的叶序演化趋势当是:互生 对生 轮生。

Kuntze(1885)在其专著中绘出铁线莲属叶从一回三出到两回三出和1-3回羽状分裂的示意图,似乎是表示叶分裂的演化趋势。Tamura(1967)认为毛茛科中较普遍的叶为基部心形、掌状分裂、边缘具缺刻或牙齿的单叶,由此演化到不分裂的单叶,另一方面演化到三出复叶及1-4回分裂的羽状复叶。这种情况在sect. *Brachiatae*(王文采, 2004b)和sect. *Pseudanemone*(王文采, 2004c)可大致看到。但在陕南单叶铁线莲*C. henryi* var. *ternata* M. Y. Fang (sect. *Viorna* subsect. *Connatae*),其枝条的多数叶为不分裂的单叶,枝条顶部的叶

则为三出复叶;在 *C. dimorphophylla* W. T. Wang 和 *C. variifolia* W. T. Wang (sect. *Aspidanthera* subsect. *Dioicae*),前者枝条下部叶为不分裂的单叶,上部叶为三出复叶,后者小枝基部叶为不分裂的单叶,其上一对叶为三出复叶,其余上部叶则均为具5小叶的羽状复叶,从上述情况可以看到由不分裂的单叶演变为三出复叶和羽状复叶的趋势。另外,在单花锡金铁线莲 *C. siamensis* var. *monantha* W. T. Wang & L. Q. Li (sect. *Viorna* subsect. *Connatae*),枝条多数叶为三出复叶,枝顶部的叶为不分裂的单叶,这里可看到三出复叶由于二小叶消失而演变成单叶的演化趋势逆转现象。

在铁线莲属中,多数组中只有少数种具单叶,在 sect. *Meclatis*、sect. *Brachyura*、sect. *Viticella*、sect. *Viorna* subsect. *Bebaenanthera*、sect. *Atragenopsis* 和 sect. *Atragene*,全部种只有复叶,而无单叶。在具单叶的种中,具近似上述原始形态的单叶的只有4种1变种: *C. acerifolia*、*C. cirrhosa* var. *semitriloba* (Lag.) Butt. (sect. *Cheiroopsis*), *C. trifida* Hook. (sect. *Pseudanemone*), *C. ranunculoides* (sect. *Viorna* subsect. *Connatae*)和 *C. alternata* (sect. *Archiclematis*); 另外,*C. marmoraria* Sneddon (sect. *Aspidanthera* subsect. *Hexapetalae*)的单叶掌状细裂,*C. nannophylla* (sect. *Fruticella*)的单叶羽状全裂。其他具不分裂单叶的植物有24种: *C. cirrhosa* (sect. *Cheiroopsis*), *C. lancifolia*、*C. songarica*、*C. xinhuiensis* (sect. *Clematis*), *C. dubia* (Endl.) P. S. Green (sect. *Aspidanthera*), *C. actinostemmatifolia* W. T. Wang (sect. *Brachiatae*), *C. fruticosa*、*C. tomentella* (Maxim.) W. T. Wang & L. Q. Li、*C. viridis* (W. T. Wang & M. C. Chang) W. T. Wang (sect. *Fruticella*), *C. smilacifolia*、*C. fulvicoma* Rehd. & Wils.、*C. metouensis* (sect. *Naraveliopsis*), *C. chiupehensis* M. Y. Fang、*C. henryi*、*C. yui* W. T. Wang、*C. repens*、*C. kweichowensis* Pei、*C. pinchuanensis* W. T. Wang & M. Y. Fang (sect. *Viorna* subsect. *Connatae*), *C. flabellata* Nakai、*C. integrifolia*、*C. ochroleuca* Aiton、*C. albicoma* Wherry、*C. viticaulis* Steele、*C. fremontii* S. Watson (sect. *Viorna* subsect. *Crispae*)。另一方面,具3-4回分裂复叶的种与具掌状分裂单叶的种一样也相当少,只有8种,这又可分为两类:*C. ulbrichiana* Pilger、*C. seemannii* Kuntze、*C. millefoliolata*、*C. rutoides* W. T. Wang (sect. *Aspidanthera*)等4种的叶为2-3回羽状复叶,*C. falciformis* Viguiet & Perrier、*C. dissecta* Baker (sect. *Brachiatae*), *C. anethifolia* (sect. *Pseudanemone*), *C. aethusifolia* (sect. *Viorna* subsect. *Connatae*)等4种的叶3-4回羽状细裂。由上可见,铁线莲属大部分种的叶为1-2回三出复叶或1-2回羽状复叶,具叶分裂方面的中等演化水平。

在质地方面,像银莲花属植物,铁线莲属多数种的叶为纸质或草质。一些种的叶呈亚革质,如亚热带低山的 *C. meyeniana*、*C. finetiana* Lévl. & Van.、*C. uncinata*、*C. crassifolia* (sect. *Clematis*),以及干旱地区的 *C. songarica* (sect. *Clematis*), *C. fruticosa* (sect. *Fruticella*)。少数种的叶呈革质,如亚热带、热带低山区的 *C. armandii* Franch.、皱叶铁线莲 *C. uncinata* var. *coriacea* Pamp. (sect. *Clematis*), *C. smilacifolia* (sect. *Naraveliopsis*), *C. kweichowensis* (sect. *Viorna* subsect. *Connatae*), 热带高山的 *C. seemannii*、*C. millefoliolata* (sect. *Aspidanthera* subsect. *Dioicae*), 干旱地区的 *C. nannophylla*; 产热带新几内亚岛的 *C. sclerophylla* W. T. Wang 和 *C. cruttwellii* H. Eichler ex W. T. Wang 的三出复叶呈厚革质,是铁线莲属中最厚、最坚硬的叶。

2.4 花序

银莲花属植物通常具顶生的1至数花的聚伞花序,据此推测铁线莲属花序的原始类型可能近似这样的花序。这时,花序的花通常中等大,直径2–4 cm。由这种类型的花序发生二演化方向(王文采, 1998),一是花序分枝稍增,花数目随之增加,达20–35朵;在少数情况下,如 *C. gouriana* (sect. *Clematis*)和 *C. sclerophylla* (sect. *Aspidanthera* subsect. *Aristatae*),花序长达30 cm,多回分枝,约具100朵花,花小,直径仅0.8–1 cm。另一方向是减化(reduction),花序变成不分枝,只含1朵花,这时在有些种如 *C. kockiana* Schneid.、*C. ranunculoides* (sect. *Viorna* subsect. *Connatae*)和花序分枝发生减化同时,花序梗缩短,苞片变小,这种具1花的花序再进一步减化的结果是花序梗和苞片一同消失,只剩下1朵仅具花梗的花(王文采, 2002),如 *C. montana* (sect. *Cheiropsis*), *C. viridis* (sect. *Fruticella*), *C. patens* (sect. *Viticella*)等。这时,单朵且顶生的花通常中等大,有时很大,直径可达7 cm,如 *C. chrysoarpa* (sect. *Pseudanemone*), 或达7–15 cm,如 *C. patens*, *C. lanuginosa* (sect. *Viticella*)。

在直立的草本,如 *C. hexapetala*、*C. recta* (sect. *Clematis*)或小灌木,如 *C. songarica*、*C. delavayi* (sect. *Clematis*), *C. fruticosa* (sect. *Fruticella*), 其花序均顶生;但小灌木 *C. viridis* (sect. *Fruticella*)是个例外,其花序减化为1朵只具花梗的花,生于腋生短枝的顶端,顶生花序则完全消失(王文采, 2002)。在大多数藤本种类,花序或同时在当年生枝上顶生并腋生,如 *C. apiifolia*、*C. grata*、*C. grandidentata* (Rehd. & Wils.) W. T. Wang、*C. vitalba*、*C. brevicaudata*、*C. meyeniana*、*C. flammula*、*C. terniflora* (sect. *Clematis*), *C. dioica*、*C. ligusticifolia*、*C. microphylla*、*C. pickeringii* Gray、*C. glycinoides* DC. (sect. *Aspidanthera*), *C. simensis* Fresen.、*C. hirsuta* (sect. *Brachiatae*), *C. tangutica*、*C. tibetana* var. *vernayi* (C. E. C. Fisch.) W. T. Wang (sect. *Meclatis*), *C. pinnata* (sect. *Tubulosae*), *C. lasiantha* Maxim.、*C. aethusifolia*、*C. ranunculoides* (sect. *Viorna* subsect. *Connatae*),或在当年生枝上全部腋生,顶生花序消失,如 *C. potaninii*、*C. tongluensis* (Brühl) Tamura (sect. *Cheiropsis*), *C. tenuipes* W. T. Wang、*C. vaniotii* Lévl. & Port. (sect. *Clematis*), *C. virginiana*、*C. polygama* Jacq.、*C. campestris*、*C. linearifolia* Steud.、*C. aristata*、*C. paniculata*、*C. foetida* Raoul. (sect. *Aspidanthera*), *C. mauritiana*、*C. commutata*、*C. graveolens*、*C. dissecta* (sect. *Brachiatae*), *C. orientalis*、*C. akebioides* (Maxim.) Veitch、*C. intricata* (sect. *Meclatis*), *C. smilacifolia*、*C. fulvicoma*、*C. tashiroi* (sect. *Naraveliopsis*), *C. courtoisii* Hand.-Mazz.、*C. florida*、*C. hancockiana* Maxim.、*C. cadmia* Buch.-Ham. ex Hook. f. & Thoms. (sect. *Viticella*), *C. henryi*、*C. connata*、*C. leschenaultiana*、*C. rehderiana* (sect. *Viorna* subsect. *Connatae*)。最后一种情况是在一些藤本种类,花序或花与叶同自老枝的腋芽中生出:在 *C. pauciflora* (sect. *Aspidanthera* subsect. *Lasianthae*),花枝与叶同自一老枝腋芽中生出;在 *C. zemuensis* W. W. Smith (sect. *Clematis*), *C. lasiantha* (sect. *Aspidanthera* subsect. *Lasianthae*)和 *C. japonica* (sect. *Viorna* subsect. *Bebaenanthera*),花序与叶同自一老枝腋芽中生出;在 *C. montana*、*C. gracilifolia*、*C. cirrhosa* (sect. *Cheiropsis*), *C. barbellata*、*C. pseudopogonandra* Finet & Gagnep. (sect. *Viorna* subsect. *Bebaenanthera*),只具花梗的单花与叶同自一老枝腋芽中生出。另外,在 *C. fasciculiflora* Franch. (sect. *Cheiropsis*)和 *C. armandii* (sect. *Clematis*),只具花梗的花或花序分别单独由一老枝腋芽中生出。上述花序或花自老枝腋芽生出的现

象, Tamura (1963, 1967, 1995) 认为是对寒冷气候的适应结果。

2.5 花

铁线莲属大多数种的花为两性, 只有 sect. *Aspidanthera* 的全部种(王文采, 2004a) 和 sect. *Naraveliopsis* 的少数种(王文采, 2000a) 以及 sect. *Tubulosae* 的一些种, 花的一种性器官退化和消失而成为单性。

在铁线莲属, 多数种的花梗直, 花不下垂, 在一些花构造较进化的群如 sect. *Viorna* subsect. *Crispae* 和 sect. *Archiclematis* (萼片直立, 雄蕊被毛), 其花梗顶部反曲, 花变为下垂, 这当是进化的现象。

2.6 萼片

在毛茛科 Ranunculaceae 的原始属驴蹄草属 *Caltha* L.、鸡爪草属 *Calathodes* Hook. f. & Thoms.、金莲花属 *Trollius* L. 以及银莲花属的较原始种, 如西南银莲花 *Anemone davidii* Franch., 萼片为5片, 平展, 呈黄色或白色, 膜质或纸质, 倒卵形, 顶端圆形或钝, 外面近边缘处被贴短柔毛或无毛, 内面无毛; 其雄蕊无毛, 花丝狭条形, 花药呈长圆形, 顶端不突起。在铁线莲属中具符合上述萼片形态的植物只有大约6种, 即 sect. *Cheiroopsis* 中的 *C. brevipes*、*C. potaninii*、*C. montana*、*C. gracilifolia*、*C. venusta* 和 *C. chrysocoma* (Wang, 2002)。对本属植物进行全面观察后可以看到以下演化趋势: (a) 数目: 铁线莲属中大多数种的花具4萼片, 少数为5片或更多, 如在 *C. paniculata* (sect. *Aspidanthera* subsect. *Hexapetalae*) 为5–8片, 在 *C. florida* 为5–6片, 在 *C. patens* (sect. *Viticella*) 为6–8片。从上述情况可见4或5片当是原始现象。(b) 卷叠式: 铁线莲属大多数种的萼片在花芽时期呈镊合状排列, 但在 sect. *Cheiroopsis* subsect. *Williamsianae*、sect. *Aspidanthera* subsect. *Hexapetalae* 及 sect. *Pseudanemone* 诸群植物的萼片部分覆瓦状排列, 部分镊合状排列, 这种混合的卷叠式可能衍生于镊合状卷叠式(Kuntze, 1885; Hutchinson, 1920; Godley, 1977; Tobe, 1980; Tamura, 1987, 1995)。(c) 颜色: 根据上述毛茛科原始属萼片的颜色, 以及银莲花属萼片主要为白色, 可见在铁线莲属中, 萼片白色或黄色是原始特征, 而蓝色、紫色、红色等为进化特征。(d) 根据上述有关原始属的萼片均为平展, 可见铁线莲属萼片开展的演化趋势是平展 斜上展 直立(王文采, 1989, 1998) (图2)。(e) 质地: 铁线莲属的萼片通常与银莲花属的萼片一样, 呈草质或纸质, 但在少数种, 如 *C. villosa*、*C. katangensis* (sect. *Pseudanemone*), *C. tibetana* var. *vernayi* (sect. *Meclatis*), *C. viorna* (sect. *Viorna* subsect. *Crispae*), 萼片质地变厚, 呈亚革质或革质。(f) 形状: 如前所述, 在铁线莲属, 只有 *C. montana* 等6种的萼片呈倒卵形, 其他种的萼片则多少变狭呈倒卵状长圆形、倒披针形、披针形或长圆形, 在少数种或变种如毛茛扬子铁线莲 *C. puberula* var. *tenuisepala* (Maxim.) W. T. Wang (sect. *Clematis*) 和 *C. microphylla* (sect. *Aspidanthera* subsect. *Microphyllae*), 萼片呈狭长圆形或宽条形, 而后一亚组的 *C. fawcettii* Muell. 和 *C. delicata* H. Eichler ex W. T. Wang 的萼片呈狭条形, 宽仅1.1–1.8 mm, 是铁线莲属中最狭长的萼片(Wang, 2004a) (图3)。(g) 顶端: 从上述铁线莲属萼片形状从宽到狭的演变同时可看到其顶端的演化趋势: 圆形或钝 急尖 渐近 渐狭(图3)。(h) 边缘毛被: 在 sect. *Cheiroopsis* 的大多数种, 以及在具覆瓦状排列萼片的 sect. *Aspidanthera* subsect. *Hexapetalae* 和 sect. *Pseudanemone*, 萼片边缘本身无毛或有柔毛, 但不被密短绒毛, 在外面沿边缘有贴伏的短柔毛, 这种情况与银莲花属的萼片相似。在 sect. *Cheiroopsis* 的 *C.*

wenshanensis W. T. Wang, subgen. *Clematis* 的多数种(上述具覆瓦状排列萼片的群除外), 以及 subgen. *Viorna* 的全部种, 在萼片边缘上有一狭条密短绒毛带, 萼片具有这种毛被会对花芽起到更好的保护作用。(i)边缘延展: 铁线莲属的多数种的萼片边缘不延展, 只在少数种

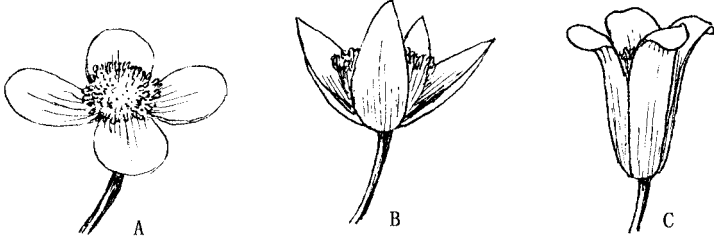


图2 3种铁线莲属植物的花, 显示萼片的3种开展方向 A, 绣球藤的花, 具平展萼片; B, 甘川铁线莲的花, 具斜上展萼片; C, 毛木通的花, 具直立萼片。

Fig. 2. Flowers each in three species of *Clematis*, showing three spreading directions of sepals. A, flower of *Clematis montana* Buch.-Ham. ex DC., with sepals horizontally spreading; B, *C. akebioides* (Maxim.) Veitch, with sepals ascending; C, *C. buchananiana* DC., with sepals erect.

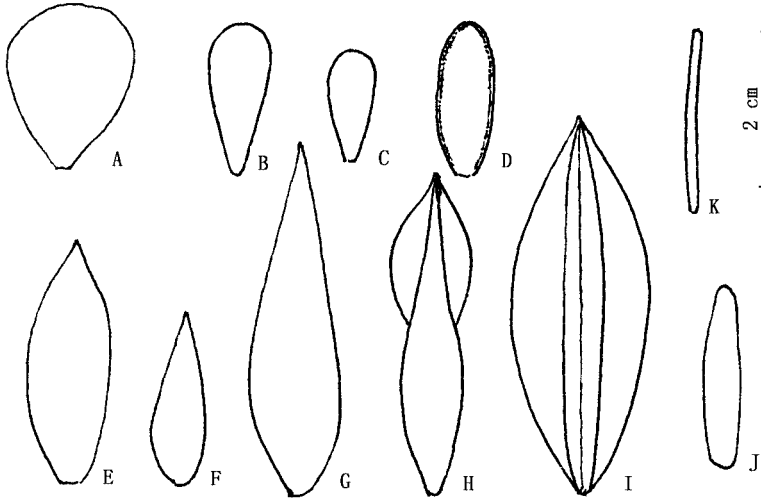


图3 11种铁线莲属植物的萼片, 显示萼片的不同形状 A, 绣球藤(根据俞德浚8282号标本绘); B, 光叶铁线莲(根据王晓东, 孙坤251号标本绘); C, 短毛铁线莲(根据Polunin et al. 3051号标本绘); D, 菝葜叶铁线莲(根据蒋英12935号标本绘); E, *C. commutata* Kuntze (根据Winter & Marais 4942号标本绘); F, 裂叶铁线莲(根据236 Exped. 1353号标本绘); G, *C. tongluensis* (Brühl) Tamura (根据Anderson 335号标本绘); H, *C. crispa* L. (根据B. F. Bush无号标本绘); I, 光柱铁线莲(根据中德考察队56-904号标本绘); J, *C. microphylla* DC. (根据I. B. Wilson 508号标本绘); K, *C. fawcettii* Muell (根据无名氏24313号标本绘)。

Fig. 3. Sepals in 11 species of *Clematis*, showing their different shapes. A, *Clematis montana* Buch.-Ham. ex DC. (from T. T. Yu 8282, PE); B, *C. glabrifolia* K. Sun & M. S. Yan (from X. D. Wang & K. Sun 251, PE); C, *C. puberula* Hook. f. & Thoms. (from Polunin et al. 3051, GH); D, *C. smilacifolia* Wall. (from Y. Tsiang 12935, PE); E, *C. commutata* Kuntze (from Winter & Marais 4942, K); F, *C. parviloba* Gardn. & Champ. (from 236 Exped. 1353, PE); G, *C. tongluensis* (Brühl) Tamura (from Anderson 335, K); H, *C. crispa* L. (from B. F. Bush s.n., US); I, *C. longistyla* Hand.-Mazz. (from Sino-German Exped. 56-904, PE); J, *C. microphylla* DC. (from I. B. Wilson 508, GH); K, *C. fawcettii* Muell. (from Anonymous 24313, K).

发生延展现象:在sect. *Fruticella*诸种,其卵形萼片在花开放后自边缘生出狭长的膜质边缘;在sect. *Viticella*,除*C. hancockiana*以外的大多数种的狭披针形萼片边缘在花开放后全长向外强烈延展成宽翅,使整个萼片呈椭圆形或狭倒卵形,从侧生基出脉向外分出多数平行细脉;在*C. crispa*和*C. baldwinii* (sect. *Viorna* subsect. *Crispae*),其披针形的萼片在花开放后边缘中部以上延展成翅(图3)。(j)萼片内面毛被:铁线莲属多数种的萼片内面像银莲花属的萼片一样无毛,但也有不少种的萼片内面被毛:在sect. *Clematis* subsect. *Clematis*, sect. *Aspidanthera* subsect. *Dioicae*, sect. *Brachiatae*, sect. *Pseudanemone*和sect. *Meclatis*的多数种,sect. *Viorna* subsect. *Connatae*和sect. *Atragene*的部分种的萼片内面被短柔毛;另外,少数种如*C. fulvicoma* (sect. *Naraveliopsis*), *C. villosa*, *C. uhehensis* Engler, *C. katangensis* (sect. *Pseudanemone*)的萼片内面密被短绒毛,此情况可作为与组内种类区别的进化特征。

2.7 雄蕊

根据上述毛茛科原始属以及银莲花属的雄蕊形态,可以看到铁线莲属雄蕊的以下演化趋势(Wang, 1998): (a)毛被:无毛 花丝有毛,花药无毛 花丝和花药均有毛。(b)花丝:条形或狭条形 下部或上部变宽 整体变宽,如 *C. robertsiana* Aitch & Hemsl. (sect. *Atragenopsis*); 平 皱缩(*C. crassifolia*, sect. *Clematis*)。 (c)花药:长圆形,长0.8–3.5 mm 狭长圆形 条形,长3–10 mm; *C. katangensis* (sect. *Pseudanemone*)的条形花药长8–9.5 mm (Wang, 2004c), *C. lanuginosa* (sect. *Viticella*)的条形花药长达10 mm (Fang, 1980),均是铁线莲属中最长的花药。(d)药隔:不突出 稍突出,突起小尖头长约0.1 mm,如在 *C. meyeniana* (sect. *Clematis*),或突起圆锥状或近球状,长0.1–0.2 mm,如在 *C. pickeringii* (sect. *Aspidanthera*) 明显突出,或突起呈钻形,长达4 mm,如在 *C. aristata* (sect. *Aspidanthera*),或突起呈狭片形,如sect. *Naraveliopsis* 的种,一般长1–3 mm,在 *C. papillosa* H. Eichler 长达8.5 mm,在 *C. macgregorii* Merr. 长达10 mm (王文采, 2000a, 2004a) (图4)。

2.8 花粉

铁线莲属的花粉包含三沟、散沟、散孔3种类型,大多数种具三沟花粉,后者是本属花粉的主要类型(Tobe, 1974; Tarasevich & Serov, 1986; Kapoor et al., 1989; 杨宗愈,黄增泉, 1992; Yano, 1992; Nowicke & Skvarla, 1995; 张镜铨, 1998)。张镜铨(1998)对中国铁线莲属多种植物的花粉进行了深入研究,认为其演化趋势是:由三沟花粉经过散沟花粉演化出散孔花粉,或由三沟花粉直接形成散沟花粉。Kapoor et al. (1989)研究了32种印度铁线莲属的花粉,其中多数种具三沟花粉,只1种即 *C. cadmia* 具散孔花粉,他们在做过分析之后指出:“The pollen features in *Clematis* exhibit a predominantly negatively reticulate sexine pattern and are of little phylogenetic significance”。但从上引有关铁线莲属花粉研究工作可以了解花粉形态对解释sect. *Viticella*和sect. *Tubulosae*的系统发育以及分类均有重要意义:sect. *Viticella*的subsect. *Floridae*具散孔花粉,而subsect. *Viticellae*则具三孔花粉;sect. *Tubulosae*的原始群subsect. *Pinnatae*具三沟花粉,而进化群subsect. *Tubulosae*具散孔花粉。另外,在sect. *Viorna* subsect. *Crispae*,产亚欧二洲的*C. fusca*和*C. integrifolia*具三沟花粉,而产美国的*C. viorna*等种则具散孔花粉,对了解此亚组的系统发育及分类等方面,花粉也可起重要的作用。

2.9 退化雄蕊

铁线莲属的大多数种均具无退化雄蕊的两性花,只有 *C. metouensis*、*C. loureiriana*、*C. liboensis* Z. R. Xu (sect. *Naraveliopsis*) 的两性花的外方雄蕊的花药消失而成为狭条形的退化雄蕊, 以及重瓣铁线莲 *C. florida* var. *plena* D. Don (sect. *Viticella*) 和 sect. *Atragene* 组诸种的两性花具花瓣状退化雄蕊。此外,在具单性花的 sect. *Aspidanthera* 的雌花中,可以看到退化雄蕊在数目上的演化趋势:多数(subsect. *Dioicae*、subsect. *Lasianthae*) 少数(subsect. *Microphyllae*、subsect. *Aristatae*、subsect. *Hexapetalae*) 0 (subsect. *Insidiosae*) (王文采, 2004a)。

2.10 花柱

铁线莲属大多种的花柱丝形,长(3-)6-10(-20) mm,密被直展的长柔毛,花期后强烈伸长,毛(长达4-5 mm)随之开展,整个宿存花柱呈羽毛状(plumose),通常长达2.5-6 cm,在

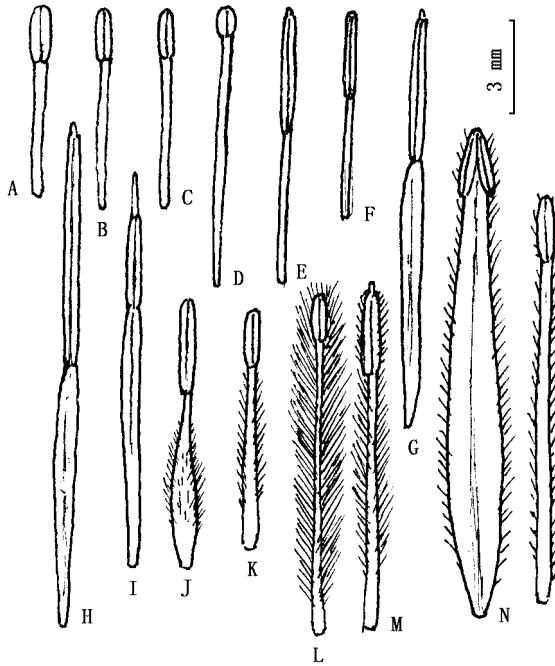


图4 14种铁线莲属植物的雄蕊 A, 美花铁线莲(根据四川考察队8231号标本绘); B, 绣球藤(根据冯国楣960号标本绘); C, 女娄(根据刘昉勋2626号标本绘); D, *C. virginiana* L. (根据Churchill 3920号标本绘); E, 毛柱铁线莲(根据王战30632号标本绘); F, 威灵仙(根据李学根200084号标本绘); G, 大花威灵仙(根据安徽调查队59-252号标本绘); H, 毛叶铁线莲(根据杭州植物园737号标本绘); I, 菝葜叶铁线莲(根据蒋英12935号标本绘); J, 甘青铁线莲(根据郑思绪425号标本绘); K, 芹叶铁线莲(根据孔宪武921号标本绘); L, 单叶铁线莲(根据李洪钧1586号标本绘); M, 贵州铁线莲(根据安顺调查队1245号标本绘); N, *C. robertsiana* Aitch & Hemsl. (根据Maarsukh 14962号标本绘)。

Fig. 4. Stamens in 14 species of *Clematis*. A, *Clematis potaninii* Maxim. (from Sichuan Exped. 8231, PE); B, *C. montana* Buch.-Ham. ex DC. (from K. M. Feng 960, PE); C, *C. apiifolia* DC. (from F. X. Liu 2626, PE); D, *C. virginiana* L. (from Churchill 3920, MO); E, *C. meyeniana* Walp. (from C. Wang 30632, PE); F, *C. chinensis* Osb. (from X. G. Li 200084, PE); G, *C. courtoisii* Hand.-Mazz. (from Anhui Exped. 59-252, PE); H, *C. lanuginosa* Lindl. (from Hangzhou Bot. Gard. 737, PE); I, *C. smilacifolia* Wall. (from Y. Tsiang 12935, PE); J, *C. tangutica* (Maxim.) Korsch. (from S. X. Zheng 425, PE); K, *C. aethusifolia* Turcz. (from H. W. Kung 921, PE); L, *C. henryi* Oliv. (from H. J. Li 1586, PE); M, *C. kweichowensis* Pei (from Anshun Exped. 1245, PE); N, *C. robertsiana* Aitch. & Hemsl. (from Maarsukh 14962, GH).

C. drummondii (sect. *Aspidanthera* subsect. *Dioicae*) (Wang, 2004a)和 *C. baldwinii* (sect. *Viorna* subsect. *Crispae*) (Pringle, 1997)可达10 cm,在 *C. grandiflora* DC.和 *C. longicauda* Steud. ex A. Rich. (sect. *Viorna* subsect. *Connatae*)可达10–12 cm,而与白头翁属 *Pulsatilla* Adans.的宿存花柱十分相似,是对风力传播果实的适应。但铁线莲属的一些种,如 *C. florida* (Finet & Gagnepain, 1903)、*C. huchouensis*、*C. viticella*、*C. campaniflora* (图5: F) (sect. *Viticella*)、*C. crispa* (图5: E)、*C. pitcheri* (sect. *Viorna* subsect. *Crispae*)的花柱长约10 mm,在花期之后稍伸长,其上的毛较短且贴伏,整个宿存花柱呈尾状或钻状,而不呈羽毛状。另有2种 *C. brachyura* (sect. *Pterocarpa*)和 *C. cadmia* (sect. *Viticella*)的花柱很短,长1–2 mm,花期后不伸长或稍伸长,呈钻状,被贴伏短毛或无毛。比铁线莲属原始的银莲花属的花柱通常短,长1–2 mm,或不存在,稀较长(Ulbrich, 1905)。因此,Brandenburg (2000)认为铁线莲属的宿存花柱的演化趋势为: not elongate 1 elongate 2自有其道理。但对上述具较短、非羽毛状花柱的诸种的果实,以及有关近缘群的花柱和果实加以考虑,则会得出其他的认识。*C. brachyura*的瘦果十分特化,强烈扁压,具宽翅(图5: H),此种可能由 sect. *Clematis* 演化而来,而在 sect. *Clematis*,宿存花柱均伸长呈羽毛状,瘦果均无翅。*C. cadmia* (图5: G)、*C. huchouensis*、*C. viticella*、*C. campaniflora* (图5: F)的瘦果均强烈扁压,有粗或肿胀的边缘框;而在 sect. *Viticella* 同组中的原始种 *C. hancockiana* 以及其他近缘种 *C. longistyla*、*C. courtoisii*、*C. patens* 等植物,宿存花柱均伸长呈羽毛状,瘦果不强烈扁压,无肿胀边缘框。*C. crispa* (图5: E)和 *C. pitcheri* 的瘦果均强烈扁压,具肿胀的边缘框;而在同一亚组 subsect. *Crispae* 中的多数种的瘦果均具伸长的羽毛状宿存花柱,均无肿胀的边缘框;sect. *Viorna* subsect. *Crispae* 源自 subsect. *Connatae* (Tamura, 1995),而在 subsect. *Connatae*,所有种的宿存花柱均伸长呈羽毛状,瘦果不强烈扁压,无肿胀边缘框。从上述情况可以推测 *C. viticella*、*C. crispa* 等种的宿存花柱弱度伸长,不呈羽毛状的现象,以及 *C. brachyura* 和 *C. cadmia* 花柱缩短现象乃是随着瘦果特化发生的花柱由短变长演化趋势的逆转现象。至于花柱原始的由短到长的演化,可能存在于已灭绝的铁线莲属原始群(见下)中,在现存的种类中已不能见到了。

2.11 果实

铁线莲属多数种的瘦果两侧扁压,侧面稍鼓起,通常卵形或椭圆形,长2–5(–7) mm,宽1–3(–5) mm (图5: A)。再稍进化的瘦果或强烈两侧扁,近扁平,如 *C. montana* (sect. *Cheirosia*)的瘦果,或边缘出现狭边缘框,如 *C. meyeniana* (sect. *Clematis*)和 *C. pickeringii* (图5: B) (sect. *Aspidanthera* subsect. *Aristatae*)。更进化的形态是强烈两侧扁,或具肿胀的边缘框,果体常增大,如在 *C. terniflora* (sect. *Clematis*),瘦果呈椭圆形,长6–9 mm (图5: C),在 *C. viticella*、*C. campaniflora* (图5: F) (sect. *Viticella*), 瘦果呈近圆形,直径约7 mm,再如 *C. crispa* (sect. *Viorna* subsect. *Crispae*)的瘦果呈椭圆形,长约8 mm (图5: E);或瘦果具延展的宽边缘,如在 *C. puberula* (sect. *Clematis*), 瘦果呈圆形,如一小饼,周围有平的宽边缘(Wang, 2000a),另外在 *C. microphylla* (sect. *Aspidanthera* subsect. *Microphyllae*), 瘦果椭圆形,周围的宽边缘有横皱(图5: D)。上述诸类型的瘦果或具伸长羽毛状宿存花柱,或具尾状或钻状稍伸长的宿存花柱,而下面的2种的宿存花柱很短,长约2 mm,被贴伏短毛或无毛,其中 *C. cadmia* (sect. *Viticella*)的瘦果强烈扁压,有边缘框,但边缘不延展,而 *C. brachyura* (sect.

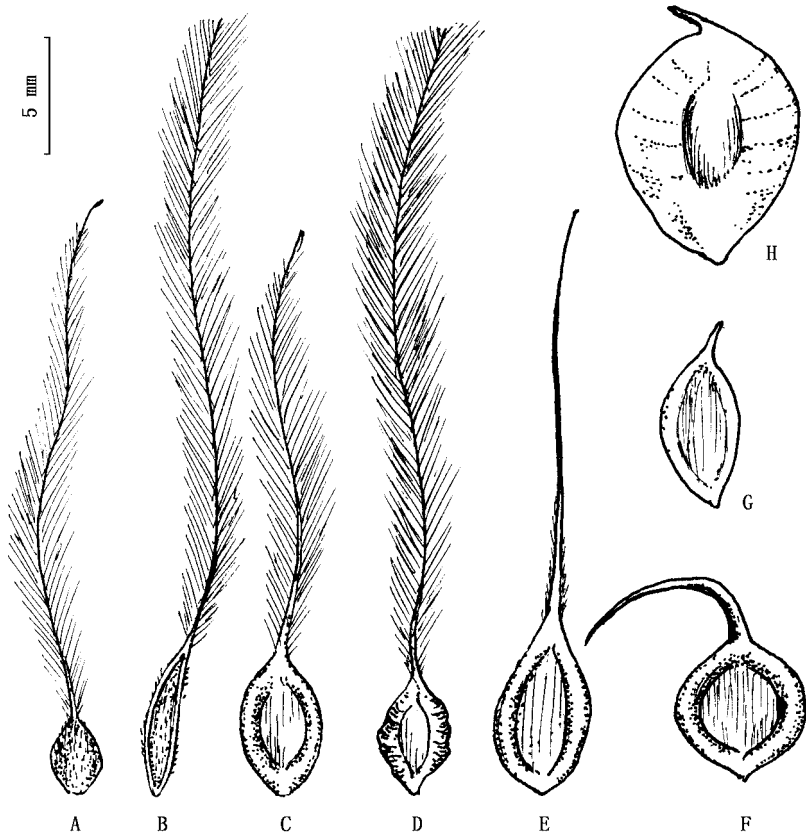


图5 6种铁线莲属植物的瘦果 A, 粗齿铁线莲(根据王作宾13281号标本绘); B, *C. pickeringii* Gray (根据Nyman 110号标本绘); C, 圆锥铁线莲(根据杭州植物园58-983号标本绘); D, *C. microphylla* DC. (根据R. H. Fisher无号标本绘); E, *C. crispa* L. (根据Kral无号标本绘); F, *C. campaniflora* Brot. (根据Rothmaler 13874号标本绘); G, 短柱铁线莲(根据Master无号标本绘); H, *C. brachyura* Maxim. (根据Jack无号标本绘)。

Fig. 5. Achenes in six species of *Clematis*. A, *Clematis grandidentata* (Rehd. & Wils.) W. T. Wang (from T. P. Wang 13281, PE); B, *C. pickeringii* Gray (from Nyman 110, UPS); C, *C. terniflora* Thunb. (from Hangzhou Bot. Gard. 58-983, PE); D, *C. microphylla* DC. (from R. H. Fisher s.n., UPS); E, *C. crispa* L. (from Kral s.n., US); F, *C. campaniflora* Brot. (from Rothmaler 13874, S); G, *C. cadmia* Buch.-Ham. ex Hook. f. & Thoms. (from Masters s.n., K); H, *C. brachyura* Maxim. (from Jack s.n., GH).

Pterocarpa)的瘦果也强烈扁压,沿背、腹缝线向外延展成宽翅(图5: H),这是对风力传播果实的一种适应,表现出高度特化水平。

3 属下各群间的亲缘关系

根据上述铁线莲属形态特征的演化趋势可以推测这属的原始群当是:多年生直立草本植物;幼苗叶互生,茎生叶互生或近互生,为掌状分裂的单叶;花序为顶生的聚伞花序,具不多的花;花萼辐状,萼片平展,倒卵形,边缘不具狭短绒毛带;雄蕊无毛,花药长圆形,药隔不突出;瘦果稍两侧扁,宿存花柱不强烈伸长。在现存的铁线莲属植物中,只有 *C. alternata* 的叶互生,为掌状浅裂的单叶,近似上述原始群的植物,但为攀援亚灌木,花下垂,萼片直立,紫

红色,雄蕊被毛,这些都是很特化的特征;sect. *Cheiroopsis* 的 *C. potaninii*、*C. montana* 等6种如上所述,其花构造与上述原始群的近似,但均为木质藤本,叶均对生,为三出或1-2回羽状复叶,瘦果强烈扁压,这些都属进化特征。所以,在现存铁线莲属植物中已不能找到上述的原始群,推测此原始群早已灭绝,现存的群当均由其演化而出。

主要根据花构造可以看到在现存铁线莲属植物中存在4条演化干(王文采, 2003, 2005)。包含 *C. montana* 等6原始种的 sect. *Cheiroopsis* 代表第一演化干,即绣球藤干,其特征为花两性,萼片倒卵形或其他变狭的形状,边缘上无毛或有短柔毛,无狭短绒毛带(但有一例外,*C. wenshanensis* 的萼片边缘有狭短绒毛带),雄蕊无毛,花药药隔通常无突起。在组内,由于萼片从平展变到直展,形状从倒卵形演变为长圆形、披针形等形状,花序从在当年生枝上腋生转变为自老枝腋芽中生出,且常退化为只具花梗的单花,而出现组下类群的分化。由于包含 *C. montana* 等6原始种,sect. *Cheiroopsis* 被视为铁线莲属的现存原始群。

第二演化干为欧洲铁线莲干,其特征为花两性,稀单性;萼片平展,稀斜上展或直展,呈长圆形、倒披针形、披针形或条形,边缘有一条狭短绒毛带(具覆瓦状排列萼片的 sect. *Aspidanthera* subsect. *Hexapetalae* 和 sect. *Pseudanemone* 例外);雄蕊无毛,稀有毛;花药长圆形至条形,药隔顶端无或有突起。此演化干包括10组,基部群为 sect. *Clematis*。此组的花两性,萼片平展,白色,雄蕊无毛,花丝条形,原始的 subsect. *Clematis* 的花药长圆形,进化的 subsect. *Rectae* 的花药条形。sect. *Aspidanthera* 与 sect. *Clematis* 极为相近,但花为单性。sect. *Brachiatae* 也与 sect. *Clematis* 极为相近,主要区别为雄蕊花丝有柔毛。sect. *Pseudanemone* 的雄蕊花丝有毛,与 sect. *Brachiatae* 相近,但茎直立,萼片卷叠式常部分为覆瓦状排列,部分为镊合状排列。sect. *Meclatis* 的雄蕊花丝也被毛,也与 sect. *Brachiatae* 相近,但萼片常斜上展,呈黄色,雄蕊花丝下部变宽而不同。sect. *Fruticella* 与 sect. *Clematis* 相近,但萼片斜上展,呈黄色,花开放后边缘延展成狭翅。sect. *Naraveliopsis* 也与 sect. *Clematis* 相近,此组植物的药隔顶端具短或长的狭片状突起。单型组 sect. *Pterocarpa* 也与 sect. *Clematis* 相近,但花柱短,不密被长柔毛,果期不强度伸长,不呈羽毛状,瘦果扁平,具宽翅。sect. *Viticella* 的特征为萼片狭披针形,花开放后边缘强度延展成宽翅,但其原始种 *C. hancockiana* 的萼片长圆形,边缘不延展,其花构造与 sect. *Clematis* 的相似。sect. *Tubulosae* 含2群,原始群 subsect. *Pinnatae* 为藤本,花两性,萼片斜上展,白色或淡紫色,长圆形,雄蕊无毛或花丝顶部有少数毛,花粉具三沟,上述特征与 sect. *Clematis* 相近;进化群 subsect. *Tubulosae* 的茎直立,花杂性,萼片直立,蓝紫色,花丝顶部常有疏毛,花粉具散孔。sect. *Pseudanemone* 可能源自 sect. *Brachiatae*,其他8组均可能源自 sect. *Clematis*。

第三演化干为尾叶铁线莲干,其萼片直立,边缘有狭短绒毛带,雄蕊花丝自下部至顶端密被柔毛,花药无毛或有毛。含2组:sect. *Viorna* 的茎生叶对生,幼苗叶互生或对生;sect. *Archiclematis* 的幼苗叶及茎生叶都为互生。尾叶铁线莲干与欧洲铁线莲干亲缘关系相近,二者可能有共同的起源。

第四演化干为长瓣铁线莲干,其特征为木质藤本,萼片薄草质,黄色、蓝色或紫色,边缘无狭短绒毛带(在 *C. sibirica* 和 *C. macropetala*,萼片在花芽时期边缘有密柔毛,在花开放后毛变稀疏),雄蕊被毛,外轮雄蕊的花丝及药隔均展宽,整个雄蕊呈狭倒披针形、披针状条形或匙形。含2组,sect. *Atragenopsis* 的雄蕊全部能育,sect. *Atragene* 的外轮雄蕊不育,成为花

瓣状退化雄蕊。此演化干可能与尾叶铁线莲干的 *sect. Viorna* 有亲缘关系。

上述四演化干在本文系统中均作为亚属处理,它们及其所包含的诸组之间的亲缘关系如图6所示。

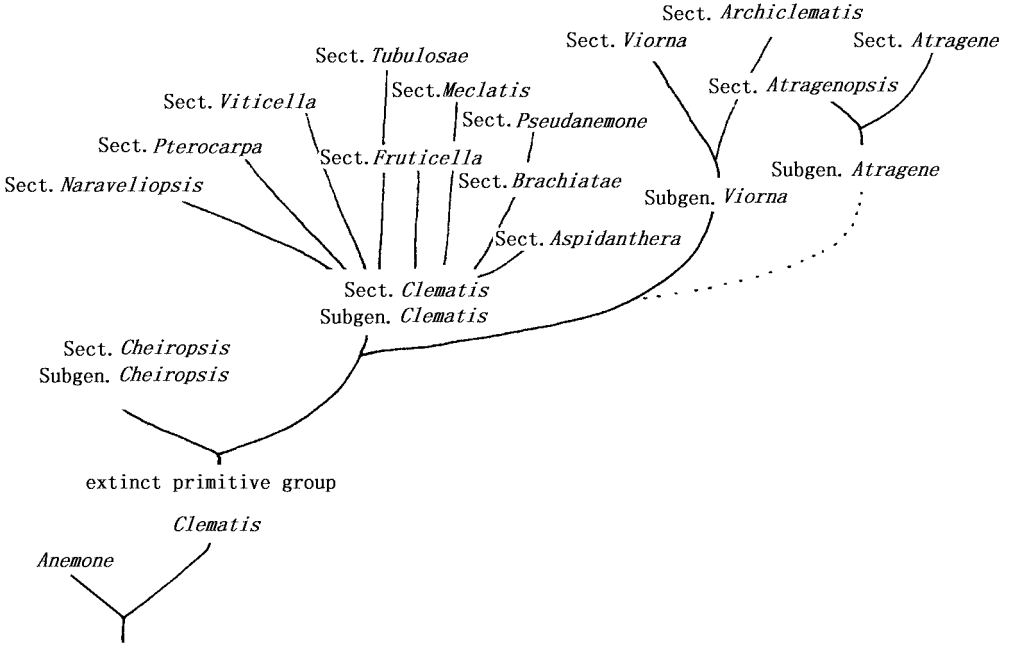


图6 铁线莲属各群间可能的系统发育亲缘关系示意图

Fig. 6. Diagram showing the putative phylogenetic relationships among the groups of the genus *Clematis*.

4 属下分类群系统排列

铁线莲属

Clematis L., Sp. Pl. 1: 543. 1753; et Gen. Pl., ed. 5, 242, no. 616. 1753; DC., Syst. 1: 131. 1818; et Prodr. 1: 2. 1824; Benth. in Benth. & Hook. f., Gen. Pl. 1: 3. 1862; Kuntze in Verh. Bot. Ver. Brand. 26: 83. 1885, p.p.; Prantl in Bot. Jahrb. 9: 249. 1888, p.p. excl. sect. *Naravelia*; et in Engler & Prantl, Nat. Pflanzenfam. 3 (2): 62. 1888, p.p. excl. sect. *Naravelia*; Koehne, Deuts. Dendr. 152. 1893; Schneid., Ill. Handb. Laubh. 1: 273. 1906; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 207. 1951; Tamura in Sci. Rep. Osaka Univ. 4: 44. 1955 et 16 (2): 31. 1967; et in Acta Phytotax. Geobot. 38: 38. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 368. 1995; Snoeijer in *Clematis* 1992: 7. 1992; M. Johnson, *Clematis* 139. 1997, p.p. excl. sect. *Naravelia*; Grey-Wilson, *Clematis* 24. 2000; Brandenb., *Meclatis* in *Clematis* 38. 2000. Lectotype: *C. vitalba* L. (Britton & Brown, 1913; Tamura, 1995).

Clematitidis Moench, Meth. 296. 1794.

木质藤本,稀为直立多年生草本、亚灌木或灌木。叶对生,稀互生,为单叶或复叶,具掌

状脉。花序聚伞状。花两性,稀单性;萼片4(-5-8),花瓣状,镊合状排列,稀覆瓦状排列;花瓣不存在;雄蕊多数,有时外部雄蕊不育成为退化雄蕊;心皮多数,稀少数,子房具1胚珠,花柱在果期宿存,通常伸长呈羽毛状。瘦果多少两侧扁。

约355种,广布世界各大洲。

本文系统承认本属包含4亚属15组如下。

亚属1 绣球藤亚属

subgen. 1. **Cheiropsis** Peterm., Deuts. Fl. 3. 1846; Grey-Wilson, Clematis 75. 2000.

Lectotype: *C. cirrhosa* L.

含1组,形态特征及地理分布见下。

组1 绣球藤组

sect. 1. **Cheiropsis** DC., Syst. 1: 162. 1818; et Prodr. 1: 9. 1824; Tamura in Sci. Rep. Osaka Univ. 16 (2): 34. 1967; et in Hiepko, Nat. Pflanzenfam., ed. 2, 17a (4): 379. 1995; M. Johnson, Klematis 365. 1997; W. T. Wang in Acta Phytotax. Sin. 40: 196. 2002.——*Cheiropsis* (DC.) Bercht. & Presl, Rostl. i. Ranunculac. 11. 1823.——*Cheiropsis* (DC.) Spach, Hist. Nat. Veg. Phan. 7: 260. 1839. Lectotype: *C. cirrhosa* L. (Tamura, 1955).

花两性。萼片镊合状排列,稀覆瓦状排列,平展或有时斜上展或直立,倒卵形、长圆形、长椭圆形、倒披针形或披针形,除1种(文山铁线莲)之外,边缘不被狭短绒毛带。雄蕊无毛;花丝条形;花药通常长圆形或狭长圆形,稀条形。宿存花柱伸长,羽毛状。

Flower bisexual. Sepals valvate, rarely imbricate, spreading or sometimes ascending or erect, obovate, oblong, long elliptic, oblanceolate or lanceolate, on margin without a narrow velutinous strip (except in one species, *C. wenshanensis*). Stamens glabrous; filaments linear; anthers oblong or narrowly oblong, rarely linear. Persistent styles elongate, plumose.

约23种,隶属8亚组,分布于亚洲,欧洲南部,非洲北部。

亚组1 美花铁线莲亚组

Subsect. 1. **Potaninianae** W. T. Wang in Acta Phytotax. Sin. 36: 162. 1998, sphalm. *Potanianae*, et 38: 401, 499. 2000 et 40: 200. 2002.——sect. *Clematis* subsect. *Potaninianae* M. Johnson, Klematis 410, 451. 1997, p.p. excl. *C. trichotoma* Nakai; Grey-Wilson, Clematis 45. 2000, p.p. excl. *C. trichotoma*. Type: *C. potaninii* Maxim.

木质藤本,叶为1-2回羽状复叶。花组成含1-3朵花的聚伞花序,生于当年生枝叶腋。萼片4-7,平展,倒卵形。花药长圆形或狭长圆形。

Woody vines. Leaves 1-2-pinnate. Flowers in 1-3-flowered cymes arising from leaf axils of hornotinous branch. Sepals 4-7, spreading, obovate. Anthers oblong or narrowly oblong.

2种: 1. 短梗铁线莲 *C. brevipes* Rehd., 2. 美花铁线莲 *C. potaninii* Maxim.。特产中国西南部。

亚组2 Subsect. 2. **Heynianae** W. T. Wang in Acta Phytotax. Sin. 38: 402, 499. 2000 et 40: 203. 2002. Type: *C. heynei* Rau.

木质藤本。叶为三出复叶。聚伞花序顶生或腋生,有3至多数花。萼片4-6,平展,倒披针形。花药条形。

Woody vines. Leaves ternate. Flowers in 3–many-flowered, terminal or axillary cymes. Sepals 4–7, spreading, oblanceolate. Anthers linear.

1种: 3. *C. heynei* Rau. 特产印度中部。

亚组3 槭叶铁线莲亚组

Subsect. 3. **Acerifoliae** W. T. Wang in Acta Phytotax. Sin. 36: 101. 1998 et 38: 499. 2000 et 40: 203. 2002. Type: *C. acerifolia* Maxim.

直立小灌木。单叶掌状浅裂。萼片5–8,平展,狭倒卵形,无毛。

Small erect shrub. Leaves simple, palmatilobed. Sepals 5–8, spreading, narrowly obovate, glabrous.

1种: 4. 槭叶铁线莲 *C. acerifolia* Maxim.。特产中国北京。

亚组4 绣球藤亚组

Subsect. 4. **Montanae** Schneid., Ill. Handb. Laubh. 290. 1906; Hand.-Mazz. in Acta Hort. Gotob. 13: 210. 1939, p.p.; M. Johnson, Klematis 386. 1997, p.p.; W. T. Wang in Acta Phytotax. Sin. 40: 204. 2002.——*Clematis* sect. *Anemoniflora* Loudon, Encycl. Trees and Shrubs 14. 1842. ——subgen. *Cheiropsis* sect. *Montanae* (Schneid.) Grey-Wilson, Clematis 75. 2000. Type: *C. montana* Buch.-Ham. ex DC.

木质藤本。叶为三出复叶,稀羽状复叶。花只具花梗,1或数朵与叶一同自老枝腋芽中生出,稀单朵或成对生于当年生枝叶腋。萼片4,平展。

Woody vines. Leaves ternate, rarely pinnate. Flowers only pedicellate, 1 or several together with leaves arising from an axillary bud of old branch, rarely singularly or in pair arising from leaf axils of hornotinous branch. Sepals 4, spreading.

12种,自中国台湾向西经过中国亚热带地区到喜马拉雅西部。

系1 绣球藤系

Ser. 1. **Montanae** Rehd. & Wils. in Sarg. Pl. Wils. 1: 331. 1913; Tamura in Sci. Rep. Osaka Univ. 4: 51. 1955; et in Acta Phytotax. Geobot. 16: 80. 1956; W. T. Wang in Acta Phytotax. Sin. 38: 500. 2000 et 40: 205. 2002. Lectotype: *C. montana* Buch.-Ham. ex DC.

萼片倒卵形,顶端圆形或钝。

Sepals obovate, apex rounded or obtuse.

6种: 5. 绣球藤 *C. montana* Buch.-Ham. ex DC., 6. 薄叶铁线莲 *C. gracilifolia* Rehd. & Wils., 7. 丽叶铁线莲 *C. venusta* M. C. Chang, 8. 金毛铁线莲 *C. chrysocoma* Franch., 9. 深裂铁线莲 *C. tripartita* W. T. Wang, 10. 宁静山铁线莲 *C. ningjingshanica* W. T. Wang。分布同绣球藤亚组。

系2 糙毛铁线莲系

Ser. 2. **Tongluenses** W. T. Wang in Acta Phytotax. Sin. 38: 501. 2000 et 40: 224. 2002. Type: *C. tongluensis* (Brühl) Tamura.

萼片长椭圆形、披针形或倒披针形,顶端急尖,渐尖,或渐狭。

Sepals long elliptic, lanceolate, or oblanceolate, apex acute, acuminate, or attenuate.

6种: 11. *C. wallichii* W. T. Wang, 12. *C. manipurensis* (Brühl) W. T. Wang, 13. *C.*

chasiana (Brühl) W. T. Wang, 14. 糙毛铁线莲 *C. laxistrigosa* (W. T. Wang & M. C. Chang) W. T. Wang, 15. *C. tongluensis* (Brühl) Tamura, 16. 文山铁线莲 *C. wenshanensis* W. T. Wang. 分布于孟加拉, 不丹, 中国西南部, 印度, 缅甸北部, 尼泊尔东部。

亚组5 戟状铁线莲亚组

Subsect. 5. **Hastatae** (W. T. Wang) W. T. Wang in Acta Phytotax. Sin. 38: 503. 2000 et 40: 226. 2002. —sect. *Clematis* subsect. *Rectae* ser. *Hastatae* W. T. Wang in Acta Phytotax. Sin. 36: 159. 1998. Type: *C. hastata* Finet & Gagnep.

本亚组似绣球藤亚组, 但枝条和叶无毛而不同。

This subsection is similar to subsect. *Montanae*, but differs in its glabrous branches and leaves.

2种: 17. 戟状铁线莲 *C. hastata* Finet & Gagnep., 18. 光叶铁线莲 *C. glabrifolia* K. Sun & M. S. Yan. 特产中国中部。

亚组6 滑叶藤亚组

Subsect. 6. **Fasciculiflorae** (Tamura) W. T. Wang in Acta Phytotax. Sin. 38: 503. 2000 et 40: 230. 2002. —sect. *Flammula* subsect. *Rectae* ser. *Fasciculiflorae* Tamura in Acta Phytotax. Geobot. 16 (3): 8. 1956. —sect. *Flammula* subsect. *Fasciculiflorae* (Tamura) M. Johnson, Klematis 604. 1997. —sect. *Cheiropsis* subsect. *Montanae* ser. *Fasciculiflorae* (Tamura) W. T. Wang in Acta Phytotax. Sin. 36: 162. 1998. —subgen. *Cheiropsis* sect. *Fasciculiflorae* (Tamura) Grey-Wilson, Clematis 94. 2000. Type: *C. fasciculiflora* Franch.

木质藤本。叶为三出复叶。花2–4朵单独或与叶同自一老枝腋芽中生出, 只具花梗。萼片4, 镊合状排列, 直立, 长圆形。

Woody vines. Leaves ternate. Flowers 2–4 alone or sometimes together with leaves arising from an axillary bud of old branch, pedicellate only. Sepals 4, valvate, erect, oblong.

1种: 19. 滑叶藤 *C. fasciculiflora* Franch.。分布中国西南部, 缅甸北部, 越南北部。

亚组7 Subsect. 7. **Williamsianae** M. Johnson, Klematis 366. 1997; W. T. Wang in Acta Phytotax. Sin 38: 504. 2000 et 40: 233. 2002; Grey-Wilson, Clematis 93. 2000. Type: *C. williamsii* Gray.

本亚组似绣球藤亚组, 但花组成具1花并具花序梗和2苞片的聚伞花序, 萼片渐升, 覆瓦状排列而不同。

This subsection is similar to subsect. *Montanae*, but differs in its flowers in 1-flowered pedunculate and bibracteate cymes and its ascending imbricate sepals.

1种: 20. *C. williamsii* Gray. 特产日本南部。

亚组8 合苞铁线莲亚组

Subsect. 8. **Cirrhosae** Prantl in Bot. Jahrb. 9: 259. 1888; M. Johnson, Klematis 365. 1997; W. T. Wang in Acta Phytotax. Sin. 38: 504. 2000 et 40: 234. 2002. Lectotype: *C. cirrhosa* L.

Sect. *Cheiropsis* subsect. *Cheiropsis* M. Johnson, Klematis 365. 1997; Grey-Wilson, Clematis 90. 2000. Type: *C. cirrhosa* L.

本亚组与 subsect. *Williamsianae* 相似, 但具1花的聚伞花序通常具总苞, 萼片镊合状排

列,直立而不同。

This subsection is similar to subsect. *Williamsianae*, but differs in its usually involucrate cymes and valvate, erect sepals.

2种: 21. *C. cirrhosa* L., 22. 合苞铁线莲 *C. napaulensis* DC.。分布于中国西南部,喜马拉雅地区,亚洲西南部,欧洲南部,非洲北部。

亚属2 欧洲铁线莲亚属

Subgen. 2. **Clematis**. Keener & Dennis in Taxon 31: 38. 1982; Tamura in Acta Phytotax. Geobot. 38: 40. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 377. 1995; Grey-Wilson, Clematis 25. 2000. Type: *C. vitalba* L.

Subgen. *Flammula* (DC.) Peterm., Deuts. Fl. 3. 1846, p.p.; Tamura in Acta Phytotax. Geobot. 38: 42. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 381. 1995; Grey-Wilson, Clematis 27. 2000. Lectotype: *C. flammula* L.

萼片镊合状排列,稀覆瓦状排列,平展,稀斜上展或直立,白色,稀黄色,蓝色或紫色,边缘有狭短绒毛带(*C. sichotealinensis* Ulanova, sect. *Aspidanthera* subsect. *Hexapetalae* 和 sect. *Pseudanemone* 例外)。雄蕊无毛,稀花丝有毛。

Sepals valvate, rarely imbricate, spreading, rarely ascending or erect, white, rarely yellow, blue or purple, margin with a narrow velutinous strip (however, in *C. sichotealinensis* Ulanova, sect. *Aspidanthera* subsect. *Hexapetalae* and sect. *Pseudanemone*, the velutinous strip is wanting). Stamens glabrous, rarely with hairy filaments.

约264种,隶属10组,分布世界各大洲。

组1 威灵仙组

Sect. 1. **Clematis**. Tamura in Sci. Rep. Osaka Univ. 16 (2): 33. 1967, p.p.; M. C. Chang in Fl. Reip. Pop. Sin. 28: 156. 1980; Tamura in Acta Phytotax. Geobot. 38: 40. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 378. 1995; M. Johnson, Klematis 407. 1997, p.p.; Grey-Wilson, Clematis 34. 2000, p.p.; W. T. Wang in Acta Phytotax. Sin. 41: 6. 2003. Type: *C. vitalba* L.

Sect. *Flammula* DC., Syst. 1: 133. 1818, p.p.

叶为1-2回三出复叶或1-2回羽状复叶,稀为单叶或3回羽状全裂。花两性。萼片4(-5-8),镊合状排列,平展,白色,稀粉红色,长圆形、倒披针形或披针形,边缘不延展。雄蕊无毛;花丝条形;花药长圆形或条形,顶端钝或有小尖头。瘦果无翅,具伸长羽毛状宿存花柱。

Leaves 1-2-ternate or 1-2-pinnate, rarely simple or 3-pinnatisect. Flower bisexual. Sepals 4(-5-8), valvate, spreading, white, rarely pink, oblong, oblanceolate or lanceolate, margin not dilated. Stamens glabrous; filaments linear; anthers oblong or linear, apex obtuse or minutely apiculate. Achenes not winged; Styles elongate, plumose.

约74种,隶属5亚组,广布于亚洲,欧洲和非洲北部和东部。

亚组1 钝萼铁线莲亚组

Subsect. 1. **Clematis**. Tamura in Acta Phytotax. Geobot. 38: 41. 1987; M. Johnson, Klematis 421. 1997; Grey-Wilson, Clematis 34. 2000, p.p.—sect. *Vitalba* Spach, Hist. Nat.

Veg. Phan. 7: 276. 1839, p.p.—sect. *Clematis* subsect. *Vitalbae* Tamura in Sci. Rep. Osaka Univ. 16 (2): 33. 1967. Type: *C. vitalba* L.

木质藤本。幼苗叶互生。萼片4(-5),被长达1 mm 的短柔毛。花丝不皱缩,花药通常长圆形或狭长圆形。

Woody vines. Seedling leaves alternate. Sepals 4(-5), with hairs up to 1 mm long. Filaments not rugose; anthers oblong or narrowly oblong.

29种,隶属2系,广布于亚洲和欧洲。

系1 钝萼铁线莲系

Ser. 1. **Clematis**.—sect. *Vitalbae* ser. *Euvitalbae* Prantl in Bot. Jahrb. 9: 260. 1888; Schneid., Ill. Handb. Laubh. 1: 290. 1906; Tamura in Sci. Rep. Osaka Univ. 4: 51. 1955.—Ser. *Vitalbae* Koehne, Deuts. Dendr. 12. 1893; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 218. 1940. Type: *C. vitalba* L.

Ser. *Pierotianae* Tamura in Sci. Rep. Osaka Univ. 4: 52. 1955.—sect. *Clematis* subsect. *Pierotianae* (Tamura) Tamura in Sci. Rep. Osaka Univ. 16 (2): 33. 1967; et in Acta Phytotax. Geobot. 38: 41. 1987; M. Johnson, Klematis 409. 1997; Grey-Wilson, Clematis 43. 2000, p.p. Type: *C. pierotii* Miq.

瘦果不扁平,不具边缘。

Achenes not flattened, nor marginate.

28种: 23. 鼎湖铁线莲 *C. tinghuensis* C. T. Ting, 24. 女娄 *C. apiifolia* DC., 25. 马山铁线莲 *C. mshanensis* W. T. Wang, 26. 细梗铁线莲 *C. tenuipes* W. T. Wang, 27. 台湾铁线莲 *C. formosana* Kuntze, 28. *C. cinnamomoides* W. T. Wang, 29. 缅甸铁线莲 *C. burmanica* Lace, 30. *C. apiculata* Hook. f. & Thoms., 31. 云贵铁线莲 *C. vaniotii* Lévl. & Port., 32. 金佛铁线莲 *C. gratopsis* W. T. Wang, 33. 粗齿铁线莲 *C. grandidentata* (Rehd. & Wils.) W. T. Wang, 34. *C. trichotoma* Nakai, 35. 密毛铁线莲 *C. pycnocomma* W. T. Wang, 36. 两广铁线莲 *C. chingii* W. T. Wang, 37. 福贡铁线莲 *C. tsaii* W. T. Wang, 38. 钝萼铁线莲 *C. peterae* Hand.-Mazz., 39. *C. vitalba* L., 40. 小蓑衣藤 *C. gouriana* Roxb. ex DC., 41. 秀丽铁线莲 *C. grata* Wall., 42. 串鼻龙 *C. javana* DC., 43. *C. mollissima* (Hall.) H. Eichler, 44. *C. multistriata* H. Eichler, 45. 短尾铁线莲 *C. brevicaudata* DC., 46. 厚萼铁线莲 *C. wissmanniana* Hand.-Mazz., 47. 细木通 *C. subumbellata* Kurz, 48. 裂叶铁线莲 *C. parviloba* Gardn. & Champ., 49. 田村铁线莲 *C. tamurae* T. Y. Yang & T. C. Huang, 50. *C. taeguensis* Y. Lee, 51. *C. pierotii* Miq. 地理分布同钝萼铁线莲亚组的分布。

系2 短毛铁线莲系

Ser. 2. **Puberulae** W. T. Wang in Acta Phytotax. Sin. 41: 54. 2003. Type: *C. puberula* Hook. f. & Thoms.

瘦果扁平,具宽边缘。

Achenes flattened, broadly marginate.

1种: 52. 短毛铁线莲 *C. puberula* Hook. f. & Thoms.。分布于中国,缅甸北部,不丹,印度北部,尼泊尔。

亚组2 厚叶铁线莲亚组

Subsect. 2. **Crassifoliae** (Tamura) Tamura in Sci. Rep. Osaka Univ. 16 (2): 33. 1967; M. C. Chang in Fl. Reip. Pop. Sin. 28: 178. 1980; W. T. Wang in Acta Phytotax. Sin. 41: 59. 2003. —subsect. *Rectae* ser. *Crassifoliae* Tamura in Sci. Rep. Osaka Univ. 4: 53. 1955. —sect. *Flammula* subsect. *Crassifoliae* (Tamura) Tamura in Acta Phytotax. Geobot. 38: 43. 1987; Grey-Wilson, *Clematis* 28. 2000. —sect. *Flammula* subsect. *Crassifoliae* (Tamura) M. Johnson, *Clematis* 604. 1997. Type: *C. crassifolia* Benth.

本亚组与钝萼铁线莲亚组接近,主要区别在于雄蕊花丝皱缩。

This subsection is related to subsect. *Clematis*, differing mainly in its rugose stamen filaments.

1种: 53. 厚叶铁线莲 *C. crassifolia* Benth. 分布于中国南部,日本南部。

亚组3 保民铁线莲亚组

Subsect. 3. **Baominianae** (W. T. Wang) W. T. Wang in Acta Phytotax. Sin. 41: 61. 2003. —subsect. *Clematis* ser. *Baominianae* W. T. Wang in l.c. 36: 157. 1998. Type: *C. baominiana* W. T. Wang.

本亚组与钝萼铁线莲亚组接近,但花具6枚萼片,萼片的毛较长(1.6–3 mm)而不同。

This subsection is related to subsect. *Clematis*, differing in its 6-sepalled flower and sepals with hairs 1.6–3 mm long.

1种: 54. 保民铁线莲 *C. baominiana* W. T. Wang. 分布于中国中部及东部。

亚组4 棉团铁线莲亚组

Subsect. 4. **Angustifoliae** Tamura in Sci. Rep. Osaka Univ. 4: 55. 1955 et 16 (2): 33. 1967; M. C. Chang in Fl. Reip. Pop. Sin. 28: 1980; W. T. Wang in Acta Phytotax. Sin. 41: 97. 2003. —sect. *Flammula* subsect. *Angustifoliae* (Tamura) Tamura in Acta Phytotax. Geobot. 16: 81. 1956 et 38: 43. 1987; M. Johnson, *Clematis* 603. 1997; Grey-Wilson, *Clematis* 113. 2000. —sect. *Angustifoliae* (Tamura) Serov in Bot. Zhurn. 73: 1740. 1988; Tamura in Hiepkko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 383. 1995. Type: *C. hexapetala* Pall.

Sect. *Fruticella* Tamura in Sci. Rep. Osaka Univ. 16 (2): 34. 1967, p.p.; M. C. Chang in Fl. Reip. Pop. Sin. 28: 147. 1980, p.p.; M. Johnson, *Clematis* 651. 1997, p.p.; W. T. Wang in Acta Phytotax. Sin. 36: 160. 1998, p.p.; Grey-Wilson, *Clematis* 126. 2000, p.p.

直立小灌木、亚灌木或多年生草本。花序顶生。萼片4–8。

Small erect shrubs, subshrubs, or perennial herbs. Inflorescences terminal. Sepals 4–8.

7种,隶属3系。分布于阿富汗,中国西部达东北部,伊朗,哈萨克斯坦,吉尔吉斯斯坦,蒙古,尼泊尔,巴基斯坦,俄国西伯利亚,塔吉克斯坦,土库曼斯坦。

系1 准噶尔铁线莲系

Ser. 1. **Songaricae** Serov in Bot. Zhurn. 73: 1739. 1988; W. T. Wang in Acta Phytotax. Sin. 41: 98. 2003. —subsect. *Songaricae* (Serov) M. Johnson, *Clematis* 653. 1997; Grey-Wilson, *Clematis* 129. 2000. Type: *C. songarica* Bunge.

Ser. *Ispahanicae* Serov in l.c. —subsect. *Ispahanicae* (Serov) M. Johnson, l.c. Type: *C.*

ispahanica Boiss.

直立小灌木或亚灌木。萼片4-7,侧生基出脉具少数细脉。

Small erect shrubs or subshrubs. Sepals 4-7, with lateral basal veins having a few veinlets.

5种: 55. 披针叶铁线莲 *C. lancifolia* Bur. & Franch., 56. 定军山铁线莲 *C. dingjunshanica* W. T. Wang, 57. 准噶尔铁线莲 *C. songarica* Bunge, 58. *C. ispahanica* Boiss., 59. 银叶铁线莲 *C. delavayi* Franch.。分布大致与棉团铁线莲亚组相同,但在中国东北无分布。

系2 Ser. 2. **Phlebanthae** (M. Johnson) W. T. Wang in Acta Phytotax. Sin. 41: 107. 2003. —sect. *Fruticella* Tamura subsect. *Phlebanthae* M. Johnson, Klematis 653. 1997; Grey-Wilson, Clematis 130. 2000. Type: *C. phlebantha* Williams.

本亚组与准噶尔铁线莲亚组相近,但花单生,萼片侧生基出脉有少数细脉而不同。

This subsection is related to subsect. *Songaricae*, differing in its solitary flowers and lateral basal veins of sepal with numerous veinlets.

1种: 60. *C. phlebantha* Williams. 特产尼泊尔。

系3 棉团铁线莲系

Ser. 3. **Hexapetalae** W. T. Wang in Acta Phytotax. Sin. 41: 108. 2003. Type: *C. hexapetala* Pall.

多年生草本。萼片(4-)5-6(-8)。

Perennial herbs. Sepals (4-)5-6(-8).

1种: 61. 棉团铁线莲 *C. hexapetala* Pall.。分布于中国北部及东北部,朝鲜,蒙古,俄国西伯利亚。

亚组5 威灵仙亚组

Subsect. 5. **Rectae** Prantl in Bot. Jahrb. 9: 259. 1888, p.p.; Schneid., Ill. Handb. Laubh. 1: 288. 1906; Tamura in Sci. Rep. Osaka Univ. 4: 53. 1955, p.p. et 16 (2): 33. 1967; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 382. 1995; M. C. Chang in Fl. Reip. Pop. Sin. 28: 158. 1980; W. T. Wang in Acta Phytotax. Sin. 41: 111. 2003. Type: *C. recta* L.

Sect. *Flammula* auct. non DC.: M. Johnson, Klematis 599. 1997, p.p.; Grey-Wilson, Clematis 95. 2000, p.p.

本亚组与钝萼铁线莲亚组很接近,主要区别为幼苗叶对生,花药条形。

This subsection is very closely related to subsect. *Clematis*, differing mainly in its opposite seedling leaves and linear anthers.

约35种,隶属6系,广布于亚洲,欧洲,非洲北部及东部。

系1 毛柱铁线莲系

Ser. 1. **Meyenianae** Tamura in Sci. Rep. Osaka Univ. 4: 54. 1955; et in Acta Phytotax. Geobot. 16: 81. 1956; W. T. Wang in Acta Phytotax. Sin. 41: 115. 2003. —sect. *Flammula* subsect. *Meyenianae* (Tamura) M. Johnson, Klematis 605. 1997; Grey-Wilson, Clematis 104. 2000. Type: *C. meyeniana* Walp.

叶为三出复叶或一回羽状复叶,稀为单叶或二回羽状复叶;小叶通常全缘。花序生于当年生枝叶腋。瘦果不扁平,卵形,椭圆形或披针形,无肿胀边缘框。

Leaves ternate or pinnate, rarely simple or 2-pinnate; leaflets usually entire. Inflorescences arising from leaf axils of hornotinous branch. Achenes not flattened, ovate, elliptic or lanceolate, not tumidly rimmed.

15种: 62. *C. thaiana* Tamura, 63. 那坡铁线莲 *C. napoensis* W. T. Wang, 64. 迦拉萨铁线莲 *C. jialasaensis* W. T. Wang, 65. 城固铁线莲 *C. chengguensis* W. T. Wang, 66. 辛氏铁线莲 *C. sinii* W. T. Wang, 67. *C. theobromina* Dunn, 68. 新会铁线莲 *C. xinhuensis* R. J. Wang, 69. 屏边铁线莲 *C. pingbianensis* W. T. Wang, 70. 毛柱铁线莲 *C. meyeniana* Walp., 71. 浙江铁线莲 *C. chekiangensis* Pei, 72. 山木通 *C. finetiana* Lévl. & Van., 73. 陕西铁线莲 *C. shensiensis* W. T. Wang, 74. 五叶铁线莲 *C. quinquefoliolata* Hutch., 75. 屏东铁线莲 *C. akoensis* Hayata, 76. 舟柄铁线莲 *C. dilatata* Pei。多数种分布于亚洲东部,只1种分布于印度南部。

系2 小木通系

Ser. 2. **Armandianae** W. T. Wang in Acta Phytotax. Sin. 36: 158. 1998 et 41: 132. 2003. Type: *C. armandii* Franch.

本系极近毛柱铁线莲系,其花序单独自老枝腋芽中生出而不同。

This series is most closely related to ser. *Meyenianae*, differing in its inflorescences alone arising from axillary buds of old branch.

3种: 77. 凌云铁线莲 *C. lingyunensis* W. T. Wang, 78. 小木通 *C. armandii* Franch., 79. 安顺铁线莲 *C. zygophylla* Hand.-Mazz.。分布于中国亚热带地区,印度,缅甸,越南。

系3 威灵仙系

Ser. 3. **Rectae** Prantl ex Rehd. & Wils. in Sarg., Pl. Wils. 1: 325. 1913, p.p.; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 215. 1951; Tamura in Sci. Rep. Osaka Univ. 4: 54. 1955; et in Acta Phytotax. Geobot. 16: 81. 1956; W. T. Wang in Acta Phytotax. Sin. 41: 137. 2003.——sect. *Rectae* Serov in Bot. Zhurn. 73: 1739. 1988. Type: *C. recta* L.

Subsect. *Rectae* ser. *Chinenses* Tamura in ll. cc.——sect. *Flammula* subsect. *Chinenses* (Tamura) M. Johnson, Klematis 603. 1997; Grey-Wilson, Clematis 110. 2000. Type: *C. chinensis* Osb.

Sect. *Flammula* subsect. *Flammula* M. Johnson, l.c. 602. 1997; Grey-Wilson, l.c. 95. 2000. Type: *C. flammula* L.

本系接近毛柱铁线莲系,但瘦果扁平,具肿胀边缘框而不同。

This series is related to ser. *Meyenianae*, differing in its achenes flattened and tumidly rimmed.

约13种: 80. 威灵仙 *C. chinensis* Osb., 81. 巴山铁线莲 *C. pashanensis* (M. C. Chang) W. T. Wang, 82. 太行铁线莲 *C. kirilowii* Maxim., 83. 秦岭铁线莲 *C. obscura* Maxim., 84. 文县铁线莲 *C. wenxianensis* W. T. Wang, 85. 条形铁线莲 *C. linearifoliola* W. T. Wang, 86. 圆锥铁线莲 *C. terniflora* DC., 87. *C. papuligera* Ohwi, 88. *C. flammula* L., 89. *C. tunisiatica*

W. T. Wang, 90. *C. elisabethae-carolae* Greuter, 91. *C. recta* L., 92. *C. lathyrifolia* Bess. ex Trautv. 广布于亚洲东部及西南部, 欧洲, 非洲北部。

系4 柱果铁线莲系

Ser. 4. **Uncinatae** Tamura in Sci. Rep. Osaka Univ. 4: 53. 1955; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 383. 1995; W. T. Wang in Acta Phytotax. Sin. 36: 159. 1998 et 41: 163. 2003. —sect. *Flammula* subsect. *Uncinatae* (Tamura) M. Johnson, Klematis 606. 1997; Grey-Wilson, Clematis 112. 2000. Type: *C. uncinata* Champ. ex Benth.

本系接近毛柱铁线莲系, 但其瘦果呈钻状圆柱形或狭披针形可以区别。

This series is related to ser. *Meyeniana*, differing mainly in its subulate-terete or narrowly lanceolate achenes.

2种: 93. 柱果铁线莲 *C. uncinata* Champ. ex Benth., 94. *C. sigensis* Engler. 分布于亚洲东部和非洲东部。

系5 Ser. 5. **Zemuenses** W. T. Wang in Acta Phytotax. Sin. 38: 505. 2000 et 41: 169. 2003. Type: *C. zemuensis* W. W. Smith.

木质藤本。叶为二回羽状复叶; 小叶具齿。聚伞花序单条与数叶自老枝一腋芽生出或单独生当年生枝下部叶腋。

Woody vines. Leaves 2-pinnate; leaflets dentate. Cymes solitarily with several leaves arising from an axillary bud of old branch or solitarily from lower leaf axils of hornotinous branch.

1种: 95. *C. zemuensis* W. W. Smith. 分布于不丹, 尼泊尔。

系6 Ser. 6. **Sichotealinenses** W. T. Wang in Acta Phytotax. Sin. 38: 504. 2000 et 41: 171. 2003. Type: *C. sichotealinensis* Ulanova.

本系稍近似 ser. *Zemuenses*, 但聚伞花序在当年枝上顶生或腋生, 萼片无毛而不同。

This series is somewhat similar to ser. *Zemuenses*, differing in its cymes terminal and axillary on hornotinous branch and its glabrous sepals.

1种: 96. *C. sichotealinensis* Ulanova. 特产俄国远东地区。

在铁线莲属大多数种, 萼片多少有柔毛, 只有2种, 即这里的 *C. sichotealinensis* 和 sect. *Cheiroopsis* 的 *C. acerifolia* 的萼片完全无毛。

组2 Sect. 2. **Aspidanthera** Spach, Hist. Nat. Veg. Phan. 7: 283. 1839; Tamura in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 380. 1995, s.l.; Snoeijer in Clematis 1992: 16. 1992; M. Johnson, Klematis 49. 1997; Grey-Wilson, Clematis 58. 2000; W. T. Wang in Acta Phytotax. Sin. 38: 505. 2000 et 42: 6. 2004, s.l. Lectotype: *C. aristata* R. Br. ex Ker Gawler.

木质藤本, 稀小亚灌木 (*C. gentianoides*, *C. marmoraria*)。叶对生, 为1-2回三出复叶或1-2回羽状复叶, 稀单叶或3回羽状复叶。花单性。萼片4(-5-8), 平展, 稀直立 (subtrib. *Insidiosae*), 白色, 稀黄色或黄绿色, 长圆形或条形。雄蕊无毛; 花丝条形; 花药长圆形, 稀条形, 药隔不突起或具圆锥状或钻形突起。瘦果无翅, 具伸长羽毛状宿存花柱。

Woody vines, rarely low shrubs. Leaves opposite, 1-2-ternate or 1-2-pinnate, rarely simple or 3-pinnate. Flower unisexual. Sepals 4(-5-8), spreading, rarely erect, white, rarely

yellow or yellow-green, oblong or linear. Stamens glabrous; filaments linear; anthers oblong, rarely linear; connectives not projected or with conic or subulate projections. Achenes not winged, with elongate plumose persistent styles.

约73种,隶属6亚组,广布于北、南美洲,大洋洲,亚洲东南部及马达加斯加。

亚组1 Subsect. 1. **Dioicae** (Prantl) W. T. Wang in Acta Phytotax. Sin. 38: 506. 2000 et 42: 7. 2003. —sect. *Flammula* DC. subsect. *Vitalbae* Prantl ser. *Dioicae* Prantl in Bot. Jahrb. 9: 260. 1888; Schneid., Ill. Handb. Laubh. 1: 291. 1906.—sect. *Clematis* subsect. *Dioicae* (Prantl) Tamura in Sci. Rep. Osaka Univ. 16 (2): 33. 1967; et in Acta Phytotax. Geobot. 38: 41. 1987; M. Johnson, Klematis 471. 1997; Grey-Wilson, Clematis 47. 2000.—sect. *Dioicae* (Prantl) Brandenb., *Meclatis* in *Clematis* 38. 2000. Type: *C. dioica* L.

花序生于当年生枝叶腋。萼片4(-5-6),镊合状排列,长圆形,倒披针形或卵形,比雄蕊稍长。雄蕊药隔不突起。退化雄蕊多数。

Inflorescences arising from leaf axils of hornotinous branch. Sepals 4(-5-6), valvate, oblong, oblanceolate or ovate, slightly longer than stamens. Connectives not projected. Staminodes numerous.

约35种,隶属2系,广布于北美洲和南美洲。

系1 Ser. 1. **Dioicae** W. T. Wang in Acta Phytotax. Sin. 38: 507. 2000 et 42: 10. 2004. Type: *C. dioica* L.

叶为1-2回三出复叶或羽状复叶,有时为单叶,稀为3回羽状复叶,此时小叶长达5.2 cm。萼片白色,稀黄色。

Leaves once to twice ternate or pinnate, sometimes simple, rarely thrice pinnate, then leaflets up to 5.2 cm long. Sepals white, rarely yellow.

约33种: 97. *C. dimorphophylla* W. T. Wang, 98. *C. malacocoma* W. T. Wang, 99. *C. virginiana* L., 100. *C. subtriloba* G. Don, 101. *C. dioica* L., 102. *C. rhodocarpa* Rose, 103. *C. polygama* Jacq., 104. *C. populifolia* Turcz., 105. *C. bonariensis* Juss. ex DC., 106. *C. variifolia* W. T. Wang, 107. *C. uruboensis* Lourt., 108. *C. coahuilensis* Keil, 109. *C. plukenetii* DC., 110. *C. grossa* Benth., 111. *C. thalictroides* Steud., 112. *C. malacoclada* W. T. Wang, 113. *C. haenkeana* Presl., 114. *C. guadelopae* Pers., 115. *C. grahamii* Benth., 116. *C. caleoides* Standley & Steyerl., 117. *C. fulvofurfuracea* W. T. Wang, 118. *C. drummondii* Torr. & Gray, 119. *C. catesbyana* Pursh, 120. *C. ligusticifolia* Nutt., 121. *C. alborosea* Ulbr., 122. *C. flammulastrum* Griseb., 123. *C. flammulastroides* W. T. Wang, 124. *C. acapulcensis* Hook. & Arn., 125. *C. brasiliana* DC., 126. *C. affinis* St. Hil., 127. *C. campestris* St. Hil., 128. *C. peruviana* DC., 129. *C. ulbrichiana* Pilger. 分布同本亚组。

系2 Ser. 2. **Millefoliolatae** W. T. Wang in Acta Phytotax. Sin. 36: 507. 2000 et 42: 58. 2003. Type: *C. millefoliolata* Eichler.

叶为3或2回羽状复叶,小叶小,长2-15(-22) mm。萼片常淡黄色。

Leaves thrice or twice pinnate; leaflets small, 2-15(-22) mm long. Sepals often yellowish.

2种: 130. *C. seemanii* Kuntze, 131. *C. millefoliolata* Eichler。分布于玻利维亚和秘鲁安第斯山高山地区。

亚组2 Subsect. 2. **Lasianthae** (Tamura) W. T. Wang in Acta Phytotax. Sin. 38: 507. 2000 et 42: 61. 2004.——sect. *Lasiantha* Tamura in Sci. Rep. Osaka Univ. 16 (2): 34. 1967; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 381. 1995; M. Johnson, Klematis 489. 1997; Grey-Wilson, Clematis 53. 2000. Type: *C. lasiantha* Nutt.

本亚组极近 subsect. *Dioicae*, 区别在于本亚组的当年生花枝或花序与数叶同自老枝一腋芽中生出。

This subsection is most closely related to subsect. *Dioicae*, differing in its hornotinous flowering branch or inflorescence arising together with several leaves from an axillary bud of old branch.

2种: 132. *C. pauciflora* Nutt., 133. *C. lasiantha* Nutt.。分布于美国西南部及墨西哥北部。

亚组3 Subsect. 3. **Microphyllae** W. T. Wang in Acta Phytotax. Sin. 38: 507. 2000 et 42: 64. 2004. Type: *C. microphylla* DC.

本亚组近似 subsect. *Dioicae*, 区别在于萼片通常比雄蕊长2–4倍, 狭长圆形或条形, 退化雄蕊较少, 2–16。

This subsection is similar to subsect. *Dioicae*, differing in its sepals usually 2–4 times longer than stamens, narrowly oblong or linear in outline, and in having fewer (2–16) staminodes.

7种: 134. *C. rhodocarpoides* W. T. Wang, 135. *C. queenslandica* W. T. Wang, 136. *C. fawcettii* Muell., 137. *C. brachystemon* Gunn ex W. T. Wang, 138. *C. linearifolia* Steud., 139. *C. microphylla* DC., 140. *C. delicata* H. Eichler ex W. T. Wang。特产澳大利亚。

亚组4 Subsect. 4. **Aristatae** (Prantl) W. T. Wang in Acta Phytotax. Sin. 38: 509. 2000 et 42: 97. 2004. ——sect. *Flammula* DC. subsect. *Aristatae* Prantl in Bot. Jahrb. 9: 260. 1888; H. Eichler in Bibl. Bot. 124: 32. 1958; Tamura in Sci. Rep. Osaka Univ. 16 (2): 33. 1967. ——sect. *Aristatae* (Prantl) Brandenb., *Meclatis* in *Clematis* 38. 2000. Lectotype: *C. aristata* R. Br. ex Ker Gawler.

Sect. *Clematis* subsect. *Papuasicae* H. Eichler in l.c. 35; Tamura in l.c. ——sect. *Aspidanthera* subsect. *Papuasicae* (H. Eichler) M. Johnson, Klematis 494. 1997; Grey-Wilson, Clematis 63. 2000. ——sect. *Papuasicae* (H. Eichler) Brandenb., l.c. Type: *C. papuasica* Merr. & Perry.

Sect. *Aspidanthera* Spach subsect. *Aspidanthera* M. Johnson, l.c. 493; Grey-Wilson, l.c. 58. Type: *C. aristata* R. Br. ex Ker Gawler.

本亚组相似于 subsect. *Dioicae*, 区别在于本亚组的雄蕊药隔明显突起, 退化雄蕊较少, 2–14(–18)。

This subsection is similar to subsect. *Dioicae*, differing in its conspicuously projected connectives and fewer (2–14–18) staminodes.

16种,隶属于3系,分布于澳大利亚,印度尼西亚东部,斐济,新喀里多尼亚,巴布亚新几内亚,所罗门群岛,东帝汶。

系1 Ser. 1. **Pickeringianae** W. T. Wang in Acta Phytotax. Sin. 38: 510. 2000 et 42: 99. 2004. Type: *C. pickeringii* Gray.

木质藤本。萼片4。药隔突起呈球状圆锥形,长0.1–0.2 mm。

Woody vines. Sepals 4. Connective projections globose-conic, 0.1–0.2 mm long.

7种: 141. *C. dubia* (Endl.) P. S. Green, 142. *C. cruttwellii* H. Eichler ex W. T. Wang, 143. *C. tuaensis* H. Eichler ex W. T. Wang, 144. *C. clemensiae* H. Eichler, 145. *C. archboldiana* Merr. & Perry, 146. *C. novocaledoniensis* W. T. Wang, 147. *C. pickeringii* Gray。分布于澳大利亚北部,印度尼西亚东部,斐济,新喀里多尼亚,巴布新几内亚,所罗门群岛,东帝汶。

系2 Ser. 2. **Aristatae** W. T. Wang in Acta Phytotax. Sin. 38: 510. 2000 et 42: 105. 2004. Type: *C. aristata* R. Br. ex Ker Gawler.

木质藤本。萼片4。药隔突起呈细柱形或钻形,长0.3–4.5 mm。

Woody vines. Sepals 4. Connective projections thinly columnar or subulate, 0.3–4.5 mm long.

8种: 148. *C. glycinoides* DC., 149. *C. phanerophlebia* Merr. & Perry, 150. *C. sclerophylla* W. T. Wang, 151. *C. tenuimarginata* H. Eichler, 152. *C. stenantha* H. Eichler, 153. *C. papuasica* Merr. & Perry, 154. *C. aristata* R. Br. ex Ker Gawler, 155. *C. clitorioides* DC.。广布于澳大利亚,印度尼西亚东部,巴布亚新几内亚,所罗门群岛。

系3 Ser. 3. **Gentianoides** W. T. Wang in Acta Phytotax. Sin. 42: 116. 2004. Type: *C. gentianoides* DC.

小亚灌木。叶为单叶或三出复叶。萼片4–6。药隔突起呈钻状柱形,长0.5–0.9 mm。

Low subshrubs. Leaves simple or ternate. Sepals 4–6. Connective projections subulate-columnar, 0.5–0.9 mm long.

1种: 156. *C. gentianoides* DC.。特产澳大利亚塔斯马尼亚。

亚组5 Subsect. 5. **Hexapetalae** (Prantl) W. T. Wang in Acta Phytotax. Sin. 38: 510. 2000 et 42: 117. 2004.——sect. *Flammula* DC. subsect. *Vitalbae* Prantl ser. *Hexapetalae* Prantl in Bot. Jahrb. 9: 260. 1888, p.p. excl. *C. microphylla* DC. ——sect. *Clematis* subsect. *Hexapetalae* (Prantl) Snoeijer in *Clematis* 1992: 15. 1992. Lectotype: *C. hexapetala* L. f. (= *C. fosteri* Gmelin).

Sect. *Novae-Zeelandiae* M. Johnson, *Clematis* 159. 1997; Grey-Wilson, *Clematis* 65. 2000. Type: *C. fosteri* Gmelin.

萼片覆瓦状排列,或部分镊合状排列。退化雄蕊2–13。

Sepals imbricate, or partly valvate. Staminodes 2–13.

11种,隶属于4系,特产新西兰。

系1 Ser. 1. **Afoliatae** W. T. Wang in Acta Phytotax. Sin. 38: 512. 2000 et 42: 119. 2004. Type: *C. afoliata* Buchan.

木质藤本。叶片通常不存在。花梗无小苞片。萼片4。

Woody vines. Leaf blades usually wanting. Pedicels not bracteolate. Sepals 4.

1种: 157. *C. afoliata* Buchan.

系2 Ser. 2. **Maratae** W. T. Wang in Acta Phytotax. Sin. 38: 512. 2000 et 42: 119. 2004.

Type: *C. marata* Armstr.

木质藤本。叶为三出复叶。花梗有明显对生的小苞片。萼片4。退化雄蕊2-4。

Woody vines. Leaves ternate. Pedicels with conspicuous opposite bracteoles. Sepals 4.

Staminodes 2-4.

2种: 158. *C. marata* Armstr., 159. *C. quadribacteolata* Colenso.

系3 Ser. 3. **Hexapetalae** W. T. Wang in Acta Phytotax. Sin. 38: 512. 2000 et 42: 121. 2004.

Type: *C. fosteri* Gmelin.

木质藤本。叶为1-2回三出复叶。萼片(4-)5-8,披针形或狭长圆形。退化雄蕊3-5(-12)。

Woody vines. Leaves 1-2-ternate. Sepals (4-)5-8, lanceolate or narrowly oblong.

Staminodes 3-5(-12).

7种: 160. *C. paniculata* Gmelin, 161. *C. cunninghamii* Turcz., 162. *C. foetida* Raoul.,

163. *C. fosteri* Gmelin, 164. *C. hookeriana* Allan, 165. *C. australis* Kirk, 166. *C. petriei* Allan.

系4 Ser. 4. **Marmorariae** W. T. Wang in Acta Phytotax. Sin. 38: 512. 2000 et 42: 129. 2004.

Type: *C. marmoraria* Sneddon.

小亚灌木。叶为单叶,掌状全裂,全裂片细裂。萼片5-8,倒卵状椭圆形。退化雄蕊8-13。

Low subshrubs. Leaves simple, palmatisect; segments dissected. Sepals 5-8, obovate-elliptic. Staminodes 8-13.

1种: 167. *C. marmoraria* Sneddon.

亚组6 Subsect. 6. **Insidiosae** W. T. Wang in Acta Phytotax. Sin. 38: 315, 513. 2000 et 42:

130. 2004. Type: *C. insidiosa* Baill.

木质藤本。萼片4(-5-6),镊合状排列,雄花萼片平展,雌花萼片直立。雌花无退化雄蕊。

Woody vines. Sepals 4(-5-6), valvate; those of staminate flower spreading, and those of pistillate flower erect. Staminodes wanting in pistillate flowers.

2种,隶属2系,特产马达加斯加。

系1 Ser. 1. **Saxicolae** (Prantl) W. T. Wang, comb. nov.—sect. *Flammula* DC. subsect.

Vitalbae Prantl ser. *Saxicolae* Prantl in Bot. Jahrb. 9: 260. 1888, p.p. quoad *C. saxicola* Hils. & Bojer tantum. Lectotype: *C. saxicola* Hils. & Bojer ex Baill. (= *C. insidiosa* Baill.).

Subsect. *Insidiosae* ser. *Insidiosae* W. T. Wang in Acta Phytotax. Sin. 38: 513. 2000.

Type: *C. insidiosa* Baill.

叶为具5小叶的羽状复叶; 小叶长(2.5-)3-6 cm。

Leaves 5-foliolately pinnate; leaflets (2.5-)3-6 cm long.

1种: 168. *C. insidiosa* Baill.。

系2 Ser. 2. **Rutoides** W. T. Wang in Acta Phytotax. Sin. 38: 513. 2000 et 42: 132. 2004.

Type: *C. rutoides* W. T. Wang.

叶为2-3回羽状复叶; 小叶多数,小,长0.3-2.2 cm。

Leaves 2–3-pinnate; leaflets numerous, small, 0.3–2.2 cm long.

1种: 169. *C. rutoides* W. T. Wang.

组3 Sect. 3. **Brachiatae** Snoeijer in *Clematis* 1992: 12. 1992, ut “*Brachiata*”; W. T. Wang in *Acta Phytotax. Sin.* 42: 292. 2004. Type: *C. brachiata* Thunb.

Sect. *Flammula* DC. subsect. *Wightianae* Prantl in *Bot. Jahrb.* 9: 261. 1888.—sect. *Meclatis* (Spach) Tamura subsect. *Wightianae* (Prantl) W. T. Wang in *Acta Phytotax. Sin.* 38: 321. 2000 et 39: 325. 2001. Lectotype: *C. wightiana* Wall. ex Wight & Arn.

Sect. *Clematis* subsect. *Africanae* M. Johnson, *Clematis* 416. 1997, p.p. excl. *C. ibarensis* Baker ssp. *edentata* (Baker) Viguier & Perrier et *C. sigensis* Engler.—sect. *Meclatis* subsect. *Africanae* (M. Johnson) Grey-Wilson, *Clematis* 155. 2000, p.p. Type: *C. hirsuta* Perr. & Guill.

本组极近 sect. *Clematis* subsect. *Clematis*, 主要区别为雄蕊花丝被毛。

This section is most closely related to sect. *Clematis* subsect. *Clematis*, differing in its hairy stamen filaments.

24种, 隶属2系, 多数种分布于非洲大陆, 马达加斯加及邻近岛屿, 少数种分布于亚洲南部。

系1 Ser. 1. **Wightianae** (W. T. Wang) W. T. Wang in *Acta Phytotax. Sin.* 42: 295. 2004.—sect. *Meclatis* (Spach) Tamura subsect. *Wightianae* (Prantl) W. T. Wang ser. *Wightianae* W. T. Wang in *Acta Phytotax. Sin.* 38: 421. 2000. Type: *C. wightiana* Wall. ex Wight & Arn.

叶为三出复叶或1–2回羽状复叶, 稀为单叶或3回羽状复叶; 小叶通常卵形, 长圆形或披针形。腋生聚伞花序具(1–)少数到多数花。萼片长圆形, 卵形或披针形。

Leaves ternate or 1–2-pinnate, rarely simple or 3-pinnate; leaflets usually ovate, oblong, or lanceolate. Axillary cymes (1–)few–many-flowered. Sepals oblong, ovate, or lanceolate.

22种: 170. *C. actinostemmatifolia* W. T. Wang, 171. *C. strigillosa* Baker, 172. *C. mauritiana* Lam., 173. *C. zaireensis* W. T. Wang, 174. *C. ibarensis* Baker, 175. *C. simensis* Fresen., 176. *C. kakoulimensis* Schnell, 177. *C. massoniana* DC., 178. *C. tibestica* Quézel, 179. *C. dolichopoda* Brenan, 180. *C. wightiana* Wall. ex Wight & Arn., 181. *C. hirsuta* Perr. & Guill., 182. *C. brachiata* Thunb., 183. *C. viridiflora* Bertol., 184. *C. commutata* Kuntze, 185. *C. comoresensis* W. T. Wang, 186. *C. oweniae* Harvey, 187. *C. bowkeri* Burt Davy ex W. T. Wang, 188. *C. triloba* Thunb., 189. *C. thalictrifolia* Engler, 190. *C. graveolens* Lindl.。分布与组的分布相同。

系2 Ser. 2. **Dissectae** (W. T. Wang) W. T. Wang in *Acta Phytotax. Sin.* 42: 328. 2004.—sect. *Meclatis* (Spach) Tamura subsect. *Wightianae* (Prantl) W. T. Wang ser. *Dissectae* W. T. Wang in *Acta Phytotax. Sin.* 38: 423. 2000. Type: *C. dissecta* Baker.

叶为3–4回羽状全裂复叶, 末回裂片条状披针形、条形或狭三角形。腋生花序具1花。萼片宽椭圆形。

Leaves 3–4-pinnatisect; ultimate lobes linear-lanceolate, linear, or narrowly triangular. Axillary cymes 1-flowered. Sepals broadly elliptic.

2种: 191. *C. falciformis* Viguier & Perrier, 192. *C. dissecta* Baker。特产马达加斯加。

组4 Sect. 4. **Pseudanemone** Prantl in Bot. Jahrb. 9: 257. 1888, p.p. excl. *C. welwitschii* Hiern., *C. commutata* Kuntze et *C. dissecta* Baker; et in Engler & Prantl, Nat. Pflanzenfam. 3 (2): 63. 1888; Tamura in Acta Phytotax. Geobot. 38: 40. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 376. 1995; Snoeijer in Clematis 1992: 12. 1992; M. Johnson, Klematis 140. 1997; Brummitt in Kew Bull. 55: 102. 2000; W. T. Wang in Acta Phytotax. Sin. 42: 385. 2004.——subgen. *Pseudanemone* (Prantl) Grey-Wilson, Clematis 30: 195. 2000. Lectotype: *C. pimpinellifolia* Hook. (Tamura, 1995).

Clematopsis Bojer ex Hutch. in Bull. Misc. Inform. Kew 1920: 12. 1920 et 1923: 84. 1923; Exell & Mendonca in Carrisso, Consp. Fl. Angol. 1: 4. 1937; Staner & Léonard in Bull. Soc. R. Bot. Belg. 82: 338. 1950; Léonard & Milne-Redhead in Bull. Soc. R. Bot. Belg. 83: 47. 1951; Tamura in Sci. Rep. Osaka Univ. 16 (2): 31. 1967; Brummitt in Kew Bull. 31: 156. 1976; Raynal in Adansonia, ser. 2, 18: 3. 1978.

直立亚灌木、小灌木或多年生草本。叶对生,稀轮生,为单叶,三出复叶,羽状复叶或2–4回羽状全裂复叶。花两性。萼片4(–5–6),覆瓦状排列,或部分镊合状排列,平展,边缘无短绒毛带。雄蕊花丝条形,有柔毛,花药条形或狭长圆形,无毛,药隔顶端不突出或有1小尖头。瘦果不扁平,不具翅,具伸长羽毛状宿存花柱。

Subshrubs erect, low shrubs or perennial herbs. Leaves opposite, rarely verticillate, simple, ternate, pinnate, or 2–4-pinnatisect. Flower bisexual. Sepals 4(–5–6), imbricate or partly valvate, spreading, on margin without a narrow velutinous strip. Stamen filaments linear, pubescent; anthers linear or narrowly oblong, glabrous; connective apex not projected or with a minute apiculum. Achenes not flattened, nor winged; persistent styles elongate, plumose.

约16种,隶属3系,分布于非洲大陆和马达加斯加。

系1 Ser. 1. **Pimpinellifoliae** W. T. Wang in Acta Phytotax. Sin. 42: 2004. Type: *C. pimpinellifolia* Hook.

萼片纸质或膜质,内面无毛或被短柔毛。花药条形或狭长圆形,长2.2–4 mm。

Sepals papery or membranous, inside glabrous or puberulous. Anthers linear or narrowly oblong, 2.2–4 mm long.

7种: 193. *C. trifida* Hook., 194. *C. macrophylla* (Raynal) W. T. Wang, 195. *C. bojeri* Hook., 196. *C. pseudoscabiosifolia* Perrier, 197. *C. oligophylla* Hook., 198. *C. pimpinellifolia* Hook., 199. *C. anethifolia* Hook.。特产马达加斯加。

系2 Ser. 2. **Villosae** (Prantl) W. T. Wang in Acta Phytotax. Sin. 42: 399. 2004. ——sect. *Pseudanemone* subsect. *Villosae* Prantl in Bot. Jahrb. 9: 258. 1888, p.p. Type: *C. villosa* DC.

萼片纸质或亚革质,内面被短绒毛或密短柔毛。花药条形,稀狭长圆形,长2.5–4.5(–5) mm。

Sepals papery or subcoriaceous, inside velutinous or densely puberulous. Anthers linear, rarely narrowly oblong, 2.5–4.5(–5) mm long.

3种: 200. *C. villosa* DC., 201. *C. africolineariloba* W. T. Wang, 202. *C. stanleyi* Hook.。特产非洲大陆。

系3 Ser. 3. **Chrysocarpaceae** W. T. Wang in Acta Phytotax. Sin. 42: 407. 2004. Type: *C. chrysocarpa* Welw. ex Oliv.

? Sect. *Pseudanemone* subsect. *Spatulifoliae* Prantl in Bot. Jahrb. 9: 258. 1888.

萼片纸质或亚革质,内面被短柔毛或短绒毛,稀无毛。花药条形,长达5.8–9.5 mm。

Sepals papery or subcoriaceous, inside puberulous or velutinous, rarely glabrous. Anthers linear, up to 5.8–9.5 mm long.

6种: 203. *C. intraglabra* W. T. Wang, 204. *C. uhehensis* Engler, 205. *C. grandifolia* (Staner & Leonard) M. Johnson, 206. *C. teuszii* (Kuntze) Engler, 207. *C. chrysocarpa* Welw. ex Oliv., 208. *C. katangensis* (Hutch.) M. Johnson。特产非洲大陆。

组5 黄花铁线莲组

Sect. 5. **Meclatis** (Spach) Baill., Hist. Pl. 1: 57. 1867–1869; Brandenb., *Meclatis* in *Clematis* 100. 2000.—*Meclatis* Spach, Hist. Nat. Veg. Phan. 7: 272. 1839. —sect. *Meclatis* (Spach) Tamura in Sci. Rep. Osaka Univ. 16 (2): 32. 1967; Ling in Fl. Reip. Pop. Sin. 28: 139. 1980; Tamura in Acta Geobot. 38: 39. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 375. 1995, p.p.; Serov in Bot. Zhurn. 73: 1738. 1988; Grey-Wilson in Kew Bull. 44: 34. 1989, p.p. excl. *C. graveolens* Lindl.; Snoeijer in *Clematis* 1992: 11. 1992; M. Johnson, *Clematis* 329. 1997, p.p. excl. *C. graveolens* Lindl.; Grey-Wilson, *Clematis* 155. 2000, p.p. quoad subsect. *Meclatis*, excl. subsect. *Africanæ*. Lectotype: *Meclatis orientalis* (L.) Spach (= *C. orientalis* L.) (Tamura, 1987).

Sect. *Flammula* DC. subsect. *Orientalis* Prantl in Bot. Jahrb. 9: 260. 1888; Schneid., Ill. Handb. Laubh. 1: 293. 1906, p.p. excl. *C. graveolens* Lindl.; Hand.-Mazz. in Acta Hort. Gotob. 13: 217. 1939; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 219. 1951, ut ser. *Orientalis*.—sect. *Viorna* (Reichb.) Prantl subsect. *Orientalis* (Prantl) Tamura in Sci. Rep. Osaka Univ. 4: 48. 1955; et in Acta Phytotax. Geobot. 16: 80. 1956.—sect. *Meclatis* subsect. *Orientalis* (Prantl) Tamura in Sci. Rep. Osaka Univ. 16 (2): 32. 1967; et in Acta Phytotax. Geobot. 38: 40. 1987; Grey-Wilson in Kew Bull. 44: 34. 1989. Lectotype: *C. orientalis* L. (Tamura, 1987).

Sect. *Flammula* subsect. *Tanguticae* Schneid., l.c.—sect. *Viorna* subsect. *Tanguticae* (Schneid.) Tamura in Sci. Rep. Osaka Univ. 4: 49. 1955; et in Acta Phytotax. Geobot. 16: 80. 1956.—sect. *Meclatis* subsect. *Tanguticae* (Schneid.) Tamura in Acta Phytotax. Geobot. 38: 40. 1987. Lectotype: *C. tangutica* (Maxim.) Korsh. (Tamura, 1987).

木质藤本,稀为小灌木(*C. tangutica*, *C. tibetana*)。叶为1–2回羽状复叶。萼片4,通常斜上展,黄色。雄蕊花丝狭披针形,被柔毛;花药通常狭长圆形,无毛,药隔顶端不突起或具小尖头。瘦果不扁平,无翅,具伸长羽毛状宿存花柱。

Woody vines, rarely small shrubs. Leaves 1–2-pinnate. Sepals 4, usually ascending, yellow. Stamen filaments narrowly lanceolate, pubescent; anthers usually narrowly oblong, glabrous; connective apex not projected or with a minute apiculum. Achenes not flattened, nor winged; styles elongate, plumose.

约13种: 209. 甘青铁线莲 *C. tangutica* (Maxim.) Korsh., 210. 甘川铁线莲 *C.*

akebioides (Maxim.) Veitch, 211. 黄花铁线莲 *C. intricata* Bunge, 212. 中印铁线莲 *C. tibetana* Kuntze, 213. *C. ladakhiana* Grey-Wilson, 214. 粉绿铁线莲 *C. glauca* Willd., 215. 扎达铁线莲 *C. zandaensis* W. T. Wang, 216. 角萼铁线莲 *C. corniculata* W. T. Wang, 217. 尾尖铁线莲 *C. caudigera* W. T. Wang, 218. 齿叶铁线莲 *C. serratifolia* Rehd., 219. *C. hilariae* Koval., 220. *C. sarezica* Ikonn., 221. 东方铁线莲 *C. orientalis* L.。广布亚洲北部及西部干旱地区或山地,西达欧洲东南部。

组6 灌木铁线莲组

Sect. 6. **Fruticella** Tamura in Sci. Rep. Osaka Univ. 16 (2): 34. 1967, p.p.; M. C. Chang in Fl. Reip. Pop. Sin. 28: 147. 1980, p.p. excl. *C. songarica* Bunge, *C. lancifolia* Bur. & Franch. et *C. delavayi* Franch.; Tamura in Acta Phytotax. Geobot. 38: 44. 1987, p.p.; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl. 17a (4): 384. 1995, p.p. excl. *C. delavayi* etc.; Snoeijer in Clematis 1992: 18. 1992, p.p.; M. Johnson, Klematis 651. 1997, p.p. excl. *C. delavayi*, *C. lancifolia*, *C. isphanica* Boiss., *C. phlebantha* Williams, *C. asplenifolia* Schrenk et *C. songarica*; Grey-Wilson, Clematis 126. 2000, p.p. excl. *C. delavayi*, *C. lancifolia*, *C. songarica*, *C. asplenifolia*, *C. isphanica* et *C. phlebantha*; W. T. Wang & L. Q. Li in Acta Phytotax. Sin. 43: 196. 2005. Type: *C. fruticosa* Turcz.

小灌木。叶为单叶,不分裂或分裂。萼片4,镊合状排列,斜上展,黄色,卵形,花开放后边缘延展成膜质狭翅。雄蕊无毛。瘦果不扁平,无翅,具伸长羽毛状宿存花柱。

Small shrubs. Leaves simple, undivided or divided. Sepals 4, valvate, ascending, yellow, with margins dilated after anthesis into narrow membranous wings. Stamens glabrous. Achenes not flattened, nor winged; persistent styles elongate, plumose.

5种,隶属2系,分布于中国西部及北部,蒙古。

系1 灌木铁线莲系

Ser. 1. **Fruticosae** (Tamura) W. T. Wang & L. Q. Li in Acta Phytotax. Sin. 43: 197. 2005. —sect. *Flammula* DC. subsect. *Fruticosae* Tamura in Sci. Rep. Osaka Univ. 4: 55. 1955; et in Acta Phytotax. Geobot. 16: 81. 1956. Type: *C. fruticosa* Turcz.

Sect. *Fruticella* Tamura subsect. *Fruticella* M. Johnson, Klematis 651. 1997, p.p. excl. *C. delavayi* et *C. lancifolia*; Grey-Wilson, Clematis 126. 2000, p.p. excl. *C. delavayi*. Type: *C. fruticosa* Turcz.

花组成顶生的具花序梗和2苞片的聚伞花序。

Flowers in terminal, pedunculate, bibracteate cymes.

4种: 222. 灌木铁线莲 *C. fruticosa* Turcz., 223. 小叶铁线莲 *C. nannophylla* Maxim., 224. 毛灌木铁线莲 *C. canescens* (Turcz.) W. T. Wang & M. C. Chang, 225. 灰叶铁线莲 *C. tomentella* (Maxim.) W. T. Wang & L. Q. Li. 地理分布同组的分布。

系2 绿叶铁线莲系

Ser. 2. **Virides** W. T. Wang & L. Q. Li in Acta Phytotax. Sin. 43: 207. 2005. Type: *C. viridis* (W. T. Wang & M. C. Chang) W. T. Wang.

花单生于腋生短枝的顶端,只具花梗。

Flowers singularly arising from the apexes of axillary short branches, only pedicellate.

1种: 226. 绿叶铁线莲 *C. viridis* (W. T. Wang & M. C. Chang) W. T. Wang. 特产中国横断山区北部。

组7 菝葜叶铁线莲组

Sect. 7. **Naraveliopsis** Hand.-Mazz. in Acta Hort. Gotob. 13: 219. 1939; Tamura in Sci. Rep. Osaka Univ. 4: 55. 1955; H. Eichler in Bibl. Bot. 124: 43. 1958; Tamura in Sci. Rep. Osaka Univ. 16 (2): 35. 1967; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 226. 1980; Tamura in Acta Phytotax. Geobot. 38: 42. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 380. 1995; Snoeijer in Clematis 1992: 16. 1992; M. Johnson, Klematis 511. 1997; Grey-Wilson, Clematis 54. 2000; W. T. Wang in Acta Phytotax. Sin. 38: 412. 2000. Lectotype: *C. smilacifolia* Wall. (Eichler, 1958).

Sect. *Pseudonaravelia* Janchen in Denkschr. Akad. Wis. Wien, Math.-Nat. Kl. 108(4): 43. 1949, nom. seminud.

Sect. *Naraveliocarpa* Tamura in Acta Phytotax. Geobot. 51: 127. 2001. Type: *C. eichleri* (Tamura) Tamura.

木质藤本。叶为单叶,三出复叶或1-2回羽状复叶。花两性,稀单性。萼片4或6。雄蕊无毛,稀被毛,有时最外部雄蕊不育;药隔顶端突出成狭片状突起。瘦果不具翅,有伸长羽毛状宿存花柱。

Woody vines. Leaves simple, ternate, or 1-2-pinnate. Flowers bisexual, rarely unisexual. Sepals 4 or 6. Stamens glabrous, rarely pubescent, sometimes outermost stamens sterile and transformed into linear staminodes; connective apex projecting into narrow lamella. Achenes not winged; persistent styles elongate, plumose.

约21种,隶属3亚组,广布于亚洲热带。

亚组1 菝葜叶铁线莲亚组

Subsect. 1. **Smilacifoliae** W. T. Wang in Acta Phytotax. Sin. 36: 363. 1998 et 38: 414. 2000. Type: *C. smilacifolia* Wall.

Subsect. *Liboenses* ser. *Loureirianae* W. T. Wang in l.c. 38: 420. 2000. Type: *C. loureiriana* DC.

花两性。雄蕊无毛,全部能育,稀最外部雄蕊不育。

Flowers bisexual. Stamens glabrous, all fertile, rarely those outermost sterile.

约18种: 227. 菝葜叶铁线莲 *C. smilacifolia* Wall., 228. 滇南铁线莲 *C. fulvicoma* Rehd. & Wils., 229. 墨脱铁线莲 *C. metouensis* M. Y. Fang, 230. 粗柄铁线莲 *C. crassipes* Chun & How, 231. *C. gialaiensis* Serov, 232. *C. andersonii* (Clarke ex Kuntze) H. Eichler, 233. *C. munroiana* Wight, 234. 丝铁线莲 *C. loureiriana* DC., 235. *C. hedyarifolia* DC., 236. 勐腊铁线莲 *C. menglaensis* M. C. Chang, 237. *C. bourdillonii* Dunn, 238. 片马铁线莲 *C. pianmaensis* W. T. Wang, 239. 国楣铁线莲 *C. fengii* W. T. Wang, 240. *C. herrei* H. Eichler, 241. *C. korthalsii* H. Eichler, 242. 长萼铁线莲 *C. tashiroi* Maxim., 243. *C. papillosa* H. Eichler. 分布于亚洲热带地区。

亚组2 荔波铁线莲亚组

Subsect. 2. **Liboenses** W. T. Wang in Acta Phytotax. Sin. 36: 164. 1998 et 38: 420. 2000.

—subsect. *Liboenses* ser. *Liboenses* W. T. Wang in Acta Phytotax. Sin. 38: 420. 2000. Type:

C. liboensis Z. R. Xu.

花两性。雄蕊被柔毛,最外部雄蕊不育。

Flowers bisexual. Stamens pubescent, those outermost sterile.

1种: 244. 荔波铁线莲 *C. liboensis* Z. R. Xu。特产中国贵州东南部。

亚组3 Subsect. 3. **Macgregoriana** W. T. Wang in Acta Phytotax. Sin. 38: 421. 2000. Type:

C. macgregorii Merr.

花单性。雄蕊和雌花退化雄蕊均无毛。

Flowers unisexual. Stamens and staminodes of pistillate flower all glabrous.

2种: 245. *C. antonii* (Elmer) H. Eichler, 246. *C. macgregorii* Merr.。特产菲律宾。

组8 Sect. 8. **Pterocarpa** Tamura in Sci. Rep. Osaka Univ. 4: 50. 1955 et 16 (2): 34. 1967; et

in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 385. 1995; Snoeijer in Clematis 1992: 18.

1992; M. Johnson, Klematis 649. 1997; Grey-Wilson, Clematis 125. 2000. Type: *C. brachyura*

Maxim.

小亚灌木。叶为三出复叶或羽状复叶。聚伞花序顶生。萼片4–6,平展,白色,倒披针形。

雄蕊无毛;花丝条形;花药狭长圆形。瘦果扁平,有宽翅,具钻形短宿存花柱。

Small subshrubs. Leaves ternate or pinnate. Cymes terminal. Sepals 4–6, spreading, white,

oblancoolate. Stamens glabrous; filaments linear; anthers narrowly oblong. Achenes flattened,

broadly winged, with short subulate persistent styles.

1种: 247. *C. brachyura* Maxim.。特产朝鲜。

组9 铁线莲组

Sect. 9. **Viticella** (Dill. ex Moench) DC., Syst. 1: 160. 1818; et Prodr. 1: 8. 1824; Prantl

in Bot. Jahrb. 9: 259. 1888; et in Engler & Prantl, Nat. Pflanzenfam. 3 (2): 63. 1888; Koechne,

Deuts. Dendr. 152. 1893; Schneid., Ill. Handb. Laubh. 1: 285. 1906; Hand.-Mazz. in Acta Hort.

Gotob. 13: 198. 1939; Rehd., Cult. Trees & Shrubs, ed. 2, 212. 1951; Tamura in Sci. Rep.

Osaka Univ. 16 (2): 34. 1967; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 199. 1980; Tamura in

Acta Phytotax. Geobot. 38: 43. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4):

384. 1995; M. Johnson, Klematis 665. 1997; Grey-Wilson, Clematis 114. 2000.—*Viticella*

Dill. ex Moench, Method. 296. 1794; Spach, Hist. Nat. Veg. Phan. 7: 263. 1839; Small, Fl.

Southeast U.S. 437. 1903. —*Clematis* subgen. *Viticella* (Dill. ex Moench) Keener &

Dennis in Taxon 31: 142. 1982; Snoeijer in Clematis 1992: 18. 1992; Pringle in Morin et al.,

Fl. N. Amer. 3: 164. 1997. Type: *Viticella deltoidea* Moench (= *Clematis viticella* L.).

Clematis sect. *Tessen* Tamura in Sci. Rep. Osaka Univ. 4: 49. 1955; et in Acta Phytotax.

Geobot. 16: 80. 1956. Type: *C. florida* Thunb.

木质或草质藤本。叶为1–2回三出复叶或羽状复叶,稀为单叶。花两性。萼片4–8,平

展或斜上展,边缘在花开放后强烈延展,稀不延展。雄蕊无毛,或花丝近顶部有毛;花药条形,

有时狭长圆形。瘦果不扁平,具伸长羽毛状宿存花柱,或扁平,有肿胀边缘框,具较短尾状或钻形宿存花柱。

Woody or herbaceous vines. Leaves 1–2-ternate or pinnate, rarely simple. Flowers bisexual. Sepals 4–8, spreading or ascending, with margins strongly dilated after anthesis, rarely not dilated. Stamens glabrous, or filaments near apex pilose; anthers linear, sometimes narrowly oblong. Achenes not flattened, and with elongate plumose persistent styles, or flattened, tumidly rimmed, and with shorter tail-like or subulate persistent styles.

11种,隶属3亚组,分布于亚洲东部和西南部和欧洲南部。

本组的 *C. hancockiana* 的花具4枚长圆形萼片,边缘不延展,其花构造与 sect. *Clematis* 的相同,因此是 sect. *Viticella* 的原始种。但是,此种萼片紫色,花粉具散孔,这些均是进化特征,这说明 sect. *Viticella* 的真正原始群(可能花具4枚白色萼片和三沟花粉)早已灭绝。

Erickson (1943)认为本组的 *C. viticella* 应属于 sect. *Viorna* s. str.。Tamura (1967, 1995)根据 *C. crispa* (sect. *Viorna* subsect. *Crispae*)的小叶坚纸质,全缘,花单生叶腋,较大,萼片边缘延展等特征与 sect. *Viticella* 相似,也认为 sect. *Viticella* 与 *C. viorna* 群有亲缘关系。但是上面关于 *C. hancockiana* 系统地位的讨论说明 sect. *Viticella* 系由 sect. *Clematis* 演化而出;另一方面,*C. viorna* 群系由 *C. connata* 群演化而出(Tamura, 1995),所以,sect. *Viticella* 与 sect. *Viorna* 的相似实为两条演化路线发展结果的趋同演化(convergence)现象。

亚组1 毛萼铁线莲亚组

Subsect. 1. **Hancockianae** W. T. Wang, subsect. nov. Type: *C. hancockiana* Maxim.

Folia 1–2-pinnata vel ternata. Flores in cymas axillares 1-floras manifeste 2-bracteatas dispositi. Sepala 4, patentia, purpurea, oblonga, margine post anthesin haud dilatata, trinervia, nervis basalibus lateralibus nervillis carentibus. Stamina glabra. Pollenia pantoporata. Achenia haud complanata, stylis persistentibus valde elongatis plumosis.

叶为1–2回羽状复叶,或为三出复叶。花组成腋生、具1花和2枚明显苞片的聚伞花序。萼片4,平展,紫色,花期后边缘不展宽,具3条基出脉,侧生基出脉无细脉。雄蕊无毛。花粉具散孔。瘦果不扁平;宿存花柱强烈伸长,羽毛状。

1种: 248. 毛萼铁线莲 *C. hancockiana* Maxim.。特产中国东部。

亚组2 铁线莲亚组

Subsect. 2. **Floridae** Prantl in Bot. Jahrb. 9: 259. 1888; Schneid., Ill. Handb. Laubh. 1: 286. 1906; Hand.-Mazz. in Acta Hort. Gotob. 13: 198. 1939; Tamura in Sci. Rep. Osaka Univ. 4: 50. 1955; et in Acta Phytotax. Geobot. 38: 43. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 385. 1995; M. Johnson, Klematis 675. 1997; Grey-Wilson, Clematis 120. 2000. Lectotype: *C. florida* Thunb. (Tamura, 1955).

叶为单叶,1–2回三出复叶或1–2回羽状复叶。花组成腋生、具1花和2苞片的聚伞花序,或单独顶生。萼片5–8,平展,白色或紫色,狭披针形,具3条脉,边缘在花期之后强烈展宽,侧生脉具多数平行、1–3回二叉状分枝的细脉。雄蕊无毛。花粉具散孔。瘦果扁压,但通常不扁平;宿存花柱通常强烈伸长,羽毛状,稀为尾状或几乎不伸长。

Leaves simple, 1–2-ternate, or 1–2-pinnate. Flowers in axillary, 2-bracteate, 1-flowered

cymes, or solitary and terminal. Sepals 5–8, spreading, white or purple, narrowly lanceolate, 3-veined; margins strongly dilated after anthesis; lateral basal veins with numerous parallel veinlets 1–3 times dichotomous. Stamens glabrous. Pollen pantoporate. Achenes compressed, usually not flattened; persistent styles usually strongly elongate, plumose, rarely tail-like, or nearly not elongate.

6种,隶属2系,分布于亚洲东部。

系1 铁线莲系

Ser. 1. **Floridae** W. T. Wang, ser. nov. Type: *C. florida* Thunb.

Subgen. *Viticella* sect. *Floridae* Snoeijer in *Clematis* 1992: 19. 1992, nom. illegit.

Folia 1–2-ternata vel 1–2-pinnata. Flores in cymas axillares 1-floras manifeste 2-bracteatas dispositi. Sepala 5–6. Styli persistentes valde elongati, plumosi, raro caudiformes vel fere haud elongati.

叶为1–2回三出复叶或1–2回羽状复叶。花组成腋生、具1花和2显著苞片的聚伞花序。萼片5–6。宿存花柱强烈伸长,羽毛状,稀呈尾状或几乎不伸长。

4种: 249. 光柱铁线莲 *C. longistyla* Hand.-Mazz., 250. 大花威灵仙 *C. courtoisii* Hand.-Mazz., 251. 铁线莲 *C. florida* Thunb., 252. 短柱铁线莲 *C. cadmia* Buch.-Ham. ex Hook. f. & Thoms.。分布于中国亚热带地区,越南北部,缅甸北部,印度东北部,孟加拉。

系2 转子莲系

Ser. 2. **Patentes** (Tamura) W. T. Wang, st. nov. —sect. *Viticella* subsect. *Patentes* Tamura in *Sci. Rep. Osaka Univ.* 4: 50. 1955; in *Acta Phytotax. Geobot.* 38: 43. 1987; et in *Hiepk. Nat. Pflanzenfam., Zwei. Aufl., 17a* (4): 385. 1995; M. Johnson, *Clematis* 682. 1997; Grey-Wilson, *Clematis* 123. 2000.—*Clematis* sect. *Patentes* (Tamura) Tamura in *Sci. Rep. Osaka Univ.* 16(2): 34. 1967.—subgen. *Viticella* sect. *Patentes* Snoeijer in *Clematis* 1992: 19. 1992. Type: *C. patens* Morr. & Decne.

Sect. *Viticella* subsect. *Lanuginosae* M. Johnson, *Clematis* 681. 1997; Grey-Wilson, *Clematis* 124. 2000. Type: *C. lanuginosa* Lindl.

叶为单叶或三出复叶,稀为羽状复叶。花单独顶生。萼片5–8。宿存花柱强烈伸长,羽毛状。

Leaves simple or ternate, rarely pinnate. Flowers solitary, terminal. Sepals 5–8. Persistent styles strongly elongate, plumose.

2种: 253. 毛叶铁线莲 *C. lanuginosa* Lindl., 254. 转子莲 *C. patens* Morr. & Decne.。分布于中国东部和东北部,朝鲜,日本。

亚组3 湖州铁线莲亚组

Subsect. 3. **Viticella** Tamura in *Sci. Rep. Osaka Univ.* 16 (2): 34. 1967; M. Johnson, *Clematis* 670. 1997; Grey-Wilson, *Clematis* 114. 2000.—subgen. *Viticella* sect. *Viticella* Snoeijer in *Clematis* 1992: 18. 1992, p.p. excl. *C. cadmia*. Type: *C. viticella* L.

Subsect. *Euviticellae* Prantl in *Bot. Jahrb.* 9: 259. 1888; Schneid., *Ill. Handb. Laubh.* 1: 285. 1906.

叶为1–2回羽状复叶。花组成腋生、有时顶生、具1–7花的聚伞花序。萼片4,斜上展,狭披针形,具3条脉,边缘在花开放后多少强度延展;侧基出脉具平行细脉。雄蕊花丝顶部被短缘毛,稀无毛。花粉具三沟。瘦果扁平,具肿胀边缘框,宿存花柱稍伸长,尾状。

Leaves 1–2-pinnate. Flowers in axillary, sometimes also terminal, 1–7-flowered cymes. Sepals 4, ascending, narrowly lanceolate, 3-veined, with margins more or less strongly dilated after anthesis; lateral basal veins with parallel veinlets. Stamen filaments near apex ciliate, rarely glabrous. Pollen 3-colpate. Achenes flattened, tumidly rimmed, with slightly elongate tail-like persistent styles.

4种,隶属2系,分布于中国中部和东部以及亚洲西南部和欧洲南部。

系1 湖州铁线莲系

Ser. 1. **Huchouenses** W. T. Wang, ser. nov. Type: *C. huchouensis* Tamura.

Sepala alba, margine post anthesin minus dilatata. Stamina glabra.

萼片白色,边缘在花开放后弱度延展。雄蕊无毛。

1种: 255. 湖州铁线莲 *C. huchouensis* Tamura。特产中国中部和东部。

系2 Ser. 2. **Viticellae** W. T. Wang, ser. nov. Type: *C. viticella* L.

Sepala purpurea, coerulea vel rubra, raro alba, margine post anthesin valde dilatata. Staminum filamenta apice ciliolata, raro glabra.

萼片紫色、蓝色或红色,稀白色,边缘在花开放后强度延展。雄蕊花丝顶部被短缘毛,稀无毛。

3种: 256. *C. viticella* L., 257. *C. campaniflora* Brot., 258. *C. rigoi* W. T. Wang。分布于欧洲南部和亚洲西南部。

组10 大叶铁线莲组

Sect. 10. **Tubulosae** Decne. in Nouv. Arch. Mus. Hist. Nat. Paris. Sér. 2, 4: 203. 1881; H. Eichler in Bibl. Bot. 124: 18. 1958, excl. syn.; M. Johnson, Klematis 265. 1997; W. T. Wang in Acta Phytotax. Sin. 39: 6. 2001.——subgen. *Tubulosae* (Decne.) Grey-Wilson, Clematis 30, 189. 2000. Lectotype: *C. heracleifolia* DC. (Eichler, 1958).

木质藤本、多年生直立草本、矮亚灌木或灌木。叶为三出复叶或1–2回羽状复叶;小叶有齿。花两性或单性。萼片4,镊合状排列,斜上展或直立,白色、蓝色或紫色,倒卵状长圆形。雄蕊花丝条形,通常近顶部有短柔毛。瘦果不扁平,无翅,宿存花柱伸长,羽毛状。

Woody vines, erect perennial herbs, low subshrubs or shrubs. Leaves ternate or 1–2-pinnate; leaflets dentate. Flowers bisexual or unisexual. Sepals 4, valvate, ascending or erect, white, blue or purple, obovate-oblong. Stamen filaments linear, usually near apex pilose. Achenes not flattened; persistent styles elongate, plumose.

9种,隶属2亚组,分布于亚洲东部。

由于 *C. heracleifolia* 群诸种的萼片直立,雄蕊常有毛,Prantl (1888)、Schneider (1906)、Handel-Mazzetti (1939)、Johnson (1997)、Grey-Wilson (2000)误将此群与 *C. connata* 群或 *C. viorna* 群相联系,另一方面,后三位作者则将 sect. *Tubulosae* 的原始种 *C. pinnata* 误置于 sect. *Clematis* subsect. *Clematis* 中,造成混乱。这里,*C. heracleifolia* 群与 *C. connata* 群或 *C. viorna*

群的相似,正如上述的 *C. viticella* 群与 *C. viorna* 群的相似,也是一种趋同演化现象。

亚组1 羽叶铁线莲亚组

Subsect. 1. **Pinnatae** (W. T. Wang) W. T. Wang in Acta Phytotax. Sin. 39: 9. 2001.——sect. *Clematis* subsect. *Pinnatae* W. T. Wang in Acta Phytotax. Sin. 36: 159. 1998. Type: *C. pinnata* Maxim.

Subsect. *Pinnatae* ser. *Tatarinowianae* W. T. Wang in Acta Phytotax. Sin. 39: 9. 2001. Type: *C. tatarinowii* Maxim.

木质藤本。叶为三出复叶或1–2回羽状复叶。花序顶生和腋生,通常具多数花。萼片斜上展,白色。花粉具三沟。

Woody vines. Leaves ternate or 1–2-pinnate. Inflorescences terminal and axillary, usually many-flowered. Flowers bisexual. Sepals ascending, white. Pollen 3-colpate.

2种: 259. 羽叶铁线莲 *C. pinnata* Maxim., 260. *C. takedana* Makino. 分布于中国河北西部、北京、辽宁、黑龙江南部,日本。

史京华(2003)经过野外观察,发现 *C. pinnata* 的叶在分裂方面变异很大,*C. pinnata* 与 *C. tatarinowii* Maxim. 实为同一种,遂在其未发表的论文中正确地将后者并入前者,澄清了分类学多年存在的一个混乱。

本亚组的2种,即中国的 *C. pinnata* (萼片白色)和日本的 *C. takedana* (萼片淡紫色)在体态及花构造方面极为相似,二者的亲缘关系极为相近,可能是有共同祖先的一对姊妹群,也可能后者由前者演化而出。但是, Makino(1907), Kitagawa (1937), Ohwi (1965), Tamura (1982) 均认为 *C. takedana* 是 sect. *Clematis* 的 *C. apiifolia* 和本组的 *C. stans* 的杂交种。2003年,史京华(2003)经过研究又认为 *C. pinnata* 是 sect. *Clematis* 的 *C. brevicaudata* 和本组的 *C. heracleifolia* 的杂交种。这样就产生2个问题,需加解决:一是在中国大陆和在日本从不同亲本形成的杂交种为何如此高度相似。二是关于 *C. heracleifolia* 群(本文系统的 subsect. *Tubulosae*)的起源问题。王文采(2001)曾认为 subsect. *Pinnatae* 的系统位置介于 sect. *Clematis* 和 subsect. *Tubulosae* 之间, subsect. *Tubulosae* 可能由 subsect. *Pinnatae* 演化而来,如果 subsect. *Pinnatae* 是由杂交形成的群,而 subsect. *Tubulosae* 为其亲本之一,则后者源于何祖先群的问题就会产生。

亚组2 大叶铁线莲亚组

Subsect. 2. **Tubulosae** (Decne.) W. T. Wang in Acta Phytotax. Sin. 39: 9. 2001.——sect. *Tubulosae* Decne. in l.c.; Kitagawa in J. Jap. Bot. 13: 343. 1937; Tamura in Acta Phytotax. Geobot. 38: 39. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 372. 1995; Snoeijer in *Clematis* 1992: 10. 1992.——sect. *Viorna* subsect. *Tubulosae* (Decne.) Prantl in Bot. Jahrb. 9: 258. 1888, p.p.; Schneid., Ill. Handb. Laubh. 1: 28. 1906; Hand.-Mazz. in Acta Hort. Gotob. 13: 191. 1939, p.p. excl. *C. tatarinowii* Maxim.; Tamura in Sci. Rep. Osaka Univ. 16 (2): 32. 1967; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 93. 1980, p.p. excl. *C. tatarinowii* Maxim.——subgen. *Tubulosa* T. Y. A. Yang in Syst. Geogr. Pl. 68: 301. 1999; et in Chiu & Peng, Proc. Cross-str. Symp. Fl. Divers. & Cons. 92. 1998. Lectotype: *C. heracleifolia* DC.

直立多年生草本植物,小灌木或亚灌木。花序通常顶生。花通常杂性。萼片直立,蓝

色或紫色。花药具散孔。

Erect perennial herbs, small shrubs or subshrubs. Inflorescences usually terminal. Flowers usually polygamous. Sepals erect, blue or purple. Pollen pantoporate.

约7种,隶属2系,分布于中国,朝鲜和日本。

系1 大叶铁线莲系

Ser. 1. **Tubulosae** Rehd. & Wils. in Sarg. Pl. Wils. 1: 320. 1913; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 209. 1951, p.p. excl. *C. ranunculoides* Franch.; W. T. Wang in Acta Phytotax. Sin. 39: 10. 2001. Lectotype: *C. heracleifolia* DC.

叶为三出复叶。花多数,组成顶生花序。

Leaves ternate. Flowers in terminal, many-flowered inflorescences.

约6种: 261. *C. urticifolia* Nakai ex Kitagawa, 262. 大叶铁线莲 *C. heracleifolia* DC., 263. 卷萼铁线莲 *C. tubulosa* Turcz., 264. 台湾草牡丹 *C. psilandra* Kitagawa, 265. *C. speciosa* Makino, 266. *C. stans* Sieb. & Zucc.。分布与大叶铁线莲亚组相同。

系2 高山铁线莲系

Ser. 2. **Uniflorae** W. T. Wang in Acta Phytotax. Sin. 39: 10. 2001. Type: *C. tsugetorum* Ohwi.

叶为三出复叶或羽状复叶。花单朵顶生。

Leaves ternate or pinnate. Flowers solitary, terminal.

1种: 267. 高山铁线莲 *C. tsugetorum* Ohwi. 特产中国台湾。

亚属3 尾叶铁线莲亚属

Subgen. 3. **Viorna** Gray, Syn. Fl. N. Amer. 1 (1): 5. 1895; Keener & Dennis in Taxon 31: 37. 1982; Pringle in Morin et al., Fl. N. Amer. 3: 167. 1997. Lectotype: *C. viorna* L.

Viorna Reichb., Handb. 277. 1837; Spach, Hist. Nat. Veg. Phan. 7: 268. 1839; Small, Fl. Southeast. U.S. 437. 1903; Rydb., Fl. Rocky Mts. 291. 1917.——subgen. *Viorna* (Reichb.) Tamura in Acta Phytotax. Geobot. 38: 40. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 376. 1995; Grey-Wilson, Clematis 200. 2000. Lectotype: *Viorna urnigera* Spach (= *Clematis viorna* L.).

Subgen. *Campanella* Tamura in Acta Phytotax. Geobot. 38: 38. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 372. 1995, p.p.; Snoeijer in Clematis 1992: 10. 1992; T. Y. A. Yang & Moore in Syst. Geogr. Pl. 68: 300. 1999; Grey-Wilson, Clematis 133. 2000. Type: *C. lasiandra* Maxim.

木质藤本植物、直立多年生草本植物、小亚灌木或灌木。花两性。萼片4,镊合状排列,直立,长圆形,倒披针形或披针形,边缘上有一狭短绒毛带。雄蕊被毛;花丝条形;花药长圆形或狭长圆形。

Woody vines, erect perennial herbs, small subshrubs or shrubs. Flowers bisexual. Sepals 4, valvate, erect, oblong, oblanceolate, or lanceolate, on margin with a narrow velutinous strip. Stamens pubescent; filaments linear; anthers oblong or narrowly oblong.

约72种,隶属2组,广布于亚洲,非洲,欧洲和北美洲。

组1 尾叶铁线莲组

Sect. 1. **Viorna** (Reichb.) Prantl in Bot. Jahrb. 9: 258. 1888, p.p.; et in Engler & Prantl, Nat. Pflanzenfam. 3 (2): 63. 1888; Koehne, Deuts. Dendr. 152. 1893; Schneid., Ill. Handb. Laubh. 1: 275. 1906, p.p.; Kraschen. in Kom., Fl. USSR 7: 312. 1937, p.p.; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 207. 1951, p.p.; Tamura in Sci. Rep. Osaka Univ. 4: 45. 1955 et 16 (2): 32. 1967, p.p.; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 88. 1980, p.p. Lectotype: *C. viorna* L.

幼苗叶互生。茎生叶对生,为单叶或复叶。

Seedling leaves alternate. Mature cauline leaves opposite, simple or compound.

约71种,隶属3亚组,分布同尾叶铁线莲亚属。

亚组1 尾叶铁线莲亚组

Subsect. 1. **Connatae** Koehne, Deuts. Dendr. 158. 1893; Schneid., Ill. Handb. Laubh. 1: 283. 1906; Hand.-Mazz. in Acta Hort. Gotob. 13: 191. 1939; H. Eichler in Bibl. Bot. 124: 18. 1958; Tamura in Sci. Rep. Osaka Univ. 4: 46. 1955 et 16 (2): 79. 1967; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 96. 1980.—sect. *Connatae* (Koehne) M. Johnson, Klematis 287. 1997. Type: *C. connata* DC.

Trigula Noronha, Verh. Batav. Gen. 5, Art. 4: 4. 1790. Type: *T. trifoliata* Noronha (= *Clematis leschenaultiana* DC.).

Sect. *Campanella* Tamura in Acta Phytotax. Geobot. 38: 38. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl. 17a (4): 372. 1995; Snoeijer in Clematis 1992: 10. 1992; T. Y. A. Yang & Moore in Syst. Geogr. Pl. 68: 301. 1999, p.p. excl. *C. pseudopogonandra* Finet & Gagnep. et *C. tatarinowii* Maxim.; Grey-Wilson, Clematis 133. 2000, p.p. excl. *C. pseudopogonandra* Finet & Gagnep. Type: *C. lasiandra* Maxim.

幼苗叶互生,稀对生(芹叶铁线莲)。花通常不下垂,组成在当年枝上顶生或腋生的聚伞花序。萼片白色,稀黄色或紫色。

Seedling leaves alternate, rarely opposite (*C. aethusifolia*). Flowers usually not pendulous, in cymes arising from apex or leaf axils of hornotinous branch. Sepals white, rarely yellow or purple.

43种,隶属5系,广布于亚洲东部和南部及非洲。

系1 尾叶铁线莲系

Ser. 1. **Connatae** Rehd. & Wils. in Sarg., Pl. Wils. 1: 322. 1913; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 210. 1951. Type: *C. connata* DC.

Subsect. *Connatae* ser. *Henryianae* Tamura in Sci. Rep. Osaka Univ. 4: 47. 1955; et in Acta Phytotax. Geobot. 16: 79. 1956.—sect. *Connatae* subsect. *Henryianae* (Tamura) M. Johnson, Klematis 325. 1997. Type: *C. henryi* Oliv.

叶为单叶,三出复叶或1-2回羽状复叶。聚伞花序顶生或腋生,具花序梗和2枚苞片,有1至多数花。萼片外面不具纵肋或纵翅。宿存花柱长2-5.5 cm。

Leaves simple, ternate or 1-2-pinnate. Cymes terminal or axillary, pedunculate, 2-bracteate, 1-many-flowered. Sepals outside not longitudinally costate or winged. Persistent

styles 2–5.5 cm long.

33种: 268. 邱北铁线莲 *C. chiupehensis* M. Y. Fang, 269. 单叶铁线莲 *C. henryi* Oliv., 270. 多花铁线莲 *C. jingdunensis* W. T. Wang, 271. 锡金铁线莲 *C. siamensis* Drumm. & Lace, 272. 尾叶铁线莲 *C. urophylla* Franch., 273. 滇川铁线莲 *C. kockiana* Schneid., 274. *C. nagaensis* W. T. Wang, 275. 柱梗铁线莲 *C. teretipes* W. T. Wang, 276. *C. nainitalensis* W. T. Wang, 277. 平坝铁线莲 *C. clarkeana* Lévl. & Van., 278. 青城山铁线莲 *C. qingchengshanica* W. T. Wang, 279. *C. acuminata* DC., 280. 云南铁线莲 *C. yunnanensis* Franch., 281. 怒江铁线莲 *C. nukiangensis* M. Y. Fang, 282. 森氏铁线莲 *C. morii* Hayata, 283. 海南铁线莲 *C. hainanensis* W. T. Wang, 284. 绣毛铁线莲 *C. leschenaultiana* DC., 285. 莓叶铁线莲 *C. rubifolia* C. H. Wright, 286. 毛木通 *C. buchananiana* DC., 287. 黄毛铁线莲 *C. grewifolia* DC., 288. 俞氏铁线莲 *C. yui* W. T. Wang, 289. 贵州铁线莲 *C. kweichowensis* Pei, 290. 曲柄铁线莲 *C. repens* Finet & Gagnep., 291. 华中铁线莲 *C. pseudootophora* M. Y. Fang, 292. 宽柄铁线莲 *C. otophora* Franch. ex Finet & Gagnep., 293. *C. staintonii* W. T. Wang, 294. 湖北铁线莲 *C. hupehensis* Hemsl., 295. 毛花铁线莲 *C. dasyandra* Maxim., 296. 长花铁线莲 *C. rehderiana* Craib, 297. *C. roylei* Rehd., 298. *C. jeypurensis* Beddome ex W. T. Wang, 299. 合柄铁线莲 *C. connata* DC., 300. 毛蕊铁线莲 *C. lasiandra* Maxim.。广布于亚洲东部和南部。

系2 须蕊铁线莲系

Ser. 2. **Pogonandrae** W. T. Wang in Acta Phytotax. Sin. 36: 170. 1998. Type: *C. pogonandra* Maxim.

叶为三出复叶。花单生当年生枝叶腋,只具花梗,无花序梗和苞片。萼片外面无纵肋和纵翅,稀在中脉上具1翅。宿存花柱长约2.5 mm。

Leaves ternate. Flowers singularly arising from leaf axils of hornotinous branch, only pedicellate, not pedunculate, nor bracteate. Sepals outside not longitudinally costate, nor winged, rarely on midrib 1-winged. Persistent styles ca. 2.5 cm long.

2种: 301. 须蕊铁线莲 *C. pogonandra* Maxim., 302. 神农架铁线莲 *C. shenlungchiaensis* M. Y. Fang。特产中国中部和西南部。

系3 Ser. 3. **Grandiflorae** W. T. Wang in Acta Phytotax. Sin. 38: 334. 2000. Type: *C. grandiflora* DC.

叶为三出复叶。聚伞花序腋生。萼片厚纸质,外面具3–5条纵肋,无翅。宿存花柱长达10–12 cm。

Leaves ternate. Cymes axillary. Sepals thickly papery, outside longitudinally 3–5-costate, not winged. Persistent styles up to 10–12 cm long.

2种: 303. *C. longicauda* Steud. ex A. Rich., 304. *C. grandiflora* DC.。分布于非洲。

系4 毛茛铁线莲系

Ser. 4. **Acutangulae** W. T. Wang in Acta Phytotax. Sin. 31: 220. 1993 et 36: 170. 1998. Type: *C. acutangula* Hook. f. & Thoms.

叶为单叶,1–2回三出复叶或羽状复叶;基生叶常存在。聚伞花序顶生并腋生。萼片外

面具2–4条狭纵翅。宿存花柱长1–2.5 cm。

Leaves simple, 1–2-ternate or pinnate; basal leaves often present. Cymes terminal and axillary. Sepals outside longitudinally narrowly 2–4-winged. Persistent styles 1–2.5 cm long.

5种: 305. 宾川铁线莲 *C. pinchuanensis* W. T. Wang & M. Y. Fang, 306. 毛茛铁线莲 *C. ranunculoides* Franch., 307. *C. acutangula* Hook. f. & Thoms., 308. 思茅铁线莲 *C. pterantha* Dunn, 309. 元江铁线莲 *C. yuanjiangensis* W. T. Wang。分布于中国西南部, 印度, 不丹和尼泊尔。

系5 芹叶铁线莲系

Ser. 5. **Aethusifoliae** Tamura in Sci. Rep. Osaka Univ. 4: 47. 1955; et in Acta Phytotax. Geobot. 16: 79. 1956.—sect. *Aethusifoliae* (Tamura) Serov in Bot. Zhurn. 73: 1739. 1988.—sect. *Connatae* subsect. *Aethusifoliae* (Tamura) M. Johnson, Klematis 327. 1997. Type: *C. aethusifolia* Turcz.

幼苗叶对生(Zhang et al., 2000)。叶为3–4回羽状细裂复叶。聚伞花序顶生并腋生。萼片外面无纵肋和纵翅。宿存花柱长1.6–2.7 cm。

Seedling leaves opposite (Zhang et al., 2000). Leaves 3–4-pinnatisect. Cymes terminal and axillary. Sepals outside not longitudinally costate, nor winged. Persistent styles 1.6–2.7 cm long.

1种: 310. 芹叶铁线莲 *C. aethusifolia* Turcz.。广布于中国北部和西北部, 蒙古和俄国西伯利亚。

亚组2 西南铁线莲亚组

Subsect. 2. **Bebaenantha** (Edgew.) W. T. Wang in Acta Phytotax. Sin. 39: 16. 2001.—sect. *Bebaenantha* Edgew. in Trans. Linn. Soc. London 20: 25. 1851; Tamura in Sci. Rep. Osaka Univ. 16 (2): 32. 1967; et in Acta Phytotax. Geobot. 38: 39. 1987; et in Hiepkow, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 373. 1995; M. Johnson, Klematis 359. 1997; Grey-Wilson, Clematis 153. 2000. Type: *C. barbellata* Edgew.

Sieboldia Hoffmgg., Preisv. Nachtr. 28. 1842. Type: *S. japonica* (Thunb.) Hoffmgg. (= *Clematis japonica* Thunb.).

Sect. *Paratragene* Tamura in Sci. Rep. Osaka Univ. 4: 49. 1955; et in Acta Phytotax. Geobot. 16: 80. 1956. Type: *C. japonica* Thunb.

幼苗叶互生。具1花的聚伞花序或花与叶同自一老枝腋芽生出。萼片外面无纵肋和翅。

Seedling leaves alternate. One-flowered cyme(s) or flower(s) arising together with leaves from an axillary bud of old branch. Sepals outside not longitudinally costate, nor winged.

6种: 311. *C. japonica* Thunb., 312. *C. obvallata* (Ohwi) Tamura, 313. *C. tosaensis* Makino, 314. *C. bracteolata* Tamura, 315. *C. barbellata* Edgew., 316. 西南铁线莲 *C. pseudopogonandra* Finet & Gagnep.。分布于日本, 中国西南部, 印度北部, 尼泊尔和巴基斯坦北部。

亚组3 褐毛铁线莲亚组

Subsect. 3. **Crispae** Prantl in Bot. Jahrb. 9: 258. 1888, p.p.; Schneid., Ill. Handb. Laubh. 1: 275. 1906; Hand.-Mazz. in Acta Hort. Gotob. 13: 190. 1939; Tamura in Sci. Rep. Osaka Univ. 4: 47. 1955 et 16 (2): 32. 1967; et in Acta Phytotax. Geobot. 16: 79. 1956; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 89. 1980. Lectotype: *C. crispa* L. (Tamura, 1955).

Viorna Reichb., l.c.; Spach, l.c.—*Clematis* subgen. *Viorna* (Reichb.) Tamura in l.c. 1987; Grey-Wilson, *Clematis* 200. 2000.

Viorna sect. *Euviorna* Spach, Hist. Nat. Veg. Phan. 7: 268. 1839.

Viorna sect. *Viornium* Spach, l.c. 270.

Sect. *Viorna* (Reichb.) Prantl in l.c., p.p.; Erickson in Ann. Missouri Bot. Gard. 30: 1. 1943.

Subgen. *Viorna* Gray, l.c.; Keener & Dennis in l.c.; Pringle in Morin et al., l.c.; T. Y. A. Yang & Moore in Syst. Geogr. Pl. 68: 301. 1999.

幼苗叶对生。花多下垂。萼片通常蓝色,紫色或红色,质地有时较厚。瘦果有时扁平,具肿胀边缘框,宿存花柱有时弱度伸展,呈尾状,不呈羽毛状。

Seedling leaves opposite. Flowers often pendulous. Sepals usually blue, purple or red, sometimes subcoriaceous in texture. Achenes sometimes flattened and tumidly rimmed; persistent styles sometimes weakly elongate, tail-like, not plumose.

约22种,隶属6系,分布于亚洲东北部和西部,欧洲,美国和墨西哥北部。

系1 褐毛铁线莲系

Ser. 1. **Fuscae** Tamura in Acta Phytotax. Geobot. 16: 79. 1956. —sect. *Viorna* subsect. *Fuscae* (Tamura) M. Johnson, *Klematis* 538. 1997; Grey-Wilson, *Clematis* 31. 2000. Type: *C. fusca* Turcz.

攀援或直立草本或亚灌木。叶为羽状复叶,有时为单叶。萼片厚,外面被褐色毛,边缘不延展。花粉具三沟。瘦果不扁,无肿胀边缘框;宿存花柱伸长,羽毛状。

Scandent or erect herbs, or subshrubs. Leaves pinnate, sometimes simple. Sepals thick, outside covered with brown hairs, margin not dilated. Pollen 3-colpate. Achenes not flattened, nor tumidly rimmed; persistent styles elongate, plumose.

约3种: 317. 褐毛铁线莲 *C. fusca* Turcz., 318. *C. ajanensis* (Regel & Tiling) Kuntze, 319. *C. flabellata* Nakai. 分布于中国东部和东北部,俄国西伯利亚东部,朝鲜和日本。

系2 全缘铁线莲系

Ser. 2. **Integrifoliae** (Erickson ex M. Johnson) W. T. Wang, st. nov. —sect. *Viorna* subsect. *Integrifoliae* Erickson [in Ann. Missouri Bot. Gard. 30: 35. 1943, sine diagn. Latin.] ex M. Johnson, *Klematis* 531. 1997, cum diagn. Latin.; Grey-Wilson, *Clematis* 31. 2000. —sect. *Integrifoliae* Serov in Bot. Zhurn. 12: 1740. 1988; Grey-Wilson, l.c., excl. subsect. *Baldwiniana*. —subgen. *Integrifolia* (Erickson) T. Y. A. Yang in Syst. Geogr. Pl. 68: 302. 1999, p.p.—sect. *Integrifolia* (Erickson) T. Y. A. Yang in l.c. Type: *C. integrifolia* L.

直立亚灌木。叶通常为单叶,全缘。萼片纸质,边缘不延展。花粉具3沟(*C. integrifolia*)

或散孔。瘦果不扁平,边缘无或稍有框状隆起;宿存花柱伸长,羽毛状,稀为尾状(*C. fremontii*)。

Erect subshrubs. Leaves usually simple, entire. Sepals papery, margin not dilated. Pollen 3-colpate (*C. integrifolia*) or pantoporate. Achenes not flattened, margin not or slightly rimmed; persistent styles elongate, plumose, rarely tail-like (*C. fremontii*).

6种: 320. 全缘铁线莲 *C. integrifolia* L., 321. *C. ochroleuca* Aiton, 322. *C. coactilis* (Fernald) Keener, 323. *C. albicoma* Wherry, 324. *C. viticaulis* Steele, 325. *C. fremontii* S. Watson. 分布于亚洲西部和中部,欧洲,美国中部及东部,墨西哥北部。

系3 Ser. 3. **Hirsutissimae** (Erickson ex M. Johnson) W. T. Wang, st. nov.—sect. *Viorna* subsect. *Hirsutissimae* Erickson [in Ann. Missouri Bot. Gard. 30: 42. 1943, sine diagn. Latin.] ex M. Johnson, Klematis 531. 1997, cum diagn. Latin.—sect. *Hirsutissima* (Erickson) T. Y. A. Yang in Syst. Geogr. Pl. 68: 302. 1999.—sect. *Hirsutissimae* (Erickson ex M. Johnson) Grey-Wilson, Clematis 31. 2000. Type: *C. hirsutissima* Pursh.

Subgen. *Integrifolia* (Erickson) T. Y. A. Yang in l.c., p.p.

直立多年生草本。叶为羽状复叶,裂片狭。花单朵顶生。萼片薄,边缘不延展。瘦果小,稍扁压;宿存花柱伸长,羽毛状。

Erect perennial herbs. Leaves pinnate, with narrow segments. Flowers solitary, terminal. Sepals thin, margin not dilated. Achenes small, slightly compressed; persistent styles elongate, plumose.

1种: 326. *C. hirsutissima* Pursh. 分布于美国西南部。

系4 Ser. 4. **Euviornae** (Erickson) W. T. Wang, st. nov. —sect. *Viorna* subsect. *Euviornae* Erickson in Ann. Missouri Bot. Gard. 30: 14. 1943, sine diagn. Latin.—sect. *Viorna* subsect. *Viorna* M. Johnson, Klematis 528. 1997, cum diagn. Latin.; Grey-Wilson, Clematis 200. 2000. Type: *C. viorna* L.

藤本植物,稀灌木状(*C. addisonii*)或茎直立(*C. bigelovii*)。叶为羽状或三出复叶。聚伞花序具1或少数花,腋生,稀花单朵顶生。萼片厚,边缘通常不延展。花粉具散孔。瘦果扁平,通常有框状边缘;宿存花柱伸长,羽毛状,稀尾状(*C. pitcheri*, *C. bigelovii*)。

Vines, rarely bushy (*C. addisonii*) or stems erect (*C. bigelovii*). Leaves pinnate or ternate. Cymes 1–few-flowered, axillary, rarely flowers solitary, terminal. Sepals thick, margin usually not dilated. Pollen pantoporate. Achenes flattened, usually rimmed; persistent styles elongate, plumose, rarely tail-like (*C. pitcheri*, *C. bigelovii*).

9种: 327. *C. viorna* L., 328. *C. morefieldii* Kral, 329. *C. addisonii* Britton, 330. *C. glaucophylla* Small, 331. *C. versicolor* Small ex Rydb., 332. *C. texensis* Buckley, 333. *C. reticulata* Walter, 334. *C. pitcheri* Torr. & Gray, 335. *C. bigelovii* Torr.。分布于美国东部和南部。

系5 Ser. 5. **Viticellae** (Erickson) W. T. Wang, st. nov.—sect. *Viorna* subsect. *Viticellae* Erickson in Ann. Missouri Bot. Gard. 30: 31. 1943, sine diagn. Latin. Type: *C. crispa* L.

Sect. *Viorna* subsect. *Crispae* M. Johnson, Klematis 530. 1997, cum diagn. Latin.;

Grey-Wilson, *Clematis* 30. 2000. Type: *C. crisper* L.

藤本。叶为羽状复叶。花单朵顶生或组成腋生、具1花的聚伞花序。萼片薄,上部延展。花粉具散孔。瘦果扁平,具边缘框;宿存花柱尾状,不呈羽毛状。

Vines. Leaves pinnate. Flowers solitary and terminal, or in axillary, 1-flowered cymes. Sepals thin, margin dilated distally. Pollen pantoporate. Achenes flattened, rimmed; persistent styles tail-like, not plumose.

1种: 336. *C. crisper* L.。特产美国东南部。

系6 Ser. 6. **Baldwinianae** (Erickson ex M. Johnson) W. T. Wang, st. nov. ——sect. *Viorna* subsect. *Baldwinianae* Erickson [in Ann. Missouri Bot. Gard. 30: 41.1943, sine diagn. Latin.] ex M. Johnson, *Clematis* 530. 1997, cum diagn. Latin.; Grey-Wilson, *Clematis* 31. 2000. ——sect. *Baldwiniana* (Erickson) T. Y. A. Yang in Syst. Geogr. Pl. 68: 302. 1999. Type: *C. baldwinii* Torr. & Gray.

Subgen. *Integrifolia* (Erickson) T. Y. A. Yang in l.c., p.p.

直立多年生草本。叶为单叶,有时为羽状复叶。花1-3朵顶生。萼片狭长圆形,边缘上部延展,瘦果扁平,具边缘框;宿存花柱羽毛状或尾状。

Erect perennial herbs. Leaves simple, sometimes pinnate. Flowers 1-3, terminal. Sepals narrowly oblong, margin dilated distally. Achenes flattened, rimmed; persistent styles plumose or tail-like.

2种: 337. *C. baldwinii* Torr. & Gray, 338. *C. socialis* Kral. 分布于美国东南部。

组2 互叶铁线莲组

Sect. 2. **Archiclematis** Tamura in Sci. Rep. Osaka Univ. 4: 45. 1955; et in Acta Phytotax. Geobot. 16: 79. 1956; M. Johnson, *Clematis* 139. 1997.——*Archiclematis* (Tamura) Tamura in Sci. Rep. Osaka Univ. 16 (2): 31. 1967; et in Acta Phytotax. Geobot. 24: 151. 1970; et in Hiepkko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 366. 1995; M. C. Chang in Fl. Reip. Pop. Sin. 28: 74. 1980.——*Clematis* subgen. *Archiclematis* (Tamura) Grey-Wilson, *Clematis* 29, 132. 2000. Type: *C. alternata* Kitam. & Tamura.

亚灌木状藤本植物。所有叶互生,为单叶,掌状浅裂。花组成具1-3朵花的腋生聚伞花序,下垂。萼片紫红色。宿存花柱伸长,羽毛状。

Suffrutescent vines. Leaves all alternate, simple, palmatilobate. Flowers in axillary, 1-3-flowered cymes, pendulous. Sepals purple-red. Persistent styles elongate, plumose.

1种: 339. 互叶铁线莲 *C. alternata* Kitam. & Tamura. 分布于中国西藏南部和尼泊尔。

亚属4 长瓣铁线莲亚属

Subgen. 4. **Atragene** Torr. & Gray, Fl. N. Amer. 1: 10. 1838; Keener & Dennis in Taxon 31: 39. 1982; Pringle in Morin et al., Fl. N. Amer. 3: 165. 1997; Grey-Wilson, *Clematis* 176. 2000. Type: *C. alpina* (L.) Mill.

木质藤本植物。叶为1-2回三出复叶或羽状复叶。花两性,通常1朵顶生于与1-2对叶同自一老枝腋芽生出的短枝上,稀组成生于当年生枝叶腋的具少数花的聚伞花序。萼片4,镊合状排列,斜上展,黄色、蓝色或紫色,卵形或长圆形,边缘上无一条短绒毛带。雄蕊被柔

毛,外部雄蕊的花丝和药隔变宽,常不育成花瓣状退化雄蕊。瘦果扁压,具伸长、羽毛状宿存花柱。

Woody vines. Leaves 1–2-ternate or pinnate. Flowers bisexual, usually solitary and terminal on new short shoots, arising together with 1–2 pairs of leaves from an axillary bud of old branch, rarely in axillary few-flowered cymes arising from leaf axils of hornotinous branch. Sepals 4, valvate, ascending, yellow, blue or purple, ovate or oblong, on margins without narrow velutinous strips. Stamens pubescent, those outer ones with dilated filaments and connectives often sterile and transformed into petal-like staminodes. Achenes compressed, with elongate, plumose persistent styles.

约15种,隶属2组,广布于北温带。

组1 Sect. 1. **Atragenopsis** Boiss., Fl. Orient. Suppl. 2. 1888. Type: *C. robertsiana* Aitch. & Hemsl.

叶为二回三出复叶。花单朵顶生。萼片淡黄色,长圆状披针形。雄蕊全部能育。

Leaves 2-ternate. Flowers solitary, terminal. Sepals yellowish, oblong-lanceolate. Stamens all fertile.

1种: 340. *C. robertsiana* Aitch. & Hemsl. 产巴基斯坦北部,在阿富汗东部可能也产。

组2 长瓣铁线莲组

Sect. 2. **Atragene** (L.) DC., Syst. 1: 165. 1818; et Prodr. 1: 9. 1824; Rehd., Man. Cult. Trees & Shrubs, ed. 2, 211. 1951; Tamura in Sci. Rep. Osaka Univ. 4: 49. 1955 et 16 (2): 34. 1967; Pringle in Bailey 19: 51. 1973; M. Y. Fang in Fl. Reip. Pop. Sin. 28: 138. 1980; Tamura in Acta Phytotax. Geobot. 38: 39. 1987; et in Hiepko, Nat. Pflanzenfam., Zwei. Aufl., 17a (4): 373. 1995; M. Johnson, Klematis 171. 1997. —*Atragene* L., Sp. Pl. 1: 542. 1753, p.p.; Spach, Hist. Nat. Veg. Phan. 7: 257. 1839; Maxim. in Bull. Acad. Sci. St.-Petersb. 22: 224. 1876; Small, Fl. Southeast. U.S. 439. 1903; Krasch. in Kom., Fl. URSS 7: 310. 1937. —sect. *Viorna* subsect. *Atragene* (L.) Prantl in Bot. Jahrb. 9: 258. 1888, ut “*Atragenae*”, p.p. excl. *C. robertsiana* Aitch. & Hemsl.; Schneid., Ill. Handb. Laubh. 1: 283. 1906; Hand.-Mazz. in Acta Hort. Gotob. 13: 196. 1936. Lectotype: *Atragene alpina* L. (= *Clematis alpina* (L.) Mill.) (Britton & Brown, 1913; Tamura, 1995).

Sect. *Atragene* subsect. *Atragene* M. Johnson, Klematis 171. 1997. Type: *C. alpina* (L.) Mill.

Sect. *Atragene* subsect. *Brachyblasti* M. Johnson, l.c. 172. Type: *Atragene moissenkoi* Serov.

叶为1–2回三出复叶或羽状复叶。花单朵顶生,稀组成1–3朵花的聚伞花序。萼片黄色、蓝色或紫色。外部雄蕊不育成退化雄蕊,椭圆状条形,倒披针形或匙形,有时具残留的花药。

Leaves 1–2-ternate or pinnate. Flowers solitary, terminal, rarely in 1–3-flowered cymes. Sepals yellow, blue or purple. Outer stamens sterile, transformed into staminodes, elliptic-linear, oblanceolate or spatulate, sometimes with rudimentary anthers.

约14种: 341. *C. occidentalis* (Hornem.) DC., 342. *C. columbiana* (Nutt.) Torr. & Gray,

343. 朝鲜铁线莲 *C. koreana* Kom., 344. *C. chiisanensis* Nakai, 345. *C. fauriei* (Boiss.) M. Johnson, 346. 伊犁铁线莲 *C. iliensis* Y. S. Hou & W. H. Hou, 347. *C. kogenensis* W. T. Wang, 348. 绒萼铁线莲 *C. moissenkoi* (Serov) W. T. Wang, 349. 长瓣铁线莲 *C. macropetala* Ledeb., 350. 长白铁线莲 *C. nobilis* Nakai, 351. *C. crassisepala* Ohwi, 352. 西伯利亚铁线莲 *C. sibirica* (L.) Mill., 353. *C. turkestanica* M. Johnson, 354. *C. alpina* (L.) Mill.。广布于北温带地区。

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