

LIATRIS VIRGATA (ASTERACEAE) IN THE SOUTHEASTERN UNITED STATES

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ABSTRACT

Liatris regimontis (Small) Schumann and *L. graminifolia* var. *smallii* (Britton) Fernald & Griscom are two names used for a taxon that is widely distributed in the southeastern United States. Diagnostic features of the type of *Liatris virgata* Nuttall are compatible with those of the holotypes of the two previous taxa. Principal components analysis shows that the type of *L. virgata* is included in the continuous range of morphological variation of a sample of specimens previously determined as *L. regimontis* or *L. graminifolia* var. *smallii*. Nuttall's name has priority and is the correct name for this taxon. The unusual, environmentally induced inflorescence of the type of *L. virgata* probably caused botanists to disregard Nuttall's name for over 100 years.

RESUMEN

Liatris regimontis (Small) Schumann y *L. graminifolia* var. *smallii* (Britton) Fernald & Griscom son dos nombres de un taxon que es ampliamente distribuido en el sudeste de los Estados Unidos. Las características diagnosticas del tipo de *Liatris virgata* Nuttall son compatibles a esas de los holotipos de los taxones anteriores. El analisis de los componentes principales muestra que el tipo de *L. virgata* esta incluido dentro del rango de la variabilidad morfologica de un muestreo de los especimenes anteriormente identificados como *L. regimontis* o *L. graminifolia* var. *smallii* por otros investigadores. El nombre de Nuttall tiene la prioridad y es el nombre exacto para este taxon. La florescencia extrana y inducida por el ambiente del tipo de *L. virgata* probablemente causo los botanistas no hacer caso del nombre de Nuttall por mas de cien anos.

INTRODUCTION

A member of *Liatris* Schreber ser. *Graminifoliae* Gaiser, widely distributed in the southeastern United States, currently is named *L. regimontis* (Small) Schumann by some authors and *L. graminifolia* Willd. var. *smallii* (Britton) Fernald & Griscom by others. Examination of the type specimens as well as herbarium collections (DUKE, G, NCSC, NCU, NY, US, USCH) indicates that a name which has seldom been used, *L. virgata* Nuttall, must replace the two names currently used. The objectives of this article are to: (1) present evidence for using the name *Liatris virgata* for this taxon, and (2) emend Nuttall's description of *L. virgata* so that the description more closely conforms to the typical morphology of the species.

TAXONOMIC HISTORY

Liatris virgata—Nuttall (1834) published the name *Liatris virgata* for material he described as “Remarkable for the decomposition of its racemes and the long leafy pedicels of the flowers. Florets about eight in each calyx.” Part of the phyllary description stated “squamis obtusis appressis.” He collected his samples in Georgia and North Carolina. Nuttall (1841) modified his description of the phyllaries to “somewhat acute or obtuse” and described the habitat as “In the pine forests of Georgia, and near Newbern, N. Carolina.”

Gaiser (1946) placed Nuttall’s name in the synonymy of *L. graminifolia* var. *dubia* (Barton) Gray even though the southerly distribution, diffuse inflorescence, and number of flowers per head indicated by Nuttall are not closely compatible with the distribution and morphology that she cited for var. *dubia*. Her key stated that var. *dubia* is “of more general distribution in the northeastern range of the species.” Gaiser described the inflorescence as “a fairly dense raceme, but frequently becoming paniculate” and the heads as “10–15 flowered and thus larger than in other varieties.”

Fernald (1949) pointed out that the open inflorescence of Nuttall’s plant makes it very different from the other elements of var. *dubia*. He treated Nuttall’s taxon at the rank of variety, thus publishing the new combination *L. graminifolia* var. *virgata* (Nuttall) Fernald. Fernald indicated that the geographical range of var. *virgata* extended from Georgia to the pine barrens of New Jersey. This range was more extensive than those for all other varieties and species of series *Graminifoliae*.

The names *Liatris virgata* and *L. graminifolia* var. *virgata* are lacking, even from synonymy, in most of the pertinent taxonomic literature for the eastern United States (Britton 1896, 1901; Chapman 1883; Cronquist 1952, 1963, 1980; Godfrey 1948; Gray 1848, 1876, 1884; Robinson and Fernald 1908; Small 1903, 1913, 1933; Strausbaugh & Core 1978). The only exceptions are the recognition of var. *virgata* by Fernald (1950) and the inclusion of the varietal name in synonymy under *L. graminifolia* Willd. by Radford et al. (1968).

Liatris regimontis*/L. *graminifolia* var. *smallii—*Liatris regimontis* (Small) Schumann (*Lacinaria regimontis* Small) and *Liatris graminifolia* var. *smallii* (Britton) Fernald & Griscom (*Lacinaria smallii* Britton) were recognized by Gaiser (1946) as distinct; however, her treatment is questionable because she included extraneous material in her circumscription of *L. regimontis* (Stucky & Pyne 1990). Cronquist (1980), recognizing the striking similarity between these plants, combined the two and listed *L. graminifolia* var. *smallii* as a synonym of *L. regimontis*. Numerical analysis (Stucky & Pyne 1990) supported Cronquist’s treatment. Additionally, it appears appropriate to treat the taxon as a species rather than a variety. *Liatris regimontis* occurs in the mountains and western Piedmont of Virginia and North Carolina and in the Piedmont and Coastal Plain of South Carolina and Georgia.

HERBARIUM COLLECTIONS

In response to a request for the type of *Liatris virgata* Nuttall, PH loaned a single herbarium sheet on which two specimens were mounted. The handwritten label for the right specimen included no indication of collection location or scientific name. The label for the left specimen was, apparently, in Nuttall's handwriting and included a general location and a scientific name. This left specimen is the lectotype of *L. virgata* [Geo. T. Nuttall s.n. (LECTOTYPE: PH!)].

The lectotype is an inflorescence approximately 40 cm long with the rachis broken terminally. The vegetative portion of the plant is not present on the specimen. The flexible definition of "raceme" by Rickett (1955) applies to this inflorescence. This definition specifies monopodial inflorescences in which the flowering sequence is either acropetal or basipetal and in which the lateral elements are either individual flowers or secondary inflorescences. The upper and lower halves of the lectotype exhibit different morphologies. The upper half is composed of a distinct central axis to which an individual head is attached at each node. Peduncle length increases from 1.0 – 2.0 cm near the broken apex to 3.0 – 3.5 cm near the middle of the inflorescence. In the lower half of the inflorescence, the lateral element attached to each rachis node is an ascending raceme with a terminal head and one to four additional heads in its distal portion. Peduncle length is 1 cm or less. Flowering sequence in each lateral raceme is basipetal. Length of lateral racemes increases basipetally along the rachis to a maximum of approximately 2 dm. The number of flowers per head in a sample of five heads was 8 – 11. Phyllaries are acute apically and divergent from the head.

The type of *Lacinaria regimontis* Small [NORTH CAROLINA. Cleveland Co.: King's Mt., 27 – 30 Aug 1894, J.K. Small s.n. (HOLOTYPE: NY!; ISOTYPE: NY!)], and the holotype of *Lacinaria smallii* Britton [VIRGINIA. Smyth Co.: along Dickey Creek on Iron Mtn., 2900 ft, 8 Aug 1892, J.K. Small s.n. (HOLOTYPE: NY!)] have heads that are morphologically similar to those on the type of *Liatris virgata*. These heads have phyllaries that are acute apically and divergent. There are 8 – 12 flowers per head. The only conspicuous difference when compared with Nuttall's type was the nature of their inflorescences. These are racemes in which the lateral elements are individual heads on peduncles no more than 0.5 cm long. They are more contracted than the type of *L. virgata*.

Only one of the herbarium specimens examined, other than the type of *Liatris virgata*, had been determined as *L. virgata*. This specimen [Hb. Nuttall s.n., NY ex BM], with a label in Nuttall's handwriting, was a portion of a stem bearing 12 heads that had been removed from the rest of the plant. The morphology of the heads was the same as that on the types of *Lacinaria regimontis*, *Lacinaria smallii*, and *Liatris virgata*. This specimen had been annotated by Dr. R.K. Godfrey as *L. graminifolia* (Walt.) Willd. var. *smallii* (Britt.) Fern. & Grisc.

Inflorescences like that on the type of *Liatris virgata* were observed on

TABLE 1. Characters and character states used in PCA.

Pedicel:

1. Pedicel length (mm)
2. Number/3 cm rachis

Head:

3. Orientation: 1, strongly divergent; 2, weakly divergent; 3, strongly ascending

Involucre:

4. Height (mm)
5. Width (mm)

Phyllaries:

6. Outer phyllary planation: 1, flat; 2, cupped; 3, keeled
7. Inner phyllary length (mm)
8. Inner phyllary width (mm)
9. Inner phyllary shape index: length (mm) from base to point of greatest width \div total length
10. Inner phyllary apex shape: 1, truncate; 2, obtuse; 3, acute; 4, acuminate
11. Inner phyllary apex reflexion: 1, none; 2, weak; 3, strong
12. Inner phyllary apex planation: 1, flat; 2, involute
13. Extent of scarious margin on inner phyllary: 1, basal 2/3; 2, > basal 2/3 but not around apex; 3, complete

Flowers:

14. Number/head
15. Corolla tube length (mm)
16. Pappus length (mm)

Pubescence:

17. Density on petioles, inflorescence bracts and phyllaries: (Density was assessed on each part and the three assessments summed.): Character states for each part 0, glabrous; 1, sparse; 2, moderate; 3, dense
18. Density on lower & middle stem and rachis: (Density was assessed on each part and the three assessments summed.): Character states for each part 0, glabrous; 1, sparse; 2, moderate; 3, dense

herbarium specimens originally determined as *Liatris gracilis* Pursh and *L. graminifolia* vars. *dubia*, *graminifolia*, and *elegantula* (Greene) Schumann. Collectively, these specimens were from a range extending from Alabama to New Jersey. The majority of these specimens (e.g. *Allard* 3827, NY; *Maxon & Standley* 6, US 640539; *Baker* 50, NY; *Eggleston* 5129, US 586023; *McAtee* 3466, US 1467836; and others lacking collection information), exhibited a rachis that was broken terminally or damaged at some point along its length. On every specimen with a damaged rachis, the portion of the inflorescence below the damaged area included lateral elements that were secondary racemes rather than individual heads.

NUMERICAL TAXONOMY

Principal components analysis (PCA) was conducted to determine if (1) the morphological similarities previously noted among the types of *Liatris virgata*, *Lacinaria regimontis*, and *Lacinaria smallii* were also indicated by a multivariate approach; (2) the types of all three names fall within one continuous field of variation; and (3) *L. graminifolia* var. *dubia* is morphologically compatible with the type of *L. virgata* as concluded by Gaiser (1946). The data set for PCA comprised 18 characters (Table 1) assessed on each of 95 OTU's (specimens). The type specimens of *L. virgata*, *La. regimontis*, and *La. smallii* as well as other specimens of *L. regimontis* and *L. graminifolia* var. *dubia* were included in the PCA. A list of all OTU's for this study can be obtained from the author on request. PCA methodology has previously been described (Stucky & Pyne 1990).

The first two PCA axes explained 41% of the total data variation (Fig. 1). Projection of OTU's onto these axes indicated a relatively strong morphological similarity among the four type specimens. All of these types were included in the continuous range of variation described by the OTU's of *Liatris regimontis*. The range of variation for *L. graminifolia* var. *dubia* was distinct from that of *L. regimontis* and did not include the type of *L. virgata*.

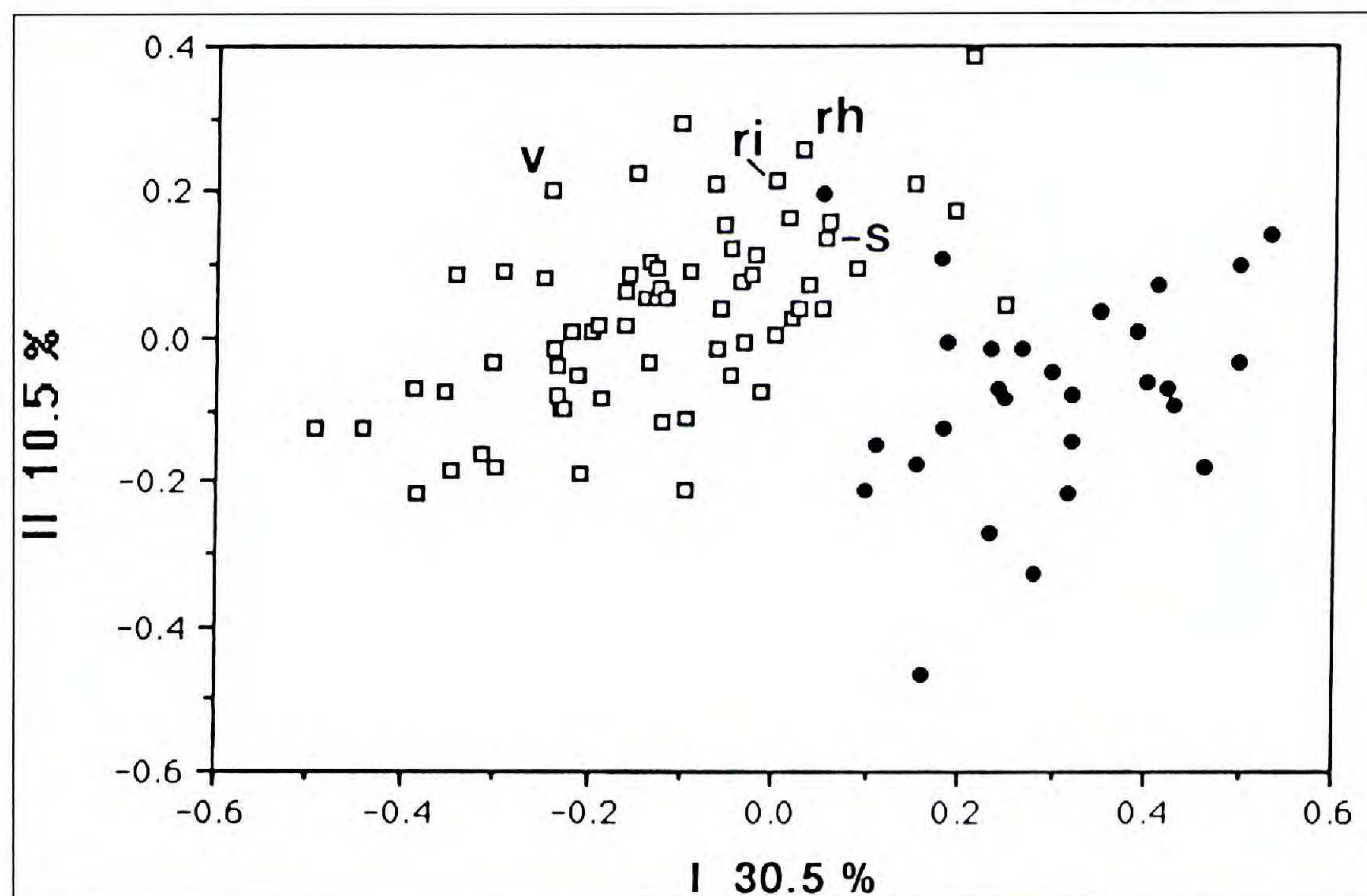


FIG. 1. PCA scores of OTU's on axes I and II. rh and ri = holotype and isotype of *Lacinaria regimontis* Small; s = holotype of *Lacinaria smallii* Britton; v = lectotype of *Liatris virgata* Nuttall. Squares and circles = OTU's of *Liatris regimontis* and *L. graminifolia* var. *dubia*, respectively.

DISCUSSION

The kind of inflorescence which Nuttall (1834) emphasized in his description of *Liatris virgata* commonly occurs in several taxa of ser. *Graminifoliae*, in association with and possibly in response to damage of the inflorescence rachis. Godfrey (1948) reported that growth in a "particularly favorable set of environmental conditions" can also cause unusually diffuse inflorescences in *Liatris*. It appears that the extensive distribution which Fernald (1949) noted for *L. graminifolia* var. *virgata* was based on specimens of several taxa with unusual inflorescences that were environmentally induced. Since the type of *Liatris virgata* Nuttall was among those with both a damaged rachis and an open, compound raceme, it appears that this taxon was based on an unreliable, environmentally induced inflorescence phenotype.

Emended Description of *Liatris virgata*—Emphasis on "decomposition of racemes" and "long leafy pedicels of the flowers" in Nuttall's description of *Liatris virgata* has, apparently, confused workers for over 100 years; otherwise, authors would have used Nuttall's name for the widely distributed taxon instead of Small's or Britton's names. Descriptions of *L. virgata* should include (1) inflorescence typically a simple raceme with basipetal flowering, peduncles no more than 3.5 – 4.0 cm long, a compound raceme with lateral racemes to 2 dm when the rachis is damaged or when plants occur in unusually favorable habitats, and (2) phyllaries apically divergent and acute, not obtuse as originally described by Nuttall (1834).

PCA shows that the type of *Liatris virgata* Nuttall is not morphologically compatible with *L. graminifolia* var. *dubia*; therefore, Gaiser's treatment of Nuttall's name in the synonymy of var. *dubia* is inappropriate. Type specimens as well as PCA show that *L. virgata* is compatible with material of *L. regimontis*. Godfrey's annotation, "*L. graminifolia* (Walt.) Willd. var. *smallii* (Britt.) Fern. & Grisc." [= *L. regimontis*], of the specimen determined originally by Nuttall as *L. virgata* corroborates PCA results. *Liatris virgata* Nuttall has priority of the various names published for this taxon so it is the correct name. The nomenclature is as follows:

Liatris virgata Nuttall, J. Acad. Nat. Sci. Philadelphia 7:72. 1834. *Liatris graminifolia* Willdenow var. *virgata* (Nuttall) Fernald, Rhodora 51:104. 1949.

Lacinaria regimontis Small, Bull. Torrey Bot. Club 25:473. 1898; *Liatris regimontis* (Small) Schumann, Just's Bot. Jahresber. 26:378. 1900.

Lacinaria smallii Britton, Man. 927. 1901; *Liatris graminifolia* Willdenow var. *smallii* (Britton) Fernald & Griscom, Rhodora 37: 182. 1935.

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