REVIEW OF EARLY NOMENCLATURE IN *EUTHAMIA* (ASTERACEAE: ASTEREAE)

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ABSTRACT

A review of the early nomenclature of *Euthamia* summarizes observations by Sieren (1981) and Reveal (1991) and adds other perspectives. Nuttall published the group in 1818 in the format of a new subdivision of *Solidago*, interpreted here at sectional rank, but noted it as "a subgenus, or rather genus." Cassini in 1825 provided the elements for validation of *Euthamia* at generic rank, but he did so unintentionally and ascribed the name to Nuttall. In this interpretation, separate citations of lectotype and type are required for the two names (sect. *Euthamia* Nutt. and genus *Euthamia* Nutt. ex Cass., respectively). Also in this interpretation, Nuttall in 1841 validated nomenclatural combinations for *E. graminifolia* (L.) Nutt. and *E. tenuifolia* (Pursh) Nutt. and added *E. occidentalis* Nutt. as a new species. The name *Euthamia caroliniana* (L.) Greene ex Porter & Britt. was validated in 1894, based on *Erigeron carolinianus* L., and includes *E. tenuifolia* as a synonym. There is reason to maintain *Euthamia galetorum* Greene at specific rank rather than as a variety of *E. caroliniana* or *E. graminifolia*. The discussion includes application of several potentially controversial interpretations of the ICBN: disposition of "alternative names;" "the term type or an equivalent" in typification; and conditions of "indirect reference" for valid publication.

RESUMEN

Una revisión de la nomenclatura previa de *Euthamia* resume las observaciones de Sieren (1981) y Reveal (1991) y añade otras perspectivas. Nuttall publicó el grupo en 1818 como una nueva subdivisión *Solidago*, que se interpreta aquí en el rango de sección, pero la citó como "un subgénero o quizás género." Cassini en 1825 dio los elementos para la validación de *Euthamia* en el rango genérico, pero lo hizo así sin querer y adscribió el nombre a Nuttall. En esta interpretación se requieren citaciones separadas de lectotipo y tipo para los dos nombres (sect. *Euthamia* Nutt. y género *Euthamia* Nutt. ex Cass., respectivamente). También en esta interpretación, Nuttall en 1841 validó combinaciones nomenclaturales para *E. graminifolia* (L.) Nutt. y *E. tenuifolia* (Pursh) Nutt. y añadió *E. occidentalis* Nutt. como una nueva especie. El nombre *Euthamia caroliniana* (L.) Greene ex Porter & Britt. fue validado en 1894, basado en *Erigeron carolinianus* L., e incluye *E. tenuifolia* como sinónimo. Hay una razón para mantener *Euthamia galetorum* Greene en el rango específico en vez de variedad de *E. caroliniana* o *E. graminifolia*. La discusión incluye la aplicación de varias interpretaciones potencialmente controvertidas del ICBN: disposición de "nombres alternativos;" "el término tipo o un equivalente" en la tipificación y condiciones de "referencia indirecta" para la publicación válida.

Reveal (1991) clarified the application of the Linnaean name *Erigeron*

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carolinianus L., confirming earlier opinions that it represents a species of *Euthamia* and that this species is correctly treated as *Euthamia caroliniana* (L.) Greene ex Porter & Britton, of which *Euthamia tenuifolia* (Pursh) Nutt. is a synonym. Reveal also noted that the name for *Euthamia* at generic rank should be cited as *Euthamia* (Nutt.) Nutt. ex Cass. (see below) and that the choice of lectotype for the genus by Britton and Brown in 1913 should stand as *Euthamia graminifolia* (L.) Nutt. Except for details regarding the generic authorship and typification and the authorship of *E. tenuifolia*, his observations are firm, but several other associated nomenclatural points were left unresolved, these discussed here. Previous perspectives regarding authorship are summarized, additional comments are provided, and a nomenclatural summary of the names involved follows at the end of the comments. Other published comments regarding *Euthamia* on a more limited or regional basis have not touched upon the nomenclatural topics discussed here.

Euthamia at generic rank

Euthamia was ambiguously described by Nuttall (1818, p. 162) as "A subgenus, or rather genus, reciprocally allied to *Solidago* and *Chrysoma*." Various botanists (e.g., Elliott 1823; de Candolle 1836; Greene 1902; Gleason & Cronquist 1991, Cronquist 1994, as inferred from citation of the genus simply as "*Euthamia* Nutt.") have tacitly accepted 1818 as the validation date for the genus, but others have not (e.g., Nuttall himself in 1841; Sieren 1981, monographer of the genus, who cited "(Nutt.) Nutt." as the authority, regarding 1841 as the date of validation). The only other previous, explicit, and published consideration (Reveal 1991) of this problem concluded that the elements of validation were not provided in 1818. The implication of the 1994 ICBN Article 34.2 regarding identical, simultaneously published names at different ranks ("alternative names") after 1 January 1953 appears to be that such names are not necessarily invalid if published before that date. The position here, however, and that perhaps implicitly taken by Reveal, is that a name at only one of the ranks should be recognized as valid, if a balance of evidence regarding the author's intention suggests a resolution to the ambiguity.

Nuttall in 1818 placed two species under the heading of *Euthamia*, which was marked by an "asterisk" (indicating a new taxon) near, but before, the end of the *Solidago* treatment. Thus *Euthamia* was not in the numbered sequence of genera treated by Nuttall (*Solidago*, including *Euthamia*, is genus 560; *Brachyris* is genus 561). Nor is *Euthamia* included in the index to generic names in the Genera of North American Plants. The two *Euthamia* species are numbered "50" and "51," terminating the numbering sequence for species of *Solidago*. After the comments on *Euthamia*, Nuttall returned to *Solidago* in a summary paragraph (provided in a manner and position similar

to such summaries for many other genera) that noted the overall geographic distribution of the genus and suggested that arborescent species of St. Helena and New Zealand probably should be excluded from *Solidago*. In contrast to the other species of *Solidago*, however, and lending to the ambiguity, Nuttall provided basionyms and author and publication citations for the *Euthamia* species, listing "50. graminifolia. *Chrysocoma graminifolia*" and "51. tenuifolia. *S*[*olidago*]. *tenuifolia*," giving an impression of his intention to make new nomenclatural combinations for these two species. The manner in which the treatment of *Euthamia* is imbedded within *Solidago*, however, is viewed here as more explicit evidence for regarding *Euthamia* of 1818 at infrageneric rank.

Nuttall's description of *Euthamia* as a "subgenus, or rather genus" was in the second paragraph of description following the "EUTHAMIA" heading, but the format for the delimitation of *Euthamia* is identical with other infrageneric names proposed in the same volume and long-accepted at sectional rank (see comments below, "*Euthamia* at infrageneric rank"). Nuttall (p. 151) applied almost exactly the same description to his group "II" of *Inula* sect. *Chrysopsis*, noting that "This genus, or subgenus, appears to be peculiar to North America." This heterogeneous group (as now seen) was composed of white-rayed species of *Aster* (compared to typical yellow-rayed *Chrysopsis*) with a double pappus, and it seems clear that the description here of "genus, or subgenus" was meant to be taken informally. The situation in *Euthamia* is analogous: the species were treated as a section within *Solidago*, but Nuttall's accompanying comment suggests that a higher rank for them is reasonable. In fact, it is the directness of this suggestion (and its close proximity to the listing of the new name) that has created the ambiguity of interpretation.

More than 20 years later, Nuttall (1841, pp. 325–326) provided a more definite account of *Euthamia*, explicitly treating it at generic rank. Here he cited the basionym for *Euthamia* "As a section of *Solidago*, Nutt., Gen. Am., Vol. II., p. 162. Decand. Prod., Vol. V., p. 341.)," indicating that he regarded the *Euthamia* of his 1818 publication to have been at infrageneric rank, as was *Euthamia* of de Candolle. Nuttall apparently intended to recognize the name at generic rank, with the authority understood to be "(Nutt.) Nutt." Remarkably, however, his ambiguity regarding the status of the name was perpetuated even here, as he did not provide *Euthamia* (in the "header") with an asterisk characteristic of the new names (e.g., *Ericameria* Nutt.) and new combinations (e.g., *Amphiachyris* (DC.) Nutt.) at generic rank elsewhere in the treatise. His treatment of *E. graminifolia* and *E. tenuifolia* (see below) also might be taken to imply that he assumed those names had already been incorporated into the valid nomenclature for *Euthamia*.

Meanwhile, as pointed out by Reveal, Cassini (1825) had preceded Nuttall's 1841 comments in providing the elements of validation for *Euthamia* at

generic rank. Here Cassini referred to "Le genre *Euthamia* de M. Nuttall" (a clear but indirect reference), apparently assuming that Nuttall in 1818 had effectively established it at generic rank and giving Nuttall credit for its publication. In his associated description and comments, Cassini unambiguously treated *Euthamia* as a genus, although he surely did so without the specific intention of publishing a formal validation at that rank. In contrast to the suggestion of Reveal (1991) that the authority for the genus *Euthamia* be cited as "(Nutt.) Nutt. ex Cass.," its citation simply as "Nutt. ex Cass." acknowledges Cassini's role in validating the name as well as his explicit recognition that the name should be ascribed to Nuttall. This appears to be in accord with guidelines for citation outlined in Article 46.4 of the 1994 ICBN. Cassini did not furnish the necessities for any nomenclatural combinations in *Euthamia* at specific rank.

In summary, evidence indicates the name *Euthamia* was originally published at infrageneric rank (interpreted here to be sectional), and despite Nuttall's ambiguity both in 1818 and 1841, the most explicit parts of his treatments suggest that the validation of *Euthamia* at generic rank was effected by Cassini (as "Nutt. ex Cass."). Or, if Cassini's protologue were considered an insufficient basis for validation, Sieren's interpretation could be followed by citing the authority as "(Nutt.) Nutt." Other interpretations would read the evidence as favoring validation of the name in 1818 as a genus rather than section or subgenus or else perhaps find the evidence so evenly equivocal that the name from 1818, with Nuttall as sole author, could be regarded as valid at two or even three ranks (as noted above, according to ICBN Article 34.2). Or, perhaps any degree of ambiguity should lead to the formal acceptance of alternative names.

Euthamia at infrageneric rank

Although Nuttall's descriptive phrase for *Euthamia* in the 1818 publication was "a subgenus, or rather genus," he stated in 1841 that *Euthamia* was positioned "as a section of *Solidago*" in 1818. The latter rank is accepted here for the original publication of the name, as it is Nuttall's most unambiguous taxonomic characterization and one that is the most consistent with his 1818 format for analogous names in other genera. Other supraspecific taxa, securely accepted at sectional rank, were described by Nuttall in 1818 with exactly the same format as *Euthamia* (e.g., *Inula* sect. *Chrysopsis* Nutt., p. 150; *Erigeron* sect. *Caenotus* Nutt., p. 148; see Semple 1981 and Cronquist 1947, respectively). Each of these names was given in small-sized capital letters, preceded by an asterisk to indicate that it was a newly proposed name, and followed by a period and a dagger, referring to a footnote providing the name's derivation.

Alternatively, in view of ambiguity regarding the rank of Nuttall's 1818

Euthamia, it nevertheless may be considered validly published as an unranked subdivision of *Solidago*, according to ICBN Article 35.2: "A new name or combination published before 1 January 1953 without a clear indication of rank is validly published provided that all other requirements for valid publication are fulfilled; ... it may serve as a basionym or replaced synonym for subsequent combinations. ..."

De Candolle (1836, p. 341) explicitly treated *Euthamia* as a section of *Solidago*, citing both Nuttall (1818) and Cassini (1825) as having treated it at generic rank, although he acknowledged that the group might be acceptable as a genus ("An genus proprium ut innuit Nuttall et asserit Cassini?"). De Candolle's choice of a less than fully forceful verb ("innuo") for Nuttall's description appears to signal a degree of uncertainty about the rank, especially as the phrase is ended with a question mark.

Erigeron sect. *Multiflori* G. Don in Loudon (1830) comprised only two species in its original description, *Erigeron villarsii* Bell. (= *Erigeron atticus* Villars) and *Erigeron carolinianus* (= *Euthamia caroliniana*). Sect. *Multiflora* was lectotypified (Nesom 1989) by *Erigeron carolinianus* partly to avoid displacing the widely used *Erigeron* sect. *Trimorpha* (Cass.) DC. (Prodr. 5:290. 1836), of which *E. villarsii* is a member, and partly because, at the time, the identity of *Erigeron carolinianus* appeared to have little chance of being removed from the realm of ambiguity.

Discussion of infrageneric categories within *Euthamia* is largely academic, because the distinctiveness of the genus, apart from any other, is now generally accepted, and marked homogeneity among the relatively few species (6–8 total) suggests that formally designated categories will hardly be necessary or useful.

Typification of *Euthamia*

If valid publication of *Euthamia* at generic rank is attributed to Cassini as a new name (as in the interpretation here) rather than a new combination, typification of the genus also was effected by Cassini. His technical description of *Euthamia* (1825, p. 471) was explicitly drawn from *Chrysocoma graminifolia* L. ("en traccant ici les caractères genériques observés par nous sur la *Chrysocoma gramifolia* de Linné") and only that species. The position of this species in fixing the application of the name *Euthamia* in Cassini's discussion is unambiguous. At the time of Cassini's work, his short phrase "indicating the generic characters," in reference to *C. graminifolia*, was a clear and concise "equivalent" to the term "type," as that term is understood today in botanical nomenclature, apparently satisfying the requirements of the 1994 ICBN (Article 7.11).

In the description of *Solidago* sect. *Euthamia*, Nuttall in 1818 did not specify which of the two included species should serve as the type. Nor did

he in 1841 make a choice among the three species included in *Euthamia* at generic rank. De Candolle (1836) included only two species in his treatment of *Solidago* sect. *Euthamia* and did not indicate which was to be regarded as the type. As noted by Reveal, Britton and Brown (1913) cited *E. graminifolia* as the generitype, which can be taken as an effective lectotypification; Sieren (1981) cited *E. tenuifolia* as the generitype. Alternately, if Reveal's interpretation of the validation of *Euthamia* as a new combination by Cassini were accepted, Cassini's presentation and documentation apparently can be be taken as the first effective lectotypification, based on *Chrysocoma graminifolia* (= *Euthamia graminifolia*), assuming that he provided an acceptable equivalent to the term "type."

Discussions of the process of lectotypification and its formal codal (ICBN) requirements have outlined ambiguities of interpretation (e.g., Barrie et al. 1992a, 1992b; Winter et al. 1992; Zijlstra 1992). A summary example of the problem of "the term type or an equivalent" is given in Brummit (1994), referring to a proposal by Reveal (1991). The course suggested here for the lectotypification of "*Euthamia* (Nutt.) Cass." does not appear to be contradicted by the current Code (ICBN 1994), unless unwritten interpretations or implications are brought to the fore. In any case, *Euthamia graminifolia* is the lectotype of any name based on *Solidago* sect. *Euthamia* Nutt., whether designated by Cassini or by Britton & Brown.

Authorship of *Euthamia* species

Various botanists have used the names *Euthamia graminifolia* (L.) Nutt. and *Euthamia tenuifolia* (Pursh) Nutt., interpreting Nuttall's epithets from 1818 as validly published in *Euthamia*. In one of the earliest examples, Elliott (1824) cited both names as such in lists of synonyms under their accepted names in *Solidago*. Greene, both in 1894 (in Porter and Britton) and in his later overview of the genus (1902), regarded 1818 as the date of valid publication for the genus and for Nuttall's two names at specific rank. Sieren (1981) regarded *E. graminifolia* as validated by Nuttall in 1841 but *E. tenuifolia* in 1818. Cronquist (1980) referred to *E. tenuifolia* (Pursh) Greene but later (in Gleason and Cronquist 1991) changed the citation to *E. tenuifolia* (Pursh) Nutt. Reveal (1991) regarded the latter to have been validated by Greene (1902) as *E. tenuifolia* (Pursh) Greene.

In Nuttall's 1841 treatment of *Euthamia*, he included three species, *E. graminifolia*, *E. tenuifolia*, and *E. occidentalis* (sp. nov.), each epithet associated with the generic name. Nuttall did not cite basionyms or citations of earlier publication for *E. graminifolia* and *E. tenuifolia*, but it is clear that he was referring to the taxa originally published by Linnaeus and Pursh, respectively, as an update of the descriptions in his 1818 publication. The 1841 descriptions for these two species are rewritten and somewhat expanded

compared to the earlier ones, where the earlier sources of the names were cited. In contrast, *E. occidentalis* Nutt. was marked as a newly proposed name by an asterisk preceding the epithet, this symbol lacking from the other two names. Despite omission of basionyms for the first two species, Nuttall's 1841 treatment of *Euthamia* provided a specific reference to his 1818 publication, and there can be little doubt that he regarded the first two names in *Euthamia* to be in parallel with those of his previous manuscript, which included the basionyms and publication citations. This appears to satisfy the condition of "indirect reference" for valid publication of names (1994 ICBN Articles 32.4 and 32.5), and the validation of *E. graminifolia* and *E. tenuifolia* in 1841 is accepted here.

After Nuttall's formal treatment of *Euthamia* in 1841, this group of plants apparently was not again recognized at generic rank until 1894, when Porter and Britton (1894) provided E.L. Greene's view of the group in a formal nomenclatural summary for the species in northeastern North America. The three species listed were *E. caroliniana* (including *E. tenuifolia* as a synonym), *E. graminifolia*, and *E. leptocephala*; the first and third are regarded here as receiving formal validation at specific rank in the 1894 publication. In a more comprehensive treatment of *Euthamia*, Greene (1902) separated the concepts of *Euthamia caroliniana* and *E. tenuifolia*, but it is now generally acknowledged that the types of these two names represent a single species.

Status of *Euthamia galetorum*

With acknowledgment that the correct name of *Euthamia tenuifolia* is *E. caroliniana*, a decision is required regarding a varietal combination within *E. tenuifolia*. *Euthamia galetorum* Greene has been treated as a variety of both *E. tenuifolia* (Fernald 1921, as *Solidago tenuifolia* var. *pycnocephala* Fern.) and *E. graminifolia* (House 1924, as *Solidago graminifolia* var. *galetorum* (Greene) House). Friesner (1933) and Harris (1943), as well as the recent monographer of *Euthamia* (Sieren 1981), maintained *E. galetorum* at specific rank. While Roland and Smith (1969) noted that *S. tenuifolia* and *S. galetorum* are "evidently closely related," they also maintained both entities at specific rank. In contrast, Taylor and Taylor (1983) formalized the varietal status of *E. galetorum* within *E. tenuifolia* (as var. *pycnocephala* (Fern.) C.&J. Taylor), noting that "field studies along with examination of types and other herbarium specimens support Fernald's treatment as a variety of *tenuifolia*" (p. 178).

Fernald (1921, pp. 143–144) observed that *Solidago tenuifolia* var. *pycnocephala* is "a very distinct goldenrod ... everywhere dominant [in southern Nova Scotia] and thoroughly characteristic of these sandy and cobbly lake-margins" but that "Too many collections ... show direct transition [to var. *tenuifolia*] in all these characters to allow the specific separation of the Nova Scotian plant." Most of the intermediacy described by Fernald involves features of habit

and leaf morphology. In later descriptions, Fernald (1950) noted that heads of *E. galetorum* have 25–50 flowers, in contrast to the 12–20 flowers per head in *E. tenuifolia* (this comparison modified to 20–50 vs. 10–20 by Sieren).

Sieren (1981, p. 560) noted that *Euthamia galetorum* "is readily separated from [*E. tenuifolia*] by its large numbers of flowers, especially the disc, its wider, ascending leaves, and the absence of axillary fascicles. In its gross morphology, *E. galetorum* most closely approaches the wide, bluntish-leaved variety of *E. graminifolia*, variety major." In specimens of *E. galetorum* I have examined, its few-branched stems, relatively short leaves, and small, compact inflorescences of few, large heads with numerous flowers, appear to be distinct from *E. tenuifolia* in the same region, in agreement with the view of Sieren and others. Until stronger evidence is presented to counter the observations and broadly based consideration of Sieren, it seems reasonable to maintain *E. galetorum* at specific rank rather than placing it varietally under *E. caroliniana*.

Euthamia galetorum was known only from Nova Scotia by Sieren (1981), but it has subsequently been identified from Maine and New Hampshire (Bruce Sorrie, pers. comm.), and House (1924) described the entity from various parts of New York, distinguishing it from *E. tenuifolia* and other related taxa.

NOMENCLATURAL SUMMARY

Taxa listed are those included in the present discussion. Those in bold, with accompanying authorship, are as accepted in the interpretation here.

Euthamia Nutt. ex Cass. in Cuvier, Dict. Sci. Nat. 37:471. 1825. TYPE: *Chrysocoma graminifolia* L. (= *Euthamia graminifolia* (L.) Nutt.).

Solidago sect. *Euthamia* Nutt., Gen. N. Amer. Pl. 2:162. 1818. Lectotype: *Euthamia graminifolia* (L.) Nutt., as designated by Britton & Brown (1913).

Euthamia (Nutt.) Nutt., Trans. Amer. Philos. Soc. ser. 2, 7:325. 1841. (nom. superfl.).

Solidago sect. *Euthamia* (Nutt.) DC., Prodr. 5:341. 1836. (nom. superfl.).

Solidago subg. *Euthamia* (Nutt.) House, Bull. New York State Mus. 254:694. 1924.

Erigeron sect. *Submultiflori* G. Don in Loudon, Hort. Brit. 343. 1830. Lectotype: *Erigeron carolinianus* L. (= *Euthamia caroliniana* (L.) Greene ex Porter & Britton), as designated by Nesom (1989).

Euthamia caroliniana (L.) Greene ex Porter & Britton, Mem. Torrey Bot. Club 5:321. 1894.

Erigeron carolinianus L., Sp. Pl. 863. 1753.

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Euthamia galetorum Greene, Leafl. Bot. Observ. Crit. 2:152. 1911.

Solidago tenuifolia var. *pycnocephala* Fern., Rhodora 23:293. 1921.

Euthamia tenuifolia var. *pycnocephala* (Fern.) C. & J. Taylor, Sida 10:177. 1983.
Solidago graminifolia var. *galetorum* (Greene) House, N.Y. State Mus. Bull. 243–244:45. 1923.
Solidago galetorum (Greene) Friesner, Butler Univ. Bot. Stud. 3:58. 1933.

Euthamia graminifolia (L.) Nutt., Trans. Amer. Philos. Soc. ser. 2, 7:325. 1841.

Chrysocoma graminifolia L., Sp. Pl. 841. 1753.
Solidago graminifolia (L.) Salisb., Prodr. 109. 1796.

Euthamia leptocephala (Torr. & Gray) Greene ex Porter & Britton, Mem. Torrey Bot. Club 5:321. 1894.

Solidago leptocephala Torr. & Gray, Fl. N. Amer. 2:226. 1841.

Euthamia occidentalis Nutt., Trans. Amer. Philos. Soc. ser. 2, 7:326. 1841.

Postscript.—After review and revision of the present manuscript, a commentary by K.N. Gandhi appeared in print, covering many of the same topics and reviewing similar rationale. Gandhi (1999) also concludes that the 1818 publication of *Euthamia* was at infrageneric (but subgeneric) rank and credits Cassini with its validation at generic rank, although he interprets the authorship as "(Nutt.) Cass.," noting that Cassini's indirect reference to Nuttall's earlier work brings the basionym into consideration. As noted by Gandhi, this brings the number of possibilities for formal citation of the generic authorship to four. Validation of *E. graminifolia* and *E. tenuifolia* is attributed to Nuttall in 1841, as in the interpretation here.

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