

## **The Euro Med treatment of Apiaceae**

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RALF HAND

## The Euro+Med treatment of *Apiaceae*

### Abstract

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A survey of *Apiaceae* genera accepted for the purpose of the Euro+Med Project is presented. As a consequence of shifts in circumscription of genera or reassessments of specific and subspecific taxa, combinations and new names that are required in the genera *Bubon*, *Cachrys*, *Dichoropetalum*, *Hellenocarum*, *Laserpitium*, *Selinum* and *Pastinaca* are published.

Additional key words: *Umbelliferae*, taxonomy, Europe, Mediterranean area

Compiling a checklist of umbellifers occurring in Europe and the Mediterranean area (in the following referred to as the Euro+Med region) and assembling distributional data for the Euro+Med Plantbase (Hand 2011) proved to be a difficult task for several reasons. Compared to other families relatively rich in species, the data sources differ considerably. Modern treatments such as the encyclopedic monograph for France by Reduron (2007–08) are extremely helpful, but their scope is limited to small parts of the Euro+Med region. The family has not been dealt with in the Med-Checklist (Greuter & al. 1984–89; Greuter & Raab-Straube 2008) so far, and its treatment in Flora Europaea dates back to 1968 (Tutin 1968) while *Apiaceae* systematics have progressed considerably since then.

There has been much progress regarding the infrafamilial systematics of *Apiaceae*. Recently, Downie & al. (2010) have summarised the current state of knowledge and compiled the recent literature on *Apiaceae* systematics. The authors also hint at some uncertainties and open questions. It should be mentioned here that for reasons of consistency within the Euro+Med project, *Hydrocotyle*

has been included into *Apiaceae* s.l. as was traditional. Recent results clearly show that the genus belongs to *Araliaceae* (see, e.g. Plunkett & al. 1997; Chandler & Plunkett 2004).

Compared to other larger families of vascular plants of the Euro+Med region the number of critical species and species groups is relatively low in the *Apiaceae*. There are only some notoriously critical taxa which are still in urgent need of an area-wide revision such as *Aethusa cynapium*, *Daucus carota*, *Pimpinella tragioides* and *Seseli libanotis*. However, the most challenging task regarding *Apiaceae* is the generic treatment within the family. Fuelled by studies using molecular methods, some much disputed cases, several of them dating back to the 19th century, can now be solved. On the other hand, molecular studies have given rise to a certain instability. The reasons are manifold but not limited to *Apiaceae*: discordance between ITS and plastid data, incomplete sampling (often neglecting extra-European areas), poly- and paraphyletic taxa only partly understood, optional rather than absolutely necessary splitting of large genera, incongruences between morphology and molecular results

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and the like. Some examples are discussed in the commented cases below.

The accepted Euro+Med genera of *Apiaceae* are listed in Table 1. For the sake of clear arrangement only a selection of recently used generic synonyms are added. All synonyms are easily accessible in the online treatment of the family (Hand 2011). Some of the problematic genera are marked with an asterisk. These genera are the most promising candidates for changes in the years to come. They have been dealt with in recent publications but need further studies. In some cases a broader sampling of species outside Europe hopefully will lead to definite decisions concerning generic treatments. In other cases

nomenclatural consequences are announced. For the time being, a moderately conservative approach is preferred. Generic changes have been adopted if the situation seems to be settled, e.g. in the case of resurrected *Helosciadium*, formerly included in *Apium*. It should be kept in mind that the Euro+Med Plantbase is designed as a dynamic, online database, which can easily integrate convincing new results in the future.

A concise characterisation of the Euro+Med Plantbase Project and its main purposes can be found in the introduction to the first notula (Greuter & al. 2003). Conventions and geographical standards used have been explained in detail by Greuter & Raab-Straube (2005).

Table 1. The Euro+Med genera of *Apiaceae*: accepted names (bold) and selected synonyms. – Bracketed names are of non-native taxa introduced in the Euro+Med area. Asterisks hint at those genera that are treated in a traditional, conservative way but whose phylogeny is not completely understood and where changes are to be expected.

<i>Actinolema</i>	<i>Chamaesciadium</i>	<i>Glochidotheca</i>
<i>Aegokeras</i>	<i>Chymysdia</i>	≡ <i>Turgeniopsis</i>
≡ <i>Olymposciadium</i>	<i>Cicuta</i>	<i>Grafia</i>
<i>Aegopodium</i>	<i>Conioselinum</i>	<i>Grammosciadium</i>
<i>Aethusa</i>	<i>Conium</i>	<i>Guillonea</i>
<i>Agasyllis</i>	<i>Conopodium</i>	<i>Hacquetia</i>
<i>Ammi</i>	<i>Coriandrum</i>	<i>Hellenocarum</i>
= <i>Visnaga</i>	<i>Crenosciadium</i>	<i>Helosciadium</i>
<i>Ammiopsis</i>	<i>Crithmum</i>	<i>Heptaptera</i>
<i>Ammodaucus</i>	<i>Cryptotaenia</i> *	<i>Heracleum</i> *
<i>Ammoides</i>	<i>Cuminum</i>	<i>Hladnikia</i>
<i>Anethum</i>	[ <i>Cyclospermum</i> ]	<i>Hohenackeria</i> *
<i>Angelica</i>	<i>Cymbocarpum</i>	<i>Horstrissea</i>
= <i>Epikeros</i>	<i>Daucus</i> *	<i>Hydrocotyle</i>
= <i>Ostericum</i>	<i>Dethawia</i>	<i>Johrenia</i>
<i>Anisosciadium</i>	<i>Deverra</i>	<i>Krubera</i>
<i>Anthriscus</i>	= <i>Pituranthos</i>	= <i>Capnophyllum</i> typo excl.
<i>Aphanopleura</i>	<i>Dichoropetalum</i>	<i>Kundmannia</i>
<i>Apium</i>	= <i>Holandrea</i>	<i>Lagoecia</i>
<i>Artedia</i>	= <i>Johreniopsis</i>	<i>Laser</i>
<i>Astomaea</i>	<i>Diplotaenia</i>	<i>Laserpitium</i>
<i>Astrantia</i>	<i>Distichoselinum</i>	<i>Lecokia</i>
<i>Astrodaucus</i>	<i>Dorema</i>	<i>Levisticum</i>
<i>Astydamia</i>	<i>Drusa</i>	<i>Ligusticum</i> *
<i>Athamanta</i> *	<i>Ducrosia</i>	= <i>Arafoe</i>
= <i>Portenschlagiella</i>	<i>Echinophora</i>	= <i>Coristospermum</i>
= <i>Tinguarra</i>	<i>Ekimia</i>	= <i>Macrosiadium</i>
<i>Aulacospermum</i>	<i>Elaeoselinum</i>	= <i>Mutellina</i>
<i>Berula</i>	<i>Elaeosticta</i>	= <i>Pachypleurum</i>
<i>Bifora</i>	<i>Eleutherospermum</i>	= <i>Tamamschjanella</i>
<i>Bonannia</i>	= <i>Tamamschjania</i>	[ <i>Lilaeopsis</i> ]
[ <i>Bowlesia</i> ]	<i>Endressia</i>	<i>Lisaea</i>
<i>Bubon</i>	<i>Eremodaucus</i>	<i>Magydaris</i>
<i>Bunium</i> *	<i>Eriosynaphe</i>	<i>Malabaila</i> *
<i>Bupleurum</i> *	<i>Eryngium</i>	= <i>Leiotulus</i>
<i>Cachrys</i>	<i>Exoacantha</i>	<i>Mandenovia</i> *
= <i>Bilacunaria</i>	<i>Falcaria</i>	<i>Margotia</i>
= <i>Hippomarathrum</i>	<i>Ferula</i>	<i>Melanoselinum</i> *
<i>Caropsis</i>	<i>Ferulago</i>	<i>Meum</i>
<i>Carum</i> *	<i>Foeniculum</i>	<i>Microsciadium</i>
<i>Caucalis</i>	<i>Froriepia</i>	<i>Molopospermum</i>
<i>Cenolophium</i>	<i>Fuernrohria</i>	<i>Monizia</i> *
[ <i>Centella</i> ]	<i>Geocaryum</i>	<i>Myrrhis</i>
<i>Chaerophyllum</i>	= <i>Huetia</i>	<i>Naufraga</i>
= <i>Physocaulis</i>	<i>Glaucosciadium</i>	<i>Neocryptodiscus</i>

continued on next page

Table 1 continued from preceding page

<i>Oenanthe</i>	<i>Polylophium</i>	<i>Smyrniopsis</i>
<i>Oliveria</i>	<i>Postiella</i>	<i>Smyrnium</i>
<i>Opopanax</i>	<i>Prangos</i>	[ <i>Sphallerocarpus</i> ]
<i>Orlaya</i>	<i>Psammogeton</i>	<i>Stefanoffia</i>
<i>Ormosciadium</i>	<i>Pseudopimpinella</i>	<i>Stenotaenia</i>
<i>Osmorhiza</i>	<i>Pseudoridolfia</i>	<i>Stoibrax</i>
<i>Pachytenium</i>	<i>Pseudorlaya</i> *	<i>Symphyloloma</i> *
<i>Palimbria</i>	<i>Ptychotis</i>	<i>Szovitsia</i>
<i>Pastinaca</i> *	<i>Pycnocycla</i>	<i>Thamnosciadium</i>
= <i>Dumaniana</i>	<i>Rhabdosciadium</i>	= <i>Sclerochorton</i> typo excl.
<i>Petagnaea</i>	<i>Ridolfia</i>	<i>Thapsia</i>
<i>Petroedmondia</i>	<i>Rouya</i>	<i>Thecocarpus</i>
<i>Petroselinum</i>	<i>Rutheopsis</i>	<i>Todaroa</i>
<i>Peucedanum</i> *	<i>Sanicula</i>	<i>Tordylium</i>
= <i>Cervaria</i>	<i>Scaligeria</i>	= <i>Ainsworthia</i>
= <i>Imperatoria</i>	<i>Scandix</i>	= <i>Synelcosciadium</i>
= <i>Oreoselinum</i>	<i>Sclerosciadium</i>	<i>Torilis</i>
= <i>Pteroselinum</i>	<i>Selinum</i> *	<i>Trachydium</i>
= <i>Taeniopetalum</i>	= <i>Cnidiocarpa</i>	= <i>Pseudotrachydium</i>
= <i>Thysselinum</i>	= <i>Cnidium</i>	<i>Trachyspermum</i>
= <i>Tommasinia</i>	= <i>Kadenia</i>	<i>Trigonosciadium</i> *
= <i>Xanthoselinum</i>	= <i>Katapsuxis</i>	<i>Trinia</i>
<i>Phlojodicarpus</i>	<i>Seseli</i> *	<i>Trochiscanthes</i>
<i>Physospermum</i>	= <i>Libanotis</i>	<i>Turgenia</i>
<i>Pimpinella</i>	<i>Silaum</i>	<i>Xatartia</i>
= <i>Albovia</i>	<i>Sison</i>	<i>Zeravschania</i>
<i>Pleurospermum</i>	<i>Sium</i>	<i>Zosima</i>

# Comments

## *Athamanta* L.

The phylogenetic position of all taxa traditionally treated as members of the genus *Athamanta* has not been fully understood. *A. della-cellae* Asch. & Barbey seems to be closely related to *Daucus* L. and its relatives, but this problem needs further clarification (Downie & al. 2000). Segregation of *Tinguarra* Parl. is rather optional than necessary; it is classified as section following the treatment by Spalik & al. (2001). *A. macedonica* (L.) Spreng. and its relatives from the Balkan peninsula are not related to *Athamanta* s.str. (Downie & al. 2000). Consequently, the Linnaean genus *Bubon* L. was restored by the latter authors who validated two names at subspecific rank. Hartvig (1986: 686–689) treated them as clearly defined species; intermediates seem to be very rare. This conception is followed here and two names need to be validated:

***Bubon albanicum*** (Alston & Sandwith) Hand, **comb. nov.** = *Athamanta albanica* Alston & Sandwith in J. Bot. 78: 193. 1940 = *Bubon macedonicum* subsp. *albanicum* (Alston & Sandwith) Spalik & S. R. Downie in Amer. J. Bot. 87: 91. 2000.

***Bubon arachnoideum*** (Boiss. & Orph.) Hand, **comb. nov.** = *Athamanta arachnoidea* Boiss. & Orph. in Boissier, Fl. Orient., Suppl.: 262. 1888 = *Bubon macedonicum* subsp. *arachnoideum* (Boiss. & Orph.) Spalik & S. R. Downie in Amer. J. Bot. 87: 91. 2000.

***Cachrys* L.** (incl. *Bilacunaria* Pimenov & V. N. Tikhom.) The relationship between *Cachrys* and *Bilacunaria* is one of several examples indicating that splitting of segregate genera is optional. *Bilacunaria* was segregated on the basis of morphological studies (Pimenov & Tichomirov 1983). A lumping of both genera is not necessarily refuted by molecular studies (Ajani & al. 2008). The placement of genera such as *Neocryptodiscus* Hedge & Lamond has obviously not been studied yet. According to the arguments of Ajani & al. (2008), two further species currently recognised in *Bilacunaria* are transferred here to *Cachrys* s.l.:

***Cachrys aksekiensis*** (A. Duran & B. Doğan) Hand, **comb. nov.** = *Bilacunaria aksekiensis* A. Duran & B. Doğan in Ann. Bot. Fenn. 48: 362. 2011.

***Cachrys boissieri*** (Boiss.) Hand, **comb. nov.** = *Hippomarathrum boissieri* Boiss., Fl. Orient. 2: 933. 1872 = *Bilacunaria boissieri* (Boiss.) Pimenov & V. N. Tikhom. in Feddes Rept. 94: 152. 1983.

## *Dichoropetalum* Fenzl / *Peucedanum* L.

The splitting of satellite genera from *Peucedanum* sensu latissimo, among them *Cervaria* Wolf, *Holandrea* Reduron & al., *Imperatoria* L., *Oreoselinum* Hill, *Pteroselinum* (Rchb.) Rchb., *Thysselinum* Hoffm., *Tommasinia* Bertol. and *Xanthoselinum* Schur, has been advo-

cated by several working groups (see, e.g. Spalik & al. 2004). It is only partially supported by character patterns such as immunochemistry of seed storage proteins (see Shneyer & al. 2003 also for general discussion). Opinion among authors of recently published floras and checklists for European countries is much divided. Some, e.g. Stace (2010) and Conti & al. (2007), follow the splitters, some not, e.g. Buttler & Hand (2008) and Fröberg (2010). The latter author summarises as follows: “However, such a division still seems premature, since data are lacking for several other segregates of *Peucedanum*. Furthermore, some of the segregate genera are located in the same clade as *Peucedanum* s.str. [...], and could be treated as one monophyletic genus”. Even a compromise solution by segregating *Cervaria* only (Fischer & al. 2008) is disputable. Its placement is ambiguous and depends on the phylogenetic method used (Spalik & al. 2004). Enigmatic taxa such as *P. nebrodense* (Guss.) Nyman are currently under consideration (Brullo & al., in press). The placement of *Chymsydia* Albov and *Endressia* J. Gay which are nested in *Peucedanum* s.l. needs further studies.

There seems to be only one group of taxa within *Peucedanum* in the traditional wide sense which is only distantly related to the rest of the peucedanoid assemblage. For this group of taxa the old name *Holandrea* has been propagated but after having required a broader sampling of related species, the genus name *Dichoropetalum* has been revitalized (Pimenov & al. 2007); the authors corroborate its segregation and provide a monographic treatment of the taxon. The placement of *P. caucasicum* (M. Bieb.) K. Koch is controversial (see Shneyer & al. 2003, Spalik & al. 2004); it may be a member of *Dichoropetalum* but more data are required to confirm this position. Two taxa recently described under *Peucedanum* but showing a combination of characters typical for *Dichoropetalum* as defined by Pimenov & al. (2007: 476–477) need to be transferred to the latter genus:

***Dichoropetalum kittaniae*** (Yıld.) Hand, **comb. nov.** = *Peucedanum kittaniae* Yıld. in Ot Sist. Bot. Dergisi 17(2): 7. 2010.

***Dichoropetalum kyriakae*** (Hadjik. & Alziar) Hand & Hadjik., **comb. nov.** = *Peucedanum kyriakae* Hadjik. & Alziar in Biocosme Mésogéen 22: 177. 2006.

#### ***Hellenocarum*** H. Wolff

*Carum* L. is among the polyphyletic genera that are not fully understood. However, the long-term controversial segregate *Hellenocarum* is not closely related to the *Carum* core group (including the generic type) and should be resurrected (Papini & al. 2007). *C. heldreichii* Boiss. is also not closely related to “true” *Carum* (Degtjareva & al. 2009); it needs further investigation.

Tan (in Tan & Sorger 1986) ranked *Hellenocarum multiflorum* (Sm.) H. Wolff and *H. strictum* as subspecies but without any discussion. Hartvig’s (1986) treatment

of both taxa as species is more convincing and followed here:

***Hellenocarum strictum*** (Griseb.) Hand, **comb. nov.** = *Bunium strictum* Griseb., Spic. Fl. Rumel. 1: 344. 1843 = *Hellenocarum multiflorum* subsp. *strictum* (Griseb.) Kit Tan in Pl. Syst. Evol. 154: 121. 1986.

#### ***Heracleum*** L. / ***Mandenovia*** Alava / ***Symphyloloma*** C. A. Mey.

The enigmatic monotypic Caucasian genera *Mandenovia* and *Symphyloloma* proved to be nested within *Heracleum* according to molecular studies by Logacheva & al. (2008). No nomenclatural changes have been proposed so far. A paraphyletic genus *Heracleum* is accepted for the time being. A synonymisation of *H. marashicum* Kit Tan & Yıldız with *Malabaila secacul* (Mill.) Boiss. seems reasonable. According to Logacheva & al. (2008) it is “slightly differing only in the number of umbel rays”.

#### ***Laserpitium*** L.

Two names of Iberian *Laserpitium* taxa have not been validly published: *L. latifolium* subsp. *merinoi* [P. Monts.], and *L. nestleri* subsp. *flabellatum*, because the herbarium where the holotypes are kept have not been mentioned (Art. 37.7. ICBN). The former case is still under consideration, the latter name is published here:

***Laserpitium nestleri*** subsp. ***flabellatum*** [P. Monts. in Collect. Bot. (Barcelona) 26: 55. 2003, nom. inval. ex] P. Monts., **subsp. nov.** – Holotype: [Spain] “Jaca, Monte Oroel (Espagne, prov. Huesca) [...] alt. 1120–1130 m”, 25.7.1999, *P. Montserrat* in ‘Soc. Echange Pl. Vasc. Eur. Bassin Méd. 28: n° 19299’ (JACA 74599).

#### ***Ligusticum*** L. / ***Selinum*** L.

*Ligusticum* and *Selinum* are certainly among the most problematic *Apiaceae* genera occurring in the Euro-Mediterranean area as regards the generic treatment. Analyses have clearly confirmed the extreme polyphyly of the *Ligusticum* alliance, incl. *Selinum* s.l., in the previously proposed interpretation (Valiejo-Roman & al. 2006). Nuclear ITS sequence variation is considerably discordant with morphology; it is also concluded that “ITS sequence data cannot be a universal key” (Valiejo-Roman & al. 2006). To sum up there are currently more open questions than convincing solutions; even segregation of taxa such as *Cnidiocarpa* Pimenov (2005), which obviously is very close to the *Selinum* core group (see Valiejo-Roman & al. 2006), seems premature. In their Flora of China treatment, Pu & Watson (2005) summarise that a general consensus has yet to be reached; they prefer a conservative, traditional classification with the knowledge that *Ligusticum* in the broad sense is an artificial assemblage. This approach is followed here for *Ligusticum* and *Selinum* in an even wider treatment. Taking into consideration the



current phylogenetic knowledge (see, e.g. Valiejo-Roman & al. 2006) and the available morphological revisions of *Cnidiocarpa* and *Cnidium* Cusson (Leute 1971; Pimenov 2005), four taxa have to be transferred to *Selinum* s.l.; in one case a nomen novum is needed:

*Selinum alatum* (M. Bieb.) Hand, **comb. nov.** = *Athamanta alata* M. Bieb., Fl. Taur.-Caucas. 1: 214. 1808 = *Cnidiocarpa alata* (M. Bieb.) Pimenov & Kljuykov in Bot. Zhurn. 95: 71. 2010.

*Selinum mandenovae* (Gagnidze) Hand, **comb. nov.** = *Cnidium mandenovae* Gagnidze in Zametki Sist. Geogr. Rast. 37: 26. 1981.

*Selinum physospermifolium* (Albov) Hand, **comb. nov.** = *Ligusticum physospermifolium* Albov in Trudy Tiflissk. Bot. Sada 1: 109. 1895 = *Cnidiocarpa physospermifolia* (Albov) Pimenov in Bot. Zhurn. 90: 254. 2005.

*Selinum ponticum* Hand, **nom. nov.** = *Cnidium coniifolium* Boiss. in Ann. Sci. Nat., Bot., ser. 3, 1: 299. 1844 = *Selinum coniifolium* (Boiss.) Leute in Ann. Naturhist. Mus. Wien 74: 508. 1971, non (DC.) Benth. in Bentham & Hooker, Gen. Pl. 1: 914. 1867 [= *Ligusticum coniifolium* DC., Prodr. 4: 158. 1830].

*Selinum rhodopetalum* (Pimenov & Kljuykov) Hand, **comb. nov.** = *Cnidiocarpa rhodopetala* Pimenov & Kljuykov in Bot. Zhurn. 95: 71. 2010.

*Malabaila* Hoffm. / *Pastinaca* L. (incl. *Dumaniana* Yild. & B. Selvi)

Problems concerning the generic delimitations of the mentioned *Tordylieae* genera have been summarised by Pimenov & Ostroumova (1994). Based on carpological studies the authors rearranged *Pastinaca* and resurrected the genus *Leiotulus*, a genus “intermediate between *Pastinaca* [...] and *Zosima*”. But this generic treatment is not corroborated by molecular results (Logacheva & al. 2008). *Pastinaca*, *Leiotulus* Ehrenb. (sensu Pimenov & Ostroumova 1994) and *Trigonosciadium* Boiss. form an aggregation with an obviously much more complicated phylogenetic history, which is in urgent need for more research. Already Menemen & Jury (2001) provided some critical discussion on the generic treatment proposed earlier but refrained from nomenclatural changes. It would not come as a surprise if *Leiotulus*, *Malabaila*, *Pastinaca* and *Trigonosciadium* would finally end up in a very broad interpretation of *Pastinaca*. *Dumaniana*, a recently proposed segregate of *Pastinaca* (Yıldırımli & Selvi 2006), has not been listed as accepted genus by Downie & al. (2010); it needs further corroboration by molecular studies. For the time being this segregate is included in *Pastinaca* and one new name needs to be published:

*Pastinaca gelendostensis* (Yild. & B. Selvi) Hand, **comb. nov.** = *Dumaniana gelendostensis* Yild. & B. Selvi in Ot Sist. Bot. Dergisi 13(2): 5. 2006

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