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Notes about *Tanacetum corymbosum s. l.* (Asteraceae)

D. IAMONICO

Laboratory of Phytogeography and Applied Geobotany, Section Environment and Landscape, Department PDTA, Sapienza University of Rome, via Flaminia 70, I-00196 Rome, Italy.

ORCID iD. D. IAMONICO: https://orcid.org/0000-0001-5491-7568

E-mail: d.iamonico@yahoo.it

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Abstract
Notes about *Tanacetum corymbosum s. l.* (Asteraceae).— I here present a study concerning nomenclatural and taxonomical notes on the names *Chrysanthemum italicum* L., *C. achilleae* L., *C. tanacetifolium* Pourr., *Pyrethrum cinereum* Griseb., *P. clusii* Fisch. ex Rchb., *P. clusii* Tausch, *P. daucifolium* Pers., and *P. tenuifolium* Ten., all belonging to the critical group of *Tanacetum corymbosum*. A new infraspecific classification of *Tanacetum corymbosum* (L.) Sch. Bip. *s. l.* is proposed recognizing five subspecies on the basis of a morphological study of type material and other specimens. A diagnosic key of the recognized taxa is provided. A nomenclatural change, i.e. *T. corymbosum* subsp. *daucifolium* (Pers.) Iamonico comb. nov., is proposed. Lectotypes are designated for the names *Chrysanthemum cinereum* (specimen preserved at GOET), *Chrysanthemum achilleae* (Micheli's illustration), *Chrysanthemum italicum* (at LINN), *Pyrethrum clusii* by Rechenbach (Clusius' image), *Pyrethrum tenuifolium* (at G) and *Pyrethrum clusii* by Tausch (Clusius' image). A neotype was designated for *Chrysanthemum tanacetifolium* (at P).

Key words: Asteraceae; *Chrysanthemum*; nomenclature; *Pyrethrum*; taxonomy; typification.

Resumen
Notas sobre *Tanacetum corymbosum s. l.* (*Asteraceae*).— Se presenta un estudio nomenclatural y taxonómico sobre *Chrysanthemum italicum* L., *C. achilleae* L., *C. tanacetifolium* Pourr., *Pyrethrum cinereum* Griseb., *P. clusii* Fisch. ex Rchb., *P. clusii* Tausch, *P. daucifolium* Pers. y *P. tenuifolium* Ten., táxones que pertenecen al grupo crítico de *Tanacetum corymbosum*. Se propone una nueva clasificación infraespecífica de *Tanacetum corymbosum* (L.) Sch. Bip. *s. l.* y se reconocen cinco subespecies sobre la base de un estudio morfológico del material tipo y otros especímenes. Se proporciona una clave de diagnóstico de los táxones estudiados. Se propone también un cambio nomenclatural, i.e. *Tanacetum corymbosum* subsp. *daucifolium* (Pers.) Iamonico comb. nov. Se designan lectotipos para los nombres *Chrysanthemum cinereum* (espécimen conservado en GOET), *Chrysanthemum achilleae* (imagen de Micheli), *Chrysanthemum italicum* (en LINN), *Pyrethrum clusii* de Rechenbach (ilustración de Clusius), *Pyrethrum tenuifolium* (en G) y *Pyrethrum clusii* de Tausch (imagen de Clusius). Se designa un neotipo para *Chrysanthemum tanacetifolium* (en P).

Palabras clave: *Asteraceae*; *Chrysanthemum*; nomenclatura; *Pyrethrum*; taxonomía; tipificación.

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INTRODUCTION

Tanacetum L. (Anthemideae Cass., Asteraceae Bercht. & J. Presl) is a genus of approximately 160 species of perennial herbs and shrubs distributed in the Mediterranean region, Central, and south-western Asia, and parts of North America (see e.g. Oberprieler *et al.*, 2009; Sonboli *et al.*, 2012).

Linnaeus published 22 names under *Chrysanthemum* L. (Linnaeus, 1753, 1759, 1763, 1767*b*). According to Jarvis (2007) 18 out of the 22 Linnaean names are already typified. Among the remaining 4 untypified names, two (*Chrysanthemum italicum* L., and *C. achilleae* L.) are applied to taxa belonging to the *Tanacetum corymbosum* group (see e.g. Heywood, 1976*a*; Greuter, 2006–2009). Other taxa linked to this group (*Pyrethrum cinereum* Griseb., *P. clusii* Fisch. ex Rchb., *P. daucifolium* Pers., *P. tenuifolium* Ten.) need a nomenclatural revision which is here presented as part of the studies on Linnaean names and the cooperation in the treatment of the Asteraceae for the new edition of the *Flora of Italy* (see e.g. Del Guacchio & Iamonico 2015; Iamonico, 2013, 2015; Iamonico & Hjertson, 2015; Iamonico & Managlia, 2014; Iamonico & Peruzzi, 2016; Iamonico *et al.*, 2014).

MATERIALS AND METHODS

The nomenclatural and taxonomical study, which is here presented, was carried out by an extensive analysis of literature (protologues included), personal field investigations, and the examination of the specimens (see Appendix 1) kept in the Herbaria B, G, GOET, GZU, JE, K, L, LINN, P, PH, RO, W and WU (acronyms according to Thiers, 2018–).

The articles cited through the text follow the *Shenzen Code* (Turland *et al.* 2018) which is further referred to as *ICN* (International Code of Nomenclature for algae, fungi, and plants).

BACKGROUND

Chrysanthemum achilleae L.

Chrysanthemum achilleae was published by Linnaeus (1767*b*: 562) through a short diagnosis and a description. A Micheli's illustration (Micheli, 1729: Tab. 29) was cited and it is original material for the name. No specimens useful for the typification purposes were traced (see also Jarvis, 2007), so this illustration is designated in this work as the lectotype of the name *Chrysanthemum achilleae*. I here recognize this taxon at subspecies rank of *Tanacetum corymbosum*, as already proposed by Greuter (in Greuter *et al*., 2003: 43) (see also the discussion of *C. achilleae*/*C. italicum* in the section "Nomenclatural and taxonomic remarks").

Chrysanthemum italicum L.

Linnaeus' protologue of *Chrysanthemum italicum* (Linnaeus 1767*a*: 116[1]) consists of a short diagnosis ("*CHRYSANTHEMUM foliis bipinnatis serratis, florum radiis disci longitudine, caule procumbente*"), and one synonym cited from Micheli (1729: 34) who provided an illustration[2] ("*Tab. 29*") which is part of original material; the collector ("*Arduini*"), and the provenance ("*Habitat in Italia*") were also provided; Linnaeus also highlighted a morphological similarity with *C. millefoliatum* (Linnaeus, 1767*b*: 563, *nom. superfl.*[3], Arts. 52.1. and 52.2 of the *ICN*). There is one sheet at LINN (no. 1012.21) bearing parts of a probably same plant whose features match the diagnosis, and the Linnaean annotation "*chrysanth*[emum] *italicum Ard*[uino]". The plant was sent from P. Arduino to C. Linnaeus, and it can be considered an ante-1767 addition to the collection and original material for the name (Jarvis, 2007). I have not been able to locate any further original material in any other Linnaean or Linnaean-linked herbaria (see also Jarvis, 2007). Among the elements selected (specimen from LINN, and illustration by Micheli) I here designate the first one as the lectotype of the name *Chrysanthemum italicum* over the illustration because of its potential ability to provide a larger number of additional characters

[1] Linnaeus also published the name *Chrysanthemum italicum* in *Systema naturae* (Linnaeus, 1967*b*: 563), where he quoted the reference to his *Mantissa* ("*Mant. 116*").

[2] The Micheli's reference was also cited in the synonymy of *Chrysanthemum achilleae* (see discussion under this name).

[3] Linnaeus (1767*b*: 563) published the name *Chrysanthemum millefoliatum* citing as synonym *Anthemis millefolia* L. (from Linnaeus, 1753: 896). Since *A. millefolia* [now *Tanacetum millefolium* (L.) Tzvelev, lectotype at LINN (No. 1012.22) designated by Humphries in Jarvis & Turland (1998: 352), image of the lectotype available at: http://linnean-online.org/10448/] was validly published, *C. millefoliatum* is a superfluous and illegitimate name according to the Arts. 52.1 and 52.2 of the *ICN*.

(micro-morphological, chemical, molecular, etc.) that cannot be examined by images (Jarvis, 2007: 21–22).

Chrysanthemum italicum is considered as a heterotypic synonym of *C. achilleae*, as is discussed in the section "Nomenclatural and taxonomic remarks".

***Chrysanthemum tanacetifolium* Pourr.**

Pourret (1788: 311) published *Chrysanthemum tanacetifolium* thorugh a short diagnosis ("*foliis bipinnatis, pinnis inciso-serratis, caule ramoso pedunculis axillaribus longis multifloris*") and provided some localities ("Aux environs de Narbonne, à Cascastel, l'Espinassiere, & c."). I have not been able to trace specimens which are part of the original material. As a consequence, on the basis of the Art. 9.8 of the *ICN*, a neotypification is required. Unfortunately, no specimen collected by Pourret was found. I select a specimen (P 00731963) collected at Montpellier, which displays morphological characteristics matching the Pourret's diagnosis. The P00731963 is designated in this work as the neotype of the name *Chrysanthemum tanacetifolium*. Based on the morphology of this specimen (especially concerning the leaf segments (2nd order) which are ovate-lanceolate), and according to the current concept in *Tanacetum* (see e.g. Heywood, 1976*a*: 170–171), the name *C. tanacetifolium* is to be considered as heterotypic synonym of *Tanacetum corymbosum* subsp. *corymbosum*.

***Pyrethrum cinereum* Griseb.**

Grisebach (1844: 203) provided a detailed diagnosis, the provenance ("In *Macedonia* et *Bithynia*[…] Pr. Palanka distr. Kostendil […] (Friedr.) [= E. Friedrichsthal]pr. Bolu (Pest.) [= F. Pestalozza]"), and the habitat ("in pascuis lapidosis […] alt. 2000′–3000′") in the protologue of *Pyrethrum cinereum*. There are two specimens at GOET (where the most of the Grisebach specimens are preserved—see Stafleu and Cowan, 1976: 1007), GOET 002103 and GOET 002109 bearing plants collected respectively by E. Friedrichsthal at Palanka (Macedonia), and F. Pestalozza at Bolu (Turkey). A third specimen is kept at W (W 0051161) and bears a plant collected by E. Friedrichsthal at Palanka. According to the Art. 9.6 of the *ICN*, these three specimens (two at GOET, and one at W) are syntypes. Some considerations are to be made on these three specimens:

1. both E. Friedrichsthal and F. Pestalozza were explicity reported by Grisebach (1844) in the title page of his *Spicilegium* as collaborators of the work;
2. the localities indicated in the labels perfectly match the protologue;
3. the specimen GOET 002103 bears the original annotation "Pyrethrum cinereum m. [mihi] 454 / Pyrethrumniveum Lag. / Diff. foliis bipinna / tipartitis lobis obl. [oblongi] / in pascuis lapidosis / pr. Palanka" which refers to the comparison provided in the protologue by Grisebach (1844: 203).

All thing stated, I here consider these three specimens as part of the original material, and designate that at GOET 002103 (it appears to be better preserved) as the lectotype of the name *Pyrethrum cinereum*. I here recognize this taxon at subspecies rank of *Tanacetum corymbosum*, as already proposed by Davis (1975: 262).

***Pyrethrum clusii* Fisch. ex Rchb.**

Reichenbach (1831: 231–232) named this species in honour of C. A. Clusius who described in his *Rariorum Plantarum Historia* (Clusius, 1601: 338) a "Tanacetum inodorum I". This polynomial was reported by Reichenbach (1831: 232) as synonym of *P. clusii*. The illustration provided by Clusius (1601) is part of the original material and is designated in this work as the lectotype of the name *Pyrethrum clusii*.

According to the current concept in *Tanacetum* (see e.g. Heywood, 1976*a*: 170–171), and on the basis of the lectotype of *P. clusii*, this name seems to be referred to *Tanacetum corymbosum* subsp. *subcorymbosum*. However, since the typification of *Chrysanthemum subcorymbosum* Schur (basionym of *T. corymbosum* subsp. *subcorymbosum*) was not possible to achieve (see Note 6 in "Taxonomic treatment"), I here considered *P. clusii* as doubt synonym of *T. corymbosum* subsp. *subcorymbosum*. In anycase, although *P. clusii* would have nomenclatural priority (1831 vs. 1859), the combination at subspecies rank (here accepted as

better taxonomic rank) was published earlier for *C. subcorymbosum* (1936 vs. 1976—see the section "Taxonomic treatment"). As a consequence the name to be used at subspecies rank would be however *T. corymbosum* subsp. *subcorymbosum* (Schur) Szafer & Pawłowski.

The Reichenbach's name is to be considered as a later homonym of *Pyrethrum clusii* Tausch (see the discussion below), and so illegitimate according to Art. 53.1 of the *ICN*. Dostál (1950: 1603) and Heywood (1976*b*: 272) proposed new combinations of the Reichenbach's name at subspecies rank under *Chrysanthemum* and *Tanacetum*, respectively. On the basis of the Art. 58.1 (and see the Ex. 2) "*The final epithet in an illegitimate name may be re-used in a different name, at either the same or a different rank; or an illegitimate generic name may be re-used as the epithet in the name of a subdivision of a genus. The resulting name is then treated either as a replacement name with the same type as the illegitimate name*". As a consequence, the Dostál's and Heywood's combinations are legitimate and to be considered as replaced names of *Pyrenthrum clusii*.

***Pyrethrum clusii* Tausch**

Tausch (1821: 8, 12) published *Pyrethrum clusii* citing "Huc spectat T. [*Tanacetum inodorum*] inodorum II. Clus. hist. I. 338." (which refers to Clusius, 1601: 338) as synonym. The Tausch's name is lectotypified in this work using the Clusius's illustration "Tanacetum inodorum II". The Clusius's illustration displays morphological characters matching the current concept [see e.g. Heywood (1976*a*: 170–171)] of *Tanacetum corymbosum* subsp. *corymbosum* (leaf blades glabrous and 1-pinnatipartite, and involucral bracts of capitula without a broad blackish-brown margin).

***Pyrethrum tenuifolium* Ten.**

Tenore (1815: 50) described *Pyrethrum teniufolium* through just a diagnosis (any locality or habitat were cited). The same author published a more complete treatment of the species in the 2nd volume of *Flora Napolitana* (Tenore, 1820: 236) where he provided a detailed description, some localities ("…monti di Abruzzo, alla Majella, al Gran sasso…"), an illustration ("Tav. LXXX", image available at http://www.ortobotaniconapoli.it/paginadimenu.htm), and a comparison with the similar *P. corymbosum*. I traced three specimens at K (K 000928497, image available at http://apps.kew.org/herbcat/getImage.do?imageBarcode=K000928497) and G (G 00450830, and G 00450834, images available at http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=317570&base=img&lang=en). The K 000928497 specimen bears a plant collected by M. Tenore in May 1830 in the locality "Majella M.te de Fiori", and (date of collection post-1815) cannot be considered as part of the original material. The G00450830 specimen was collected "In Majella", but the collection date is lacking and I cannot be sure it was an atne-1815 addition to the collection, so I avoid this specimen for he lectotypification purpose. On the contrary, the G 00450834 specimen was collected in 1814, as indicated in the original label. Moreover it was reported "*nob.*" [nobis]. The morphological characteristics of the plant beared in the G 00450834 specimen matches both the diagnosis by Tenore (1815: L), and the later description by Tenore (1820: 236). I designate in this work the specimen G 00450834 as the lectotype of the name *Pyrenthrum tenuifolium*. The morphology of the lectotype [leaf blades 2-pinnatipartite with segments (2nd order) ovate-lanceolate] allows to synonymized the Tenore's name with *Tanacetum corymbosum* subsp. *achilleae*.

The Tenore's name is to be considered as a later homonym of *Pyrethrum tenuifolium* Willd., and so illegitimate according to the Art. 53.1 of the *ICN*.

NOMENCLATURAL AND TAXONOMIC REMARKS

About 20 years later the publication of the original descriptions of *Chrysanthemum achilleae* and *C. italicum*, Gilibert (1785: 399, 401) maintained these taxa as distinct species (the first one placed under the group named "*Leucanthema*", the other species placed under "*Chrysanthema*"), although he pointed out (a note under *C. italicum*): "*Synonymon Micheli ad Ch. achilleae jam adducitur; forsan* Ch. achilleae & italicum *una eademque planta bis posita*". Few other authors listed both the Linnaean names. Forsyth (1794) accepted to list separately *C. italicum*, and *C. achilleae*. Candolle (1838: 67) included *C. italicum* in the group of "*Species non satis notae*", stating "*C.* [Chrysanthemum] *italicum*…

Species onminò obscura…affinis Pyr. [Pyrethrum] *millefoliatus, sed erectior et ligulae albae*", while *C. achilleae* was reported as the basionym of *Pyrethrum achilleae* (L.) DC. (new proposed combination in Candolle's *Prodromus*). Arcangeli (1882: 353) recognized the genus *Pyrethrum* according to Candolle (1838), accepting *P. achilleae* (L.) DC. as a separate species. Nyman (1879: 372) proposed the new combination *P. corymbosum* subsp. *achilleae* (L.) Nyman. Fiori (in Fiori & Béguinot, 1903: 244) treated *C. achilleae* at variety rank of *C. corymbosum* L. on the basis of the leaf blades, 2-pennatifid vs. pennatifid in the nominal variety [the latter taxon was invalidly named "typicum" by Fiori (in Fiori & Béguinot, 1903: 243)]; these authors listed *C. italicum* as doubtful synonym of *C. corymbosum* var. *achilleae* (L.) Fiori. Recent citations of *C. achilleae* are rare, while *C. italicum* was sometimes listed as good species especially by the Italian authors who had not cited *C. achilleae* (e.g. Allioni, 1785: 191; Tenore, 1815: 23). Greuter (in Greuter *et al*., 2003: 43) recently proposed the new combination *Tanacetum corymbosum* subsp. *achilleae* (L.) Greuter, although in his Asteraceae treatment for the Euro+Med PlantBase, the same author (Greuter, 2006–2009; Greuter & Raab-Straube, 2008) preliminarly accepted this name.

Chrysanthemum corymbosum is currently recognized under the genus *Tanacetum* L., as *T. corymbosum* (L.) Sch. Bip., a variable species including four subspecies (see e.g. Greuter, 2006–2009): subsp. *corymbosum*, subsp. *achilleae*, subsp. *cinereum* (Griseb.) Grierson, and subsp. *subcorymbosum* (Schur) Pawl. The type of *C. corymbosum s. str.* (≡ *C. corymbiferum*) [lectotype (LINN, Herb. Linn. No. 1012.13) designated by Humphries in Jarvis & Turland (1998: 358); image available at http://linnean-online.org/10439/)] shows a plant with leaves pinnatipartite, the segments having margins toothed or incised. On the whole, the morphological configuration of *C. corymbosum* subsp. *corymbosum* [both considering the lectotype, and the current concept of the species (see e.g. Heywood 1976*a*: 170–171)] does not match those of *C. achilleae* which type show leaves clearly 2-pinnatipartite. *C. achilleae* cannot be associated neither with the subsp. *cinereum*, nor with the subsp. *subcorymbosum* that are characterized in having pinnatipartite leaves. The Micheli's illustration (lectotype of *C. achilleae*) shows the segments of 1st order about two times longer than wide and those of the 2nd order ovate with margins mainly toothed, while the specimen Herb. Linn No. 1012.21 at LINN (lectotype of *C. italicum*; image available at: http://linnean-online.org/10447/) is a plant with segments (1st order) 2.5–3.0 times longer than wide, and segments (2nd order) lanceolate incised to laciniate. On the basis of the lectotypes of *C. achilleae*, and *C. italicum*, these two names appear to be referred to different taxa. However, the forms with leaves 2-pinnatipartite have segments (2st order) which margins configuration vary continuously from toothed to deeply incised (pers. observ.). The type of *C. achilleae* and *C. italicum* seems to represent the limits of the range concerning the character of the margin of the leaves segments (2st order). I here propose to treat the names *Chrysanthemum italicum* and *C. achilleae* as heterotypic synonyms. Since both names were published in the same date (15–31 october 1767 according to Stafleu & Cowan (1981: 107), the Art. 11.4 of the *ICN* cannot be applied, and I am obliged to consider Art. 11.5 instead. Arcangeli (1882: 353) was the first author who united both names, choosing *Chrysanthemum achilleae* (sub *Pyrethrum achilleae*) which deserves priority.

Greuter (2006–2009) synonymized *C. daucifolium* Pers. and *Pyrethrum tenuifolium* Willd. with *T. corymbosum* subsp. *achilleae*. Podlech (1988) widely discussed the identity of *C. daucifolium*, listed *P. tenuifolium* as synonym, and proposed the new combination *T. corymbosum* var. *tenuifolium* (Willd.) Podlech[4]. The name *Chrysanthemum daucifolium* was correctly lectotypified by Podlech (*l. c.*) on a specimen preserved at L (no. 900.227-31). Concerning the Willdenow's name, Podlech (1988: 70) stated "Typus: Hab. in Caucaso, herb. Willd. (vidi Microfiche)". The Willdenow's *Pyrethrum tenuifolium* is characterized in having the basal and lower leaf blades 2-pinnatipartite, with segments (1st order) lanceolate (2.5–3.0 times longer than wide) and segments (2nd order) linear [Willdenow (1809: 906) also highlighted in the protologue "*…foliis radicalibus bipinnatis, pinnis linearibus pinnatifidis, caulinis bipinnatifidis, laciniis linearibus subintegerrimis*"]. The Willdenow's *P. tenuifolium* makes the homonym Tenore's name as illegitimate (Art. 53.1 of the *ICN*).

[4] The Podlech's name is an isonym of the previous proposed combination *Tanacetum corymbosum* var. *tenuifolium* (Willd.) Briq. & Cavill. (see the paragraph "Taxonomic Treatment and typification of the names").

As a whole, and on the basis of the personal examination of specimens collected in Europe and Middle Asia, I highlighted two main morphological groups in *Tanacetum corymbosum*, i.e. *corymbosum*/*subcorymbosum*/*cinereum* (group I) and *achilleae*/*daucifolium* (group II). The group I is characterized in having the leaf blades 1-pinnatipartite with the segments toothed or incised, while the group II shows blades 2-pinnatipartite with segments (2nd order) toothed to incised or linear. Differential characters among the taxa included in each group refer to bracts of capitula and hairness of leaves (group I), and shape of leaf segments of 2nd order (group II) as reported in the following diagnostic key:

1. Leaves (the basal and lower ones) 1-pinnatipartite **2**
-. Leaves (the basal and lower ones) 2-pinnatipartite **4**
2. Involucral bracts of capitula with a broad blackish-brown margin (each margin up to 1/3 wider of the total size of the bract)..... ..... ***T. corymbosum* subsp. *subcorymbosum***
-. Involucral bracts of capitula without a broad blackish-brown margin **3**
3. Leaf blades glabrous to slightly pubescent..... ..... ***T. corymbosum* subsp. *corymbosum***
-. Leaf blades densely pubescent ....***T. corymbosum* subsp. *cinereum***
4. Leaf segments (2nd order) ovate to lanceolate.... ..... ***T. corymbosum* subsp. *achilleae***
-. Leaf segments (2nd order) linear .... ***T. corymbosum* subsp. *daucifolium***

From the corological point of view *Tanacetum corymbosum s. l.* is a Paleotemperate element, occuring in Europe, Northern Africa and Asia (Heywood, 1976*a*; Tela Botanica 2000–; Bartolucci *et al.*, 2018; Greuter, 2006–2009; SANBI, 2012). General distribution areas for each taxa considered in the present paper follow:

(1) subsp. *achilleae* has a focal point in SW Europe and N Africa occurring in Morocco, Algeria, Tunisia, CS Italy (Liguria region, and from Emilia-Romagna to Calabria regions), SE France (departments of Var and Alpes Maritimes), and Spain.
(2) subsp. *cinereum* occurs in E Europe (Serbia, Macedonia, Montenegro, Greece, Bulgaria), and Turkey.
(3) subsp. *daucifolium* occurs in Caucasus, and Russia.
(4) subsp. *subcorymbosum* occurs in CE Europe from Switzerland, Poland, Austria, N Italy (regions Lombardy, Trentino Alto-Adige, and Fruili-Venezia Giulia) to Slovenia, Croatia, Bosnia-Herzegovina, Romania, and Ukraine (this subspecies is doubtfully native in SE France, in the department of Var).

TAXONOMIC TREATMENT AND TYPIFICATION OF THE NAMES

Tanacetum corymbosum (L.) Sch. Bip., Tanaceteen: 57 (1844) subsp. ***corymbosum*** ≡ *Chrysanthemum corymbosum* L., Sp. Pl. 2: 890 (1753) [basionym] ≡ *C. corymbiferum* L., Amoen. Acad. 4: 491 (1759), *orth. var.*[5] ≡ *Pyrethrum corymbosum* (L.) Scop., Fl. Carniol (ed. 2) 2: 148 (1772) ≡ *P. corymbiferum* (L.) S. G. Gmel., Reise Russland 1: 115 (1770–1774) ≡ *Leucanthemum corymbosum* (L.) Godr. and Gren. in Gren. and Godron, Fl. France 2: 145 (1850).
Lectotype (designated by Humphries in Jarvis & Turland, 1998: 358): Herb. Linn., No. 1012.13, LINN photo!, image available at: http://linnean-online.org/10439/.
= *Pyrethrum clusii Tausch*, Ind. Pl. Prague: 8, 12 (1821).
Lectotype (**designated here**): [Icon] "*Tanacetum inodorum II*" from Clusius (1601: 338) (image available at: http://biodiversitylibrary.org/item/14549#page/350/mode/1up).

Tanacetum corymbosum subsp. ***achilleae*** (L.) Greuter in Greuter *et al*., Willdenowia 33: 43 (2003) ≡ *Chrysanthemum achilleae* L., Syst. Nat., ed. 12, 2: 562 (1767*b*) [basionym] ≡ *Pyrethrum achilleae* (L.) DC., Prodr. 6: 57 (1838) ≡ *P. corymbosum* subsp. *achilleae* (L.) Nyman, Consp. Fl. Eur.: 372 (1879) ≡ *C. corymbosum* var. *achilleae* (L.) Fiori and Paol., Fl. Anal. Ital. [Fiori in Fiori & Béguinot] 3: 244 (1903).

[5] The name *Chrysanthemum corymbiferum* is clearly an orthographic variant of *C. corymbosum* L. (1753: 890), as noted by Stearn (1974: 632). Linnaeus (1763: 1251) in the 2nd Edition of *Species Plantarum* again used the epithet "*corymbiferum*", but in conjunction with the same diagnosis and synonyms associated with *C. corymbosum* in the 1st Edition of *Species Plantarum* (Linnaeus 1753: 890). In the 12th Edition of *Systema Naturae* (Linnaeus, 1767*b*: 562), Linnaeus again used the same diagnosis, but reverted to the use of "*corymbosum*".

Lectotype (**designated here**): [Icon] Tab. 29 "*Parthenium*" from Micheli (1729), image available at: http://bibdigital.rjb.csic.es/ing/Libro.php?Libro=2801&Pagina=287.
= *Chrysanthemum italicum* L., Mant. Pl.: 116 (1767*a*).
Lectotype (**designated here**): "Nº 69 / Parthenium foliis tenuissimis, achill [sic] / caesaris Mich. nov. gen. pag. 34 / t. 29 / Matricaria / s. Chrysant [sic] / *P. Arduino*", Herb. Linn., No. 1012.21 (LINN photo!, image available at: http://linnean-online.org/10447/)
= *Chrysanthemum tanacetifolium* Pourr., Hist. Mém. Acad. Roy. Sci. Toulouse 3: 311 (1788) ≡ *Pyrethrum corymbosum* subsp. *pourretii* (Pourr.) Nyman, Consp. Fl. Eur.: 372 (1879).
Neotype (**designated here**): [France, Occitania] "Chrysanthemum / corymbosum / N. de Montpellier / La Valette / 27.VI.41" (m. unknown) "HERBARIUM MUSEI PARISIENSIS / Herbier E. LICENT (1876-1952) / Tanacetum corymbosum (L.) Sch. Bip. / Montpellier. La Valette / 27.6.1941" (m. unknown) (P 00731963 photo!, image available at : http://mediaphoto.mnhn.fr/media/1441452107028DinFVwf5jJWUufsx.
= *Pyrethrum tenuifolium* Ten., Fl. Napol. Prodr.: L (1815), *nom. illeg. non P. tenuifolium* Willd. (1809), Art. 53.1 of the *ICN* (see McNeill *et al*., 2012).
Lectotype (**designated here**): "Pyrethrum tenuifolium Nob. / Me Tenore 1814" (m. unknown) (G 00450834 photo!, specimen on the left, image available at: http://www.ville-ge.ch/musinfo/bd/cjb/chg/adetail.php?id=317570&base=img&lang=en).

Tanacetum corymbosum subsp. ***cinereum*** (Griseb.) Grierson in Davis, Fl. Turkey 5: 262 (1975) ≡ *Pyrethrum cinereum* Griseb., Spic. Fl. Rumel. 2: 202 (1844) [basionym].
Lectotype (**designated here**): [Macedonia] "Pyrethrum cinereum m. [mihi] 454/ Pyrethrum niveum Lag. / Diff. foliis bipinna / tipartitis lobis obl. [oblongi] / in pascuis lapidosis / pr. Palanka" (m. unknown) "HERBARIUM GOTTINGEN / Comp. / Pyrethrum cinereum Griseb. / Spicil. Fl. Rumel. Bithyn. 2: 202.1846 / Syntypus / leg. FRIEDRICHSTHAL 454" "Tanacetum corymbosum / subsp. cinereum (Gris.) Grierson / LECTOTYPUS / 1986 / rev. B. Voith-Drescher" (GOET 002103 photo!, image available at: http://plants.jstor.org/stable/10.5555/al.ap.specimen.goet002103?searchUri=filter%3Dname%26so%3Dps_group_by_genus_species%2Basc%26Query%3DPyrethrum%2Bcinereum);
Syntypes: Turkey, *pr. Bolu*, *F. Pestalozza s.n.* (GOET 002109 photo!); [Macedonia, Palanka] "Nº HRB MUSEI PALAT. VINDOB / Vid Boissier / Friedrichsthal / Palanka / Hb. Maced. 454" (m. unknown) (W 0051161!, image available at: http://jacq.nhm-wien.ac.at/djatoka/jacq-viewer/viewer.html?rft_id=w_0051161&identifiers=w_0051161).

Tanacetum corymbosum subsp. ***daucifolium*** (Pers.) Iamonico, comb. et stat. nov. ≡ *Pyrethrum daucifolium* Pers., Syn. Pl. 2: 462 (1805) [basionym] ≡ *Chrysanthemum daucifolium* (Pers.) Ledeb., Fl. Ross. (Ledeb.) 1: 549 (1845).
Lectotype (designated by Podlech, 1988: 70): *in Caucaso*, M. Bieberstein s.n. (L 900.227-31 photo!).
= *Pyrethrum tenuifolium* Willd., Enum. Pl.: 906 (1809) ≡ *P. corymbosum* var. *tenuifolium* (Willd.) Ledeb., Fl. Ross. 2: 552 (1844) ≡ *Tanacetum corymbosum* var. *tenuifolium* (Willd.) Briq. and Cavill in Burnat, Fl. Alpes Marit. 6: 125 (1916).
Lectotype (designated by Podlech, 1988: 70): *Habitat in Caucaso*, C. L. Willdenow (B-Willd. 16219 photo!, image available at: http://ww2.bgbm.org/herbarium/specimen.cfm?SpecimenPK=131011&idThumb=393487&SpecimenSequenz=1&loan=0
− "*Tanacetum corymbosum* var. *tenuifolium*" in Podlech, Mitt. Bot. Staatssamml. München 27: 70 (1988), isonym (Art. 6.3 Note 2 of the *ICN*).

Tanacetum corymbosum subsp. ***subcorymbosum*** (Schur) Szafer & Pawłowski, Pl. Polon. Exic., ser. 2, 3: 21 (1936) ≡ *Chrysanthemum subcorymbosum* Schur, Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt 10: 146 (1859) [basionym]
Type: not designated[6].
?= Pyrethrum clusii Fisch. ex Rchb., Fl. Germ. Excurs.: 231–232 (1831), *nom. illeg.* (Art. 53.1) ≡

[6] As original material was not found, a neotypification would be required (Art. 9.7). However, despite repeated requestes, I have not received replies from Curators of some Herbaria in which the Schur's collection is preserved. So, I cannot be sure that a lectotype is not in extant and, in the case that original material will be found, any neotypification will be superseded. As a consequence I prefer to avoid the proposal for a neotype for the time being. For this reason *Pyrethrum clusii* was reported a doubtful synonym of *Chrysanthemum subcorymbosum*.

Chrysanthemum corymbosum subsp. *clusii* Dostál, *Květena ČSR*: 1603 (1950), *nom. nov. pro Pyrethrum clusii* Rchb. non Tausch (Art. 58.1) ≡ *Tanacetum corymbosum* subsp. *clusii* Heywood, Bot. J. Linn. Soc. 71(4): 272 (1976*b*), *nom. nov. pro Pyrethrum clusii* Rchb. non Tausch (Art. 58.1).

Lectotype (**designated here**): [Icon] "*Tanacetum inodorum I"* from Clusius (1601: 338) (image available at: http://biodiversitylibrary.org/item/14549#page/350/mode/1up).

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