



Meeting Necessity instead of Serendipity: Miscellaneous Nomenclatural Notes on Asteraceae

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Abstract

While compiling a continuously updated checklist of families and genera of world embryophytes, the authors find it necessary to resolve some nomenclatural issues in Asteraceae (Compositae). Here we propose a new supertribal classification for Asteroideae with five supertribes, two of which (Calendulodae and Anthemidodae) are new and one (Ambrosiodae) is a replacement name. A new tribe Leucomerideae in Stiffioideae is described, with the monotypic *Nouelia* newly treated as a synonym. Two older generic names, *Anacis* and *Epilepis*, are resurrected to follow the revision of *Coreopsis* s.l. and to avoid later homonymy or superfluity, alongside with necessary new combinations. A new nothogenus \times *Coreacis* is thereby established. The correct spelling Malacotrichinae of the subtribe ‘Malacothricinae’ is discussed.

Key words: Asteraceae, later homotypy, new combination, supertribe, tribe

Introduction

Taxonomy is one of the three branches of systematics, the work of which culminates in classification systems serving as the framework for storage and retrieval of information on biodiversity (Stuessy 2009). Botanical nomenclatural databases established on the basis of proper classification systems are of critical importance for botanical and ecological research, especially in a world confronted by ongoing global crises of climate change and biodiversity loss (Costa *et al.* 2023).

Asteraceae is one of the largest family of vascular plants which embraces more than 1700 genera and about 32000–35000 species including herbs, subshrubs, shrubs and rarely trees distributed worldwide except Antarctica (POWO 2017+; Mandel *et al.* 2019). It is currently subdivided into 16 subfamilies and circa 50 tribes and tribal clades (Susanna *et al.* 2020; Zhang *et al.* in press). Due to its rapid adaptive radiation and explosion of diversity since Eocene, the phylogenetic analysis and taxonomic adjustment of many tribes and large genera in Asteraceae are either achieved only in recent years (e.g., Anthemideae: Oberprieler *et al.* 2022; Calenduleae: Sadler *et al.* 2022; disintegration of *Cirsium*: Del Guacchio *et al.* 2022; Moreyra *et al.* 2023) or still yet to be satisfactorily made (e.g., Astereae, Eupatorieae, Gnaphalieae, Vernoniae, *Senecio* s.l.). For the species in these taxa, some considerable nomenclatural changes, especially those involving generic names, are therefore expectable in the foreseeable future, and an up-to-date classification system should be established as soon as possible.

Large taxa like Asteraceae usually involve proportionally large nomenclatural problems. According to our database (Duocet Group 2016+), more than 47000 valid generic names and invalid generic designations of flowering plants have been published, among which at least 4529 (namely less than 10%) names and designations belong to

Asteraceae. Correct nomenclature for updated taxonomy needs thorough and laborious investigation for the status of relevant generic and infrafamilial names following the current rules of *International Code of Nomenclature for algae, fungi, and plants (ICN)*, which may sometimes be understandably overlooked by researchers.

While compiling a continuously updated checklist of families and genera of world embryophytes, we encountered some nomenclatural issues in Asteraceae, and decided to resolve them here.

Material and methods

Based on the MediaWiki-based website Duocet Wiki (<https://duocet.ibiodiversity.net/>), we have been compiling a linear (numbered) synopsis of the Asteraceae classification, for which we determine accepted taxa following both the latest studies and our criteria of classification. Unaccepted generic names and designations are attached to accepted genera as synonyms. The 4529 generic names and designations are mainly obtained from three online databases: Tropicos (1982+), IPNI (1999+) and ING (Farr & Zijlstra 1996+), supplemented with occasionally omitted ones, e.g., *Tehuasca* Panero (Panero 2019).

For the nomenclatural issues we found to be solved here, a survey of literature since the earliest relevant publication to the present was conducted. The Shenzhen edition of *ICN* (Turland *et al.* 2018) has been followed in making nomenclatural decisions. In accordance with Turland *et al.* (2018: 205, “Index of scientific names”), orthographic variant(s) of a name in this paper is placed in single quotation marks while designations, i.e., not validly published names, as well as quoted text, are given in double quotation marks.

Unless more recent information is available, author attribution and original publication of scientific plant names cited follows IPNI (1999+) albeit in the notation required by *Phytotaxa*, i.e., by citing the protologues of the names as full bibliographic references. In the interest of accuracy and consistency, and to emphasize the historical sequence in which names were published, author attributions of scientific plant names are sometimes deliberately repeated in this paper. The information about type specimens of the basionyms of the new combinations is based on examining protologues, searching relevant literature and consulting online herbaria. Herbarium codes follow *Index Herbariorum* (Thiers 2008+).

Results and discussion

1. An updated supertribal classification of Asteroideae

The large subfamily Asteroideae, which includes over 60% of species in the family, is well characterized morphologically and phylogenetically (Pelser & Watson 2009). There were two schemes to group its members, combining phylogenetic with morphological evidences as outlined by Panero & Funk (2002) and Baldwin *et al.* (2002). One is the establishment of three supertribes (Senecionodae, Asterodae, and Helianthodae) by Robinson (2004, 2005), the other one is to recognize eight tribes and further subdivide Heliantheae s.l. into 13 supersubtribes by Jeffrey (2004). Robinson's treatment is here adopted because the rank supertribe, although scarcely used, was established earlier and cited more often than supersubtribe in large and molecularly complex families such as Poaceae (Liu 1980, 1988; Macfarlane & Watson 1982; Watson *et al.* 1985), Rubiaceae (Robbrecht & Manen 2006) and Brassicaceae (Avetisyan 1990; German *et al.* 2023) besides Asteraceae. Secondly, a reliable supertribe is facilitative to display higher-level similarities by adding least “strata” (i.e. ranks) in number, as well as to keep tribal and subtribal classification steady while compared to numerous odd supersubtribes or cumbersome informally named clades.

However, the nuclear phylogeny of Asteroideae reveals that the supertribe Asterodae is not monophyletic (Mandel *et al.* 2019). Calenduleae and Anthemideae must be excluded from Asterodae and may be put in their own supertribes, respectively. The supertribe Helianthodae *sensu* Robinson, based on the tribal classification of Panero & Funk (2002) and Baldwin *et al.* (2002), was long called the “Heliantheae alliance” by Panero (2007) and subsequent authors. Following Panero's treatment, subtribe Ambrosiinae is also a member of the Heliantheae alliance. Art 19.5 of the Shenzhen edition of *ICN* reads: “the name of any subdivision of a family that includes the type of a name listed in App. IIB is to be formed from the generic name equivalent to that type.” This rule was frequently neglected by taxonomists when they adopted suprageneric names, and Reveal (2012) had to validate a series of suprageneric names of vascular plants in the light of it. Since Ambrosiaceae is a conserved familial name in Appendix IIB, it has priority

over Helianthaceae according to the current nomenclatural rules, hence the priority of Ambrosieae over Heliantheae. Similarly, the supertribe containing *Ambrosia* must be renamed as proposed here.

Supertrib. Calendulodae Su Liu & Z.H.Feng, **supertrib. nov.**

TYPE:—*Calendula* Linnaeus (1753: 921).

Included tribe (1):—**Calenduleae** Cassini (1819: 161).

Description:—Herbs, shrubs, or small trees without latex. Leaves alternate or opposite. Involucre campanulate or cyathiform. Receptacle naked, glabrous. Ray corollas yellow to orange or white, pink, purple or blue; disc corollas hermaphrodite, yellow to orange or reddish, sometimes purplish-black-tipped. Sterile styles present in many taxa, anther caudate at base. Achenes large, usually hard, thickened, terete, orbicular, obovate, or heteromorphic, curved or rostrate, winged or fenestrate, sometimes with fleshy and colored exocarp. Pappus absent.

Supertrib. Anthemidodae Su Liu & Z.H.Feng, **supertrib. nov.**

TYPE:—*Anthemis* Linnaeus (1753: 893).

Included tribe (1):—**Anthemideae** Cassini (1819: 192).

Description:—Shrubs, subshrubs, annual or perennial herbs. Leaves generally variously dissected, rarely entire with characteristic aromatic smell. Phyllaries with narrow hyaline margins or all or at least the inner with broad, pale membranous margins. Receptacles flat, hemispherical or conical, glabrous or hairy, paleate or epaleate. Ray corollas white and/or yellow (rarely blue-violet, pinkish or reddish), outer disc florets (if present in disciform capitula) yellow, central disc corolla yellow or rarely whitish or reddish, actinomorphic. Anther obtuse at base. Achenes various, often with glandular hairs, mucilage cells and resin sacs or ducts. Pappus never capillary.

Supertrib. Ambrosiodae Z.H.Feng & Z.J.Huang, **nom. nov.** [Art. 6.11, see also Art. 19.5]

Replaced Synonym:—Supertrib. Helianthodae Robinson (2004: 118).

TYPE:—*Ambrosia* Linnaeus (1753: 987).

Included tribes and tribal clade (16):—**Callilepis** Candolle (1836: 671), **Inuleae** Cassini (1819: 193), **Athroismeae** Panero in Panero & Funk (2002: 917), **Feddeae** Pruski *et al.* in Cariaga *et al.* (2008: 199), **Helenieae** Lindley (1829: 1074), **Neurolaeneae** Rydberg (1927: 303), **Coreopsidae** Lindley (1829: 1074), **Polymnieae** (Robinson 1978: 43) Panero in Panero & Funk (2002: 919), **Ambrosieae** Cassini (1819: 191), **Millerieae** Lindley (1829: 1074), **Tageteae** Cassini (1819: 162), **Madieae** Jepson (1901: 483, 486), **Chaenactideae** Baldwin in Baldwin *et al.* (2002: 192), **Bahieae** Baldwin in Baldwin *et al.* (2002: 192), **Perityleae** Baldwin in Baldwin *et al.* (2002: 192) and **Eupatorieae** Cassini (1819: 202).

Notes:—1) The list of tribes included is emended here according to Panero (2007), Pelsner & Watson (2009) with the inclusion of Feddeae Pruski *et al.* (see above for reference). 2) Plucheeae is included in Inuleae following Jeffrey (2004) and Anderberg (2005). 3) For the phylogenetic position of *Callilepis*, see Bengtson *et al.* (2017). 4) The linear sequence of these tribal clades is in line with the nuclear phylogeny in Mandel *et al.* (2019), except that Eupatorieae and its allied tribes are placed at the end.

Keys to supertribes in Asteroideae

(presented on the basis of Robinson's description and modified to include new taxa)

- 1a. Phytomelanin usually present in achene walls supertrib. Ambrosiodae
- 1b. Phytomelanin absent in achene walls2
- 2a. Achene walls lack raphids, involucre bracts subvalvatesupertrib. Senecionodae
- 2b. Achene walls usually with raphids, involucre bracts mostly gradate.....3
- 3a. Phyllaries with hyaline or membranous margins supertrib. Anthemidodae
- 3b. Phyllaries not as above4
- 4a. Pappi absent, anther caudate at base..... supertrib. Calendulodae
- 4b. Pappi present or absent, anther obtuse at base supertrib. Asterodae

2. The establishment of a new tribe Leucomerideae and the synonymization of *Nouelia* Franchet

Leucomeris Don (1825: 169) and *Nouelia* Franchet (1888: 66) are two small woody Asian genera, the former being ditypic (*L. spectabilis* and *L. decora*) and the latter monotypic (*N. insignis*) and endemic to China. They have been

formerly positioned in Hyalideae, which was once placed in Wunderlichioideae in line with the plastid phylogeny (Panero & Funk 2008) and then moved to Stiffioideae according to the nuclear phylogeny (Mandel *et al.* 2019). Following the classification as outlined by Sancho & Freire (2009), Susanna *et al.* (2020) raised the *Leucomeris* Clade (*Leucomeris* and *Nouelia*) to the tribal rank, although they did not give a nomenclatural treatment.

Peng *et al.* (2002) discussed the close relationship between *Leucomeris decora* and *Nouelia insignis* based on their result of cytological study. Zhao *et al.* (2018) found that *L. decora* is phylogenetically closer to *N. insignis* than *L. spectabilis* in the plastid tree. In fact, *N. insignis* is nested in one clade with *L. decora* and is not monophyletic due to probable introgressive hybridization. We consider that the evidence is sufficient to justify the merger of *Nouelia* with *Leucomeris*.

Here we formally describe the tribe Leucomerideae and synonymize *Nouelia* as follows:

Trib. Leucomerideae Su Liu & Z.H.Feng, **trib. nov.** (Stiffioideae, Asteraceae)

TYPE:—*Leucomeris* Don (1825: 169).

Description:—Asian endemic large shrubs or treelets with white tomenta on the abaxial surface of leaves. Inflorescence terminal solitary capitula or capitulescences of capitulas in dense pseudocorymbs or glomerules. Capitula homogamous, radiate or discoid. Involucres turbinate or campanulate, phyllaries 4–7-seriate. Receptacles epaleaceous. Florets all hermaphrodite and fertile, styles glabrous. Anthers apiculate. Achenes cylindrical to turbinate, longitudinally ribbed, indumenta sericeous. Pappus setae 2–3-seriate, capillary, barbellate.

Included genus (1):—*Leucomeris* Don (1825: 169).

Leucomeris Don (1825: 169).

GENERITYPE:—*Leucomeris spectabilis* Don (1825: 170).

ETYMOLOGY:—*Leucomeris* derives from Greek λευκός (*leukós*, “white”) and μέρος (*méros*, “part, member”), alluding to snow-white indumentum under leaves and the white color of anthers.

Heterotypic Synonym:—*Nouelia* Franchet (1888: 66), **syn. nov.** GENERITYPE:—*Nouelia insignis* Franchet (1888: 67).

Leucomeris insignis (Franchet) Su Liu & Z.H.Feng, **comb. nov.**

Basionym:—*Nouelia insignis* Franchet (1888: 67).

LECTOTYPE (designated by Gao 2017: 46):—CHINA. Yunnan: “*Les bois et les coteaux découverts à Ta Pin Tse*”, 14 March 1887, *J.M.Delavay 2498* (P 00703231, digital image!).

3. Restoring two older genera to accommodate new segregates of *Coreopsis* Linnaeus s.l.

Coreopsis Linnaeus (1753: 908) s.l. was more recently revised by Tadesse & Crawford (2023). These authors split the genus into five according to their molecular findings, i.e., *Coreopsis* Linnaeus s.s. (18 species in three sections), *Gyrophyllum* (Nuttall) Tadesse & Crawford (six species), *Silphidium* (Torrey & Gray) Tadesse & Crawford (monotypic), *Pseudoagarista* Tadesse & Crawford (11 species) and *Burnellia* Tadesse & Crawford (28 species), thus set up an up-to-date taxonomic framework of the genus. However, both their *Gyrophyllum* and *Pseudoagarista* are illegitimate.

Tadesse & Crawford (2023) established *Gyrophyllum* (Nuttall) Tadesse & Crawford to embrace six species distributed in southeastern United States. Unfortunately, this generic name is a later homonym because of the preexisting *Gyrophyllum* Dozy & Molkenboer (1846: 149), a monotypic moss genus, though it is now considered a synonym of *Symblepharis* Montagne in Rhabdoweisiaceae (Suleiman *et al.* 2006). However, there is an early candidate ready for resurrection. Schrank (1817: 5) published the genus *Anacis* with two species, viz., *A. auriculata* (Linnaeus) Schrank and *A. tripteris* (Linnaeus) Schrank. Although it is marked as “T: *non designatus*” in ING (Farr & Zijlstra 1996+), *Anacis* was effectively lectotypified with *A. tripteris* by Jeffrey (1982: 20) but omitted by Tadesse & Crawford (2023). Fifteen years later, Lessing (1832: 227) published a monotypic genus, *Chrysostemma*, on account of the Linnaean species *Coreopsis tripteris*, which became a homotypic synonym of *Anacis* because of the above-mentioned lectotypification. Accordingly, *Anacis* is the earliest name available to house these six species.

Bentham (1839: 17) published *Epilepis* and its only species *E. rudis* Bentham. It was later sunk into *Coreopsis* as *Coreopsis rudis* (Bentham) Bentham & Hooker f. ex Hemsley (1881: 196). *Coreopsis* sect. *Pseudoagarista* (*Pseudo-Agarista*) Gray in Watson (1887: 428), which included only *C. petrophila* Gray initially, is an invalid name because a single description can only validate both a generic name and a species name simultaneously, but fails to validate a species name and an infrageneric name at the same time (Art. 38.5). When Tadesse & Crawford (2023) erected the new

genus *Pseudoagarista*, they definitely included the original type of *Epilepis* in their later published genus, thus making their new generic name nomenclaturally superfluous (Art. 52.1). Therefore, *Epilepis* is the earliest name available for harboring these 11 species centered in Mexico.

Anacis Schrank (1817: 5).

GENERITYPE (designated by Jeffrey 1982: 20):—*Anacis tripteris* (Linnaeus) Schrank (1817: 7).

ETYMOLOGY:—*Anacis* derives from Greek prefix ἀν- (*an-*), prevocalic variant of ἀ- (*a-*, “without”), and word ἀκίς (*akis*, “pointed object”), alluding to cypselae often without pappi.

Synonyms:

Chrysostemma Lessing (1832: 227). GENERITYPE:—*Coreopsis tripteris* Linnaeus (1753: 908).

Gyrophyllum (Nuttall) Tadesse & Crawford (2023: 105) (angiosperm, Asteraceae), *hom. illeg.*, non *Gyrophyllum* Dozy & Molkenboer (1846: 149) (moss, Rhabdoweisiaceae). Basionym:—*Coreopsis* sect. *Gyrophyllum* Nuttall (1841: 358). GENERITYPE:—*Coreopsis major* Walter (1788: 214).

Anacis delphiniifolia (Lamarck) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis delphiniifolia* Lamarck (1786: 108).

Homotypic Synonym:—*Gyrophyllum delphiniifolium* (Lamarck) Tadesse & Crawford (2023: 106).

TYPE:—[icon] “*Ceratocephalus Delphinii foliis* Vaill.” in Ehret 1748–1759: Tab. IX, f. 1.

Anacis major (Walter) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis major* Walter (1788: 214).

Homotypic Synonym:—*Gyrophyllum major* (Walter) Tadesse & Crawford (2023: 109).

NEOTYPE (designated by Smith 1976: 170):—U.S.A. Mississippi, Jackson Co., Ocean Springs, 10 June 1898, *S.M.Tracy 4360* (NY 02056102, digital image!).

Anacis palmata (Nuttall) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis palmata* Nuttall (1818: 180).

Homotypic Synonym:—*Gyrophyllum palmatum* (Nuttall) Tadesse & Crawford (2023: 121).

TYPE:—U.S.A. Louisiana: St. Louis, *Nuttall s.n.* (holotype: PH 00025652, digital image!).

Anacis pulchra (F.E.Boynton) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis pulchra* F.E.Boynton in Small (1903: 1277, 1340).

Homotypic Synonym:—*Gyrophyllum pulchrum* (F.E.Boynton) Tadesse & Crawford (2023: 123).

NEOTYPE (designated by Smith 1976: 179):—U.S.A. Alabama: DeKalb Co., common in thick moss over layers of sand on flat sandstone outcrop ca. 100 feet on dirty road from blacktop road 89 in De Soto State Park, 1.2 mi. NW of Park office, 27 June 1972, *E.B.Smith 1717* (UARK 071084).

Anacis tripteris (Linnaeus) Schrank (1817: 7).

Basionym:—*Coreopsis tripteris* Linnaeus (1753: 908).

Homotypic Synonyms:—*Chrysostemma tripteris* (Linnaeus) Lessing (1832: 227).—*Bidens tripteris* (Linnaeus) Krause (1905: 158).—*Gyrophyllum tripteris* (Linnaeus) Tadesse & Crawford (2023: 125).

LECTOTYPE (designated by Reveal in Jarvis & Turland 1998: 359):—[icon] “*Chrysanth. trifoliatum Virgin: folio acutiore*” in Morison 1699: sect. 6, t. 3, f. 44.

Anacis verticillata (Linnaeus) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis verticillata* Linnaeus (1753: 907).

Homotypic Synonym:—*Gyrophyllum verticillatum* (Linnaeus) Tadesse & Crawford (2023: 131).

LECTOTYPE (designated by Tadesse & Crawford 2023: 131):—U.S.A. Virginia: *Clayton s.n.* [308] (BM 000040282, digital image!).

Excluded name:—*Anacis auriculata* (Linnaeus) Schrank (1817: 7) ≡ *Coreopsis auriculata* Linnaeus (1753: 908).

Epilepis Bentham (1839: 17).

GENERITYPE:—*Epilepis rudis* Bentham (1839: 17).

ETYMOLOGY:—*Epilepis* derives from Greek prefix *επι-* (*epi-*, “on, upon”) and word *λεπίς* (*lepis*, “scale, flake”), alluding to the presence of a calyculus out of the phyllaries (not explained in original publication).

Synonym:—*Pseudoagarista* Tadesse & Crawford (2023: 136), *nom. superfl.*

Invalid Designation:—“*Coreopsis* sect. *Pseudoagarista* (*‘Pseudo-Agarista’*)” Gray in Watson (1887: 428), *nom. inval.*, *nom. nud.*

Epilepis crawfordii (Tadesse) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis crawfordii* Tadesse (1999: 235).

Homotypic Synonym:—*Pseudoagarista crawfordii* (Tadesse) Tadesse & Crawford (2023: 139).

TYPE:—MEXICO. Queretaro: 6–7 mi W of Zamorano (3 mi W of Carbonara), 2230 m, 27 September 1980, *Crawford, Stuessy and Brunner 1342* (holotype: OS 0000107, digital image!).

Epilepis davilae (Panero & Villaseñor) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis davilae* Panero & Villaseñor in Panero *et al.* (1993: 171).

Homotypic Synonym:—*Pseudoagarista davilae* (Panero & Villaseñor) Tadesse & Crawford (2023: 141).

TYPE:—MEXICO. Puebla: Summit of Cerro Tepoxtla Grande (a peak of the Filo de La Tierra Colorada range) just NW of the village of San Martin de Esperilla and S of Chacnopalan, 2650 m, 1 November 1991, *Panero, Davila and Tenorio 2590* (holotype: MEXU 00607345, digital image!).

Epilepis guanajuatensis (Turner) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis guanajuatensis* Turner (1992b: 27).

Homotypic Synonym:—*Pseudoagarista guanajuatensis* (Turner) Tadesse & Crawford (2023: 142).

TYPE:—MEXICO. Guanajuato: Road from Xichú to San Luis de la Pas; 24 miles W of Xichú, 2600 m, 14 June 1967, *McVaugh 14814* (holotype: MICH 1108993, digital image!).

Epilepis mcvaughii (Crawford) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis mcvaughii* Crawford (1969: 353).

Homotypic Synonym:—*Pseudoagarista mcvaughii* (Crawford) Tadesse & Crawford (2023: 143).

TYPE:—MEXICO. Aguascalientes: Sierra del Laurel, c. 10 mi SE of Calvillo, c. 2500 m, 4 November 1959, *McVaugh and Koetz 225* (holotype: MICH 1108995, digital image!).

Epilepis oaxacensis (Turner) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis oaxacensis* Turner (1992a: 103).

Homotypic Synonym:—*Pseudoagarista oaxacensis* (Turner) Tadesse & Crawford (2023: 145).

TYPE:—MEXICO. Oaxaca: Mpio. De Tamazulapan, Cerro Pericón, 3 km N of San Pedro Nopala on road to Yosocuno, 2600 m, 4 November 1991, *J.L.Panero, P.Davila, and P.Tenorio 2606* (holotype: MEXU 00553585, digital image!).

Epilepis petrophila (Gray) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis petrophila* Gray in Watson (1887: 428).

Homotypic Synonym:—*Pseudoagarista petrophila* (Gray) Tadesse & Crawford (2023: 146).

TYPE:—MEXICO. Jalisco: Rio Blanco, September 1886, *E.Palmer 530* (holotype: US 00128158, digital image!).

Epilepis petrophiloides (Robinson & Greenman) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis petrophiloides* Robinson & Greenman (1894: 388).

Homotypic Synonym:—*Pseudoagarista petrophiloides* (Robinson & Greenman) Tadesse & Crawford (2023: 149).

TYPE:—MEXICO. Jalisco: Nevado de Colima, 2400 m, 22 May 1893, *Pringle 5508* (holotype: GH 00006201, digital image!).

Epilepis pringlei (Robinson) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis pringlei* Robinson (1907: 41).

Homotypic Synonym:—*Pseudoagarista pringlei* (Robinson) Tadesse & Crawford (2023: 152).

TYPE:—MEXICO. Queretaro: San Juan del Rio, 2040 m (“6800 ft”), 8 September 1905, *C.G.Pringle 10,050* (holotype: GH 00006202, digital image!).

Epilepis queretarensis (Turner) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis queretarensis* Turner (1986: 168).

Homotypic Synonym:—*Pseudoagarista queretarensis* (Turner) Tadesse & Crawford (2023: 154).

TYPE:—MEXICO. Querétaro: Mpio. Peñamiller, Maguey Verde, 17 km SE of Pinal de Amoles, 2170 m, 22 October 1982, *P. Tenorio L. and C. Romero de T. 2353* (holotype: TEX 00373813, digital image!).

Epilepis rhyacophila (Greenman) Z.H.Feng, Z.J.Huang & Su Liu, **comb. nov.**

Basionym:—*Coreopsis rhyacophila* Greenman (1900: 313).

Homotypic Synonym:—*Pseudoagarista rhyacophila* (Greenman) Tadesse & Crawford (2023: 155).

TYPE:—MEXICO. Morelos: near Cuernavaca, 2500 m., 9 February 1899, *Pringle 7866* (holotype: GH 00006203, digital image!).

Epilepis rudis Benth (1839: 17).

Homotypic Synonyms:—*Coreopsis rudis* (Benth) Benth & Hooker f. ex Hemsley (1881: 196).—*Pseudoagarista rudis* (Benth) Tadesse & Crawford (2023: 157).

TYPE:—MEXICO. Jalisco: Bolaños, Canton of Colotlan, 1836–1838, *Hartweg 116* (holotype: K 000634429, digital image!).

4. A new nothogenus for hybrids between *Coreopsis* Linnaeus s.s. and *Anacis* Schrank

Coreopsis Linnaeus s.l. is not only taxonomically but also horticulturally troublesome. Unlike most of cultivars in other genera whose parentage is clear, many long-grown hybrids of *Coreopsis* are of obscure origin. The popular *Coreopsis* ‘Moonbeam’, which is usually regarded as a variety of *Coreopsis verticillata* (now *Anacis verticillata*), was proved to involve distant hybridization with its maternal plant from *Coreopsis* sect. *Eublepharis* of now *Coreopsis* Linnaeus s.s. (Sun *et al.* 2022; Tadesse & Crawford 2023). Another eye-catching red-flowered *Coreopsis* ‘Limerock Ruby’ originated from “a random cross-pollination of unidentified selections of *Coreopsis rosea* and *C. verticillata*” (Plant Finder 2024+). The establishment of a new nothogenus is therefore necessary following Art. H.3.2 and Art. H.6.2.

×*Coreacis* H.N.Sun & Z.H.Feng, **nothogen. nov.**

Hybrid Formula:—*Coreopsis* Linnaeus × *Anacis* Schrank.

5. Malacotrichinae as the correct spelling of ‘Malacothricinae’ Bremer

Bremer (1993) established three new subtribes in Cichorieae, one of which is Malacothricinae, based on *Malacothrix* Candolle (1838: 192). Lee *et al.* (2003) found that Malacothricinae *sensu* Bremer is highly polyphyletic, though all its clades are nested with Microseridinae and Stephanomeriinae. Kilian *et al.* (2009) therefore merged the three subtribes into Microseridinae s.l., whereas Susanna *et al.* (2020) still kept them separate.

The name *Malacothrix* derives from Greek μαλακός (*malakós*, “soft”) and θρίξ (*thrix*, “hair”), alluding to the long white soft shaggy hair (“*villis longis albis mollibus*”) the author found on the young plants of *M. californica*. According to Stearn (1992: 80), the word θρίξ has the irregular genitive singular form τριχός (*trikhós*). Therefore, the genitive singular of *Malacothrix* should be *Malacotrichis*, and the correct spelling of the subtribal name based on it should be Malacotrichinae (Art. 18.1, see also Art. 19.1). It should also be noted that the compounding part *-thrix* (*-trix*) is not uncommon in generic names of algae, fungi, and plants. Some suprageneric names are formed from them, e.g., Ulotrichaceae (‘Ulothricheae’) Kützing (1843: 179, 251) is formed from *Ulothrix* Kützing (1833: 517) (algae); Chrysotrichaceae (‘Chrysothricaceae’) Zahlbruckner (1905: 117), *nom. cons.* is formed from *Chrysothrix* Montagne (1852: 312), *nom. cons.* (lichenized fungi: Doweld 2012; May 2017); Chrysitrichinae (‘Chrysothricheae’) Dumortier (1829: 64), Chrysitricheae (‘Chrysothricheae’) Nees (1835: 144) and Chrysitrichoideae (‘Chrysitricheae’) Pfeiffer (1873: 741) are formed from *Chrysitrix* Linnaeus (1771: 165) (angiosperm, Cyperaceae).

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