

New Distribution Records and Biogeography of *Calligrapha* Species (Leaf Beetles), in North America (Coleoptera: Chrysomelidae, Chrysomelinae)

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The study of a large number of collection specimens from the US National Museum of Natural History belonging to the genus *Calligrapha* Chevrolat (Chrysomelidae) from the Nearctic region has provided with one new province record and one new species record for Canada and 63 new US State records for a total of 20 taxa. These new records usually correspond to adjacent areas to already identified ranges of distribution, expanding considerably the known geographical boundaries of the species studied. The zoogeography of the genus *Calligrapha* in North America is discussed based on the updated information on the distribution of the genus.

Key Words: *Calligrapha*, Leaf beetles, Nearctic region, zoogeography, biodiversity, distribution, new records.

The New World chrysomeline genus *Calligrapha* Chevrolat 1837 (Chrysomelidae) is currently recognized to have more than 80 species and subspecies distributed from Alaska and all Canada provinces (and Northwest Territories) to Argentina in South America (Blackwelder 1982; Arnett et al. 2002). Approximately one third of these species are present in North America north of Mexico (Arnett 1968; Arnett et al. 2002), the biogeographical region for which we have a better knowledge of the taxonomy and also geographical ranges of the species. This group is best known taxonomically and biologically from Eastern Canada, thanks to the observations of W. J. Brown (1940, 1945, 1958) and J. G. Robertson (1966), who studied in detail their distribution along with trophic preferences and their cytology. But even for a region like North America and a well-studied zoological group like the Chrysomelidae, information about distribution is usually scattered in catalogues of regional fauna (e.g., Blatchley 1910; Balsbaugh and Hays 1972; Clark 2000) or in the form of far from complete State records in more general species accounts (e.g., Wilcox 1975; Downie and Arnett 1996; Riley et al. 2003). Besides, our understanding about species distributions can be in particular cases quite confuse due to unreliable taxonomic designations for morphologically very similar species. Problematic species identification in *Calligrapha* is rather common for several closely related taxa because it requires information about host plants, most of the times lacking from collection specimens, or large series of individuals to capture the species variation within the species.

In order to characterize in higher detail the geographical ranges of the species of *Calligrapha* in North America it is still required extensive field work in new and already prospected areas, paying particu-

lar attention to the plants to which the beetles appear associated in the field. Furthermore, the study of the collections in Museums has logically enormous potential in providing this type of information, with new and interesting data to be gathered. Both sources of information are used in this work, together with published data, to present an updated account of the information about distribution for 20 taxa of *Calligrapha* in North America for which several new state records have been found. In most of the cases, these new records correspond to regions adjacent to the already identified areas of distribution of each taxon, broadening the known distributional ranges of these species. The study of a single, but large, source of Museum material like that deposited in the Smithsonian Institution has proved very fruitful in providing with new data. Nevertheless, it is possible that the investigation of the accessions and undetermined specimens from other Museums, particularly in Canadian and US Institutions, will certainly add new useful information about the distribution of these beetles.

Materials and Methods

Specimens studied

Collection data for some specimens were obtained by the author in two entomological campaigns in north-eastern North America in the summer of 2001 and eastern Canada in 2002. Field work done independently by Daniel J. Funk in the same areas also provided with important new distribution records. A large number of accessions from the collection at the US National Museum of Natural History (NMNH; Smithsonian Institution, Washington, DC) were also studied, which included 2030 specimens belonging to the genus *Calligrapha*.

Species identification

All the specimens reported here and all the other museum accessions available were personally identified by the author of this work, who has collected and investigated the taxonomy and phylogeny of the genus *Calligrapha* since 2000. The museum accessions were sorted out separating all the species that can be easily identified at a glance because of their characteristic features, such as the species belonging to the subgenera *Bidensomela*, *Coreopsomela* and *Graphicallo*, or the *Calligrapha* s. str. species *C. apicalis*, *C. ignota*, *C. rowena*, and others. The other samples and every single specimen reported in this work were key out using the comprehensive keys for North American *Calligrapha* in Brown (1945) and Wilcox (1972), but were also compared with correctly identified material in the British Natural History Museum Entomology collection and in the reference specimen and picture collection of the author. Moreover, the individual specimens were always compared with the original description of the species to further confirm the identity. The over 2000 identified specimens were labeled with their taxonomic assignment on white cardboard labels including "J. Gómez-Zurita det." and the year when the identification was done. The comparatively few specimens collected by D. J. Funk and other colleagues for the author's research on the molecular phylogeny of the genus are temporally held in the author's collection before the studies are finished and their final depository decided. The remaining specimens belong and are deposited in the US NMNH collection.

Data presentation

For each *Calligrapha* species, distribution information is given by state for published records. Full details, including county and specific locality data when known, collection date, the name of the collector, as well as the number of specimens studied, are given in those cases where a new state record has been registered. Similar distributional information is presented graphically on a series of maps where references from the literature and new records are distinguished (Figure 1 a-p).

Results

Calligrapha alni Schaeffer 1928 (Figure 1a)

Canada: Alberta (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Manitoba (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), New Brunswick (Bousquet 1991; Riley et al. 2003), Nova Scotia (Schaeffer 1928; Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Cavey 1994; Downie and Arnett 1996; Riley et al. 2003), Ontario (Schaeffer 1928; Robertson 1966; Bousquet 1991; Cavey 1994; Riley et al. 2003), Quebec (Robertson 1966; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Saskatchewan (Robertson 1966; Bousquet 1991; Riley et al. 2003). U.S.A.: Maine (Schaeffer 1928; Cavey 1994; Downie and Arnett 1996; Riley et al. 2003), Maryland (Cavey 1994; Downie and Arnett 1996; Riley et al. 2003), Massachusetts (Schaeffer 1928; Cavey 1994; Riley et al. 2003), Michigan (Wilcox

1972, 1975; Cavey 1994; Downie and Arnett 1996; Riley et al. 2003), Minnesota (Riley et al. 2003), New Jersey (Schaeffer 1933; Cavey 1994; Riley et al. 2003), New York (Schaeffer 1933; Cavey 1994; Downie and Arnett 1996; Riley et al. 2003), Ohio (Wilcox 1954; Cavey 1994; Riley et al. 2003), Vermont (Schaeffer 1928; Cavey 1994; Riley et al. 2003), West Virginia (Wilcox 1972, 1975; Cavey 1994; Downie and Arnett 1996; Clark 2000; Riley et al. 2003), Wisconsin (Cavey 1994; Riley et al. 2003).

NEW HAMPSHIRE: Coos Co., Jefferson, 4 May 1936, A. E. Brower collector (1)

Calligrapha alnicola Brown 1945 (Figure 1b)

Canada: New Brunswick (Brown 1945; Robertson 1966; Bousquet 1991; Clark 2000; Riley et al. 2003), Nova Scotia (Bousquet 1991; Riley et al. 2003), Ontario (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003). U.S.A.: Kentucky (Clark 2000; Riley et al. 2003), Maine (Clark 2000; Riley et al. 2003), Michigan (Clark 2000; Riley et al. 2003), New York (Riley et al. 2003).

MINNESOTA: Cook Co., route 61, North, 47°56.879'N 89°41.875'W, 14 August 2004, on *Alnus* sp., D. J. Funk collector (2)

NEW HAMPSHIRE: Grafton Co., Hanover, K. W. Cooper coll. (1); Strafford Co., Durham, 12 June 1907 (1)

VERMONT: Bennington Co., East Dorset, 8 June 1959, C. T. Parsons coll. (1); Orleans Co., near Barton, 16 July 2001, on *Alnus* sp., D. J. Funk collector (1)

WEST VIRGINIA: Tucker Co., Canaan Valley Resort S. P., 18 July 2001, J. Gómez-Zurita and D. P. Duran collector (1)

WISCONSIN: Bayfield Co., Bayfield, Wickham collector (1)

Calligrapha amator Brown 1945 (Figure 1c)

Canada: Ontario (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003). U.S.A.: Wyoming (Lawson 1976; dubious according to Riley et al. 2003).

QUEBEC: Quebec, Maisonneuve, 25 August 1901, C. Stevenson collector (3); St. Lawrence River, St. Regis, on *Tilia americana*, C. O. Houghton collector (1)

Calligrapha amelia Knab 1909 (Figure 1c)

U.S.A.: Alabama (Balsbaugh and Hays 1972; Riley et al. 2003), District of Columbia (Knab 1909; Leng 1920; Riley et al. 2003), Maryland (Knab 1909; Riley et al. 2003), New Jersey (Knab 1909; Wilcox 1972, 1975; Riley et al. 2003), New York (Knab 1909; Leng 1920; Leonard 1926; Wilcox 1972; Downie and Arnett 1996; Riley et al. 2003), Ohio (Wilcox 1954, 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Rhode Island (Sikes 1999*; Riley et al. 2003), South Carolina (Kirk 1970; Riley et al. 2003), Virginia (Knab 1909; Leng 1920; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), West Virginia (Knab 1909; Clark 2000; Riley et al. 2003).

CONNECTICUT: New London Co., Lyme, 28 May 1918, W. S. Fisher collector, on *Alnus* sp. (1)

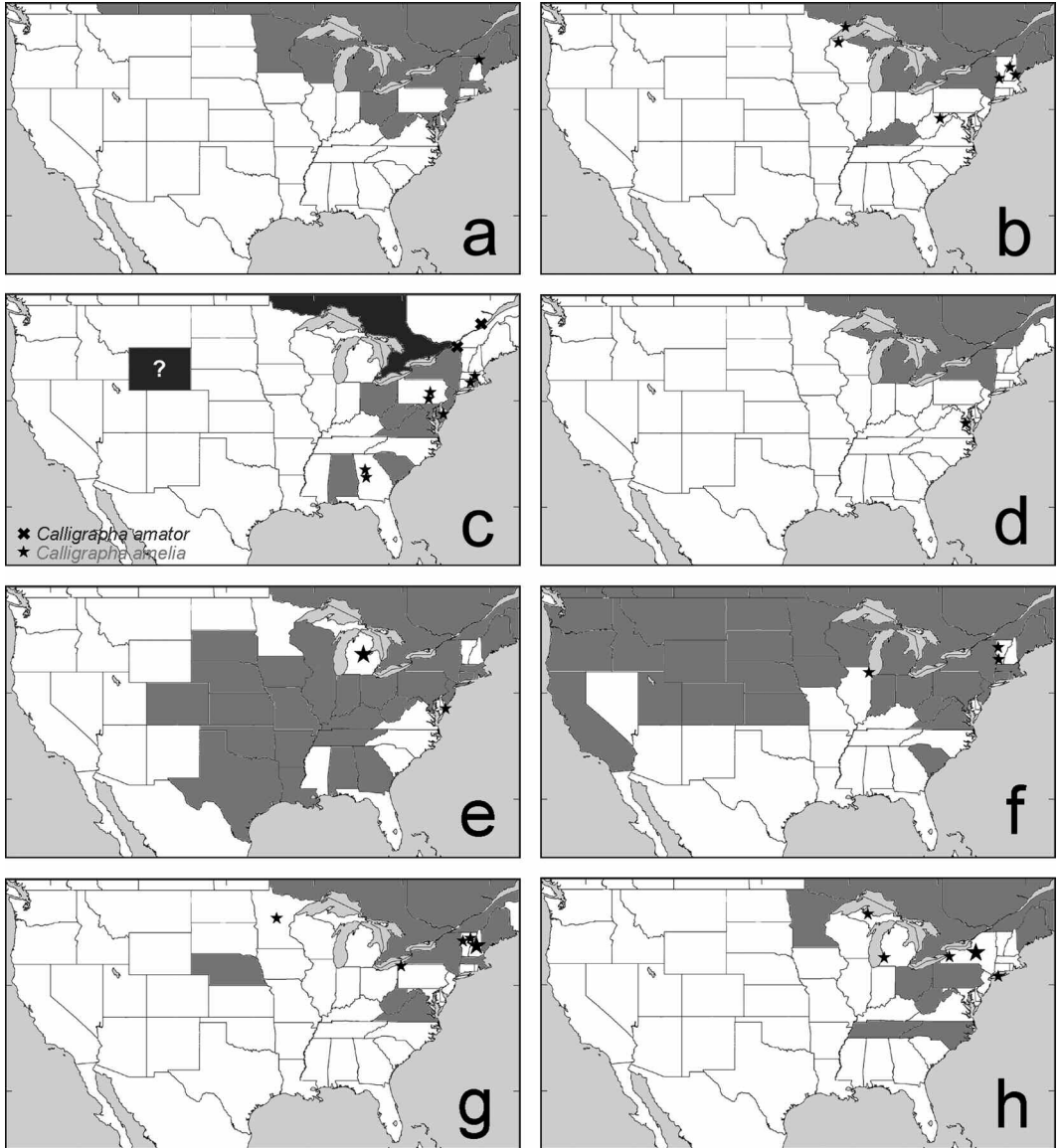


FIGURE 1. Geographical distributions of several *Calligrapha* species in North America. The shaded areas represent published province (Canada) or US State records and the symbols correspond to the new province or state records reported in this work for *C. alni* (a), *C. albicola* (b), *C. amator* and *C. amelia* (c), *C. apicalis* (d), *C. bidenticola* (e), *C. californica* s. l. (f), *C. confluens* (g), *C. ignota* (h).

DELAWARE: Sussex Co., Rehoboth, 6 April 1943, G. H. Dieke collector, in beach washup (1)

GEORGIA: De Kalb Co., 5 May 1951, H. R. Dodge collector (1); Spaulding Co., Experiment, 29 March 1937, on peach (1)

MASSACHUSETTS: F. Knab collector (1)

PENNSYLVANIA: Cumberland Co., Mount Holly Springs, 1 September 1918, R. M. Fonts collector (1); Dauphin Co., Heckton Mills, 8 July 1910, P. R. Myers collector (1)

Calligrapha apicalis Notman 1919 (Figure 1d)

Canada: Ontario (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003). U.S.A.: Michigan (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), New York (Notman 1919; Leonard 1926; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003).

MARYLAND: Calvert Co., Plum Point, 28 May 1922, L. L. Buchanan collector (1)

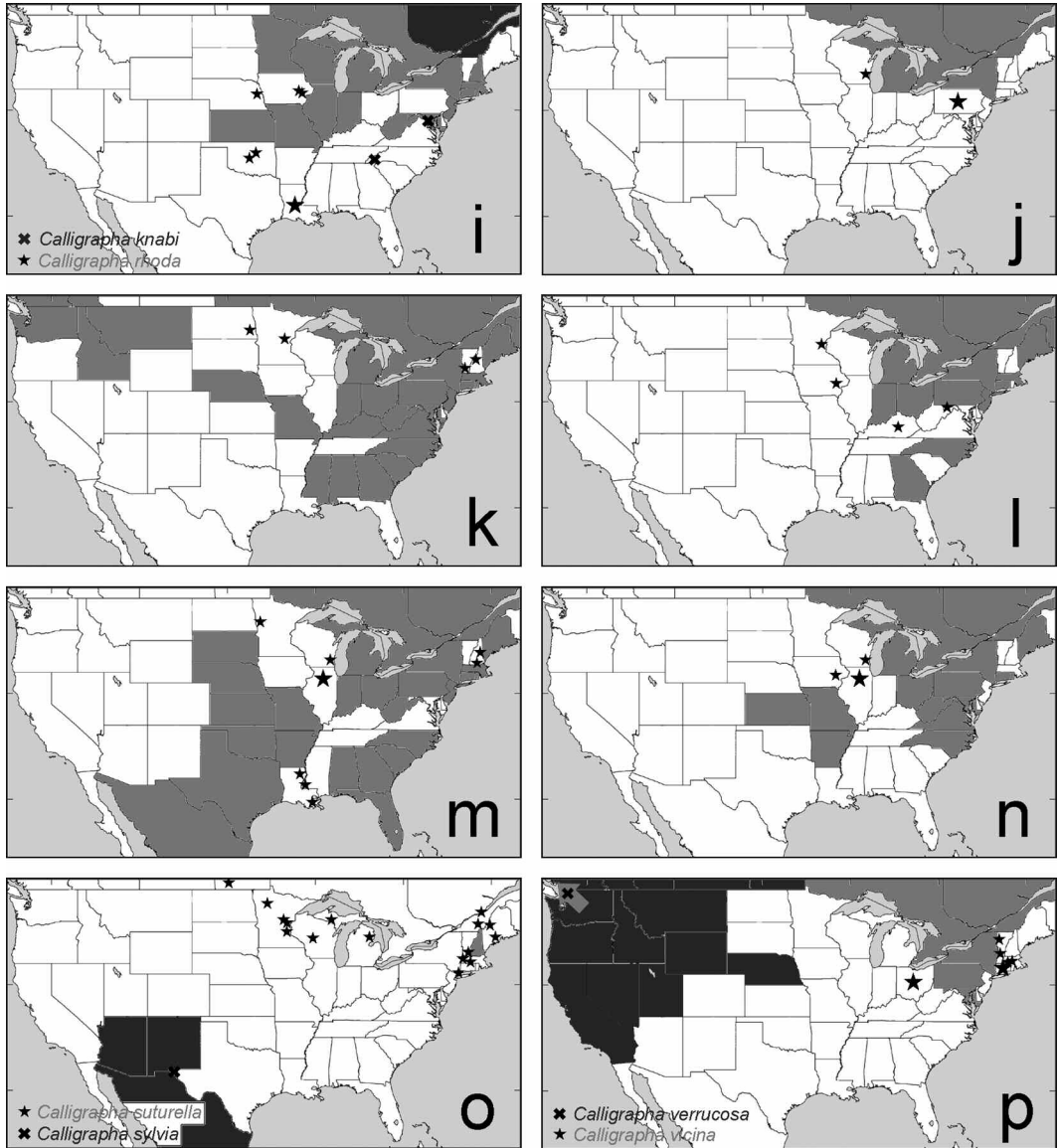


FIGURE 1. (Continued). *C. knabi* and *C. rhoda* (i), *C. ostryaea* (j), *C. philadelphia* (k), *C. rowena* (l), *C. scalaris* (m), *C. spiraea* (n), *C. suturella* and *C. sylvia* (o), and *C. verrucosa* and *C. vicina* (p). The symbols are approximately placed on the localities in the collection data. Larger symbols are used to identify US State records without specific locality.

Calligrapha bidenticola Brown 1945 (Figure 1e)

Canada: New Brunswick (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Ontario (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003). U.S.A.: Alabama (Balsbaugh and Hays 1972; Wilcox 1972; Riley et al. 2003), Arkansas (Riley et al. 2003), Colorado (Leng 1920; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Connecticut (Britton 1920; Brown 1945; Riley et al. 2003), District of Columbia (Riley et al. 2003), Florida

(Monrós 1955; Wilcox 1972, 1975; Riley et al. 2003), Georgia (Riley et al. 2003), Illinois (Riley et al. 2003), Indiana (Blatchley 1910; Leng 1920; Downie and Arnett 1996; Riley et al. 2003), Iowa (Riley et al. 2003), Kansas (Douglass 1929; Riley et al. 2003), Kentucky (Riley et al. 2003), Louisiana (Riley et al. 2003), Maine (Riley et al. 2003), Maryland (Riley et al. 2003), Massachusetts (Downie and Arnett 1996; Riley et al. 2003), Missouri (Riley and Enns 1979; Riley et al. 2003), Nebraska (Powell 1932; Riley et al. 2003), New Jersey (Riley et al. 2003), New York (Leonard 1926; Downie and Arnett 1996; Riley et al. 2003),

Ohio (Hughes 1944; Wilcox 1954; Riley et al. 2003), Oklahoma (Shaddy and Drew 1967), Pennsylvania (Riley et al. 2003), Rhode Island (Davis 1904; Sikes 1999*; Riley et al. 2003), South Dakota (Johnson 1930; Kirk and Balsbaugh 1975; Riley et al. 2003), Tennessee (Riley et al. 2003), Texas (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), West Virginia (Clark 2000; Riley et al. 2003), Wisconsin (Riley et al. 2003).

DELAWARE: Dewey Beach to Maryland, Assateague Park, 1 July 1985, dead on beach, P. Schaefer collector (1)

MICHIGAN: E. S. George Res., Pinckney, 8 June 1947, B. Summerville collector (2)

Calligrapha californica s. l. (Linell 1896) (Figure 1f)

Canada: Alberta (Beller and Hatch 1932; Brown 1945; Bousquet 1991; Riley et al. 2003), British Columbia (Brown 1945; Hatch 1971; Wilcox 1972, 1975; Bousquet 1991; Riley et al. 2003), Manitoba (Brown 1945; Bousquet 1991; Riley et al. 2003), New Brunswick (Brown 1945; Bousquet 1991; Riley et al. 2003), Northwest Territories (Bousquet 1991; Riley et al. 2003), Nova Scotia (Beller and Hatch 1932; Brown 1945; Riley et al. 2003), Ontario (Morris 1914; Bousquet 1991; Riley et al. 2003), Prince Edward Island (Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Saskatchewan (Brown 1945; Bousquet 1991; Riley et al. 2003). U.S.A.: California (Leng 1920; Beller and Hatch 1932; Schaeffer 1933; Brown 1945; Monrós 1955; Wilcox 1972, 1975; Riley et al. 2003), Colorado (Beller and Hatch 1932; Riley et al. 2003), Connecticut (Britton 1920; Brown 1945; Riley et al. 2003), District of Columbia (Beller and Hatch 1932; Riley et al. 2003), Idaho (Schaeffer 1933; Hatch 1971), Indiana (Blatchley 1910; Leng 1920; Beller and Hatch 1932; Riley et al. 2003), Iowa (Riley et al. 2003), Kansas (Douglass 1929; Riley et al. 2003), Maine (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Maryland (Riley et al. 2003), Massachusetts (Riley et al. 2003), Michigan (Lawson 1976; Riley et al. 2003), Minnesota (Riley et al. 2003), Montana (Hatch 1971; Riley et al. 2003), Nebraska (Powell 1932; Riley et al. 2003), New Jersey (Riley et al. 2003), New York (Leonard 1926; Lawson 1976; Riley et al. 2003), North Dakota (Wilcox 1972, 1975; Downie and Arnett 1996), Ohio (Hughes, 1944; Wilcox 1954; Riley et al. 2003), Oregon (Hatch 1971), Pennsylvania (Riley et al. 2003), Rhode Island (Davis 1904; Sikes 1999*; Riley et al. 2003), South Carolina (Riley et al. 2003), South Dakota (Johnson 1930; Wilcox 1972, 1975; Kirk and Balsbaugh 1975; Riley et al. 2003), Utah (Riley et al. 2003), Virginia (Williams 1989; Riley et al. 2003), Washington (Beller and Hatch 1932; Hatch 1971; Riley et al. 2003), West Virginia (Clark 2000; Riley et al. 2003), Wisconsin (Riley et al. 2003), Wyoming (Lawson 1976; Riley et al. 2003).

ILLINOIS (*C. c. coreopsivora*): Cook Co., Chicago, 30 May 1902, on the beach, A. B. Wolcott collector (1); Cook Co., Chicago, 1 June 1904, A. B. Wolcott coll. (1)

VERMONT (*C. c. coreopsivora*): Bennington Co., East Dorset, 8 July 1959, C. Parsons collector (12); Chittenden Co., Colchester, Colchester Pond, 9 May 1975, M. Langworthy collector (1); LaPlatt River, 20 September 1979, B. J. Norman collector (1)

Calligrapha confluens Schaeffer 1928 (Figure 1g)

Canada: New Brunswick (Bousquet 1991; Riley et al. 2003), Nova Scotia (Schaeffer 1928; Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Ontario (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003). U.S.A.: Maine (Schaeffer 1928; Riley et al. 2003), Massachusetts (Schaeffer 1928; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Nebraska (Powell 1932; reported as dubious by Riley et al. 2003), New York (Brown 1945; Riley et al. 2003), Virginia (Brown 1945), West Virginia (Clark 2000; Riley et al. 2003).

MINNESOTA: Cass Co., Gull Lake, 3 June 1925, F. Uhler collector (1)

NEW HAMPSHIRE: Mt. Plsnt. Hse., July, A. Feynes collection (1)

PENNSYLVANIA: Erie Co., North East, 4 July 1916, on *Alnus*, R. A. Cushman collector (1)

VERMONT: Chittenden Co., Westford, 1 October 1968, D. L. Pouliot collector (1); Caledonia Co., nr Sheffield, 20 August 1999, on *Alnus* sp., Daniel J. Funk collector (1)

Calligrapha ignota Brown 1945 (Figure 1h)

Canada: Manitoba (Bousquet 1991; Riley et al. 2003), New Brunswick (Brown 1945; Bousquet 1991; Riley et al. 2003), Nova Scotia (Brown 1945; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Ontario (Brown 1945; Bousquet 1991; Riley et al. 2003), Prince Edward Island (Brown 1945; Riley et al. 2003), Quebec (Riley et al. 2003). U.S.A.: Maine (Riley et al. 2003), Minnesota (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), North Carolina (Riley et al. 2003), Ohio (Riley et al. 2003), Pennsylvania (Linnell 1896; Brown 1945; Wilcox 1972; Downie and Arnett 1996; Riley et al. 2003), Tennessee (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), West Virginia (Clark 2000; Riley et al. 2003).

MICHIGAN: Allegan Co., Macatawa B'h, 10 June 1906, A. B. Wolcott collector (2); Marquette Co., Marquette, June 1928, Van Dyke Collection (2)

NEW YORK: Erie Co., Buffalo, E. P. V. collector, Collection Ashmead (1); Long Island, 18 April 1903, Sherman Collection (1); Long Island, Sherman Collection (4); New York, Sherman Collection (2)

Calligrapha knabi Brown, 1940 (Figure 1i)

Canada: Manitoba (Bousquet 1991; Riley et al. 2003), Ontario (Bousquet 1991; Riley et al. 2003), Quebec (Brown 1940, 1945; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003).

MARYLAND: Prince George's Co., Accokeek, 24 April 2003, on *Cornus amomum*, C. L. & S. L. Staines collector (2)

NORTH CAROLINA: Jackson Co., Balsam, 25 June 1973, Rosenberg Collection (1)

Calligrapha ostryae Brown 1945 (Figure 1j)

Canada: Ontario (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Riley et al.

2003). U.S.A.: Michigan (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), New York (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003). PENNSYLVANIA: Pennsylvania, F. Knab Collection (1) WISCONSIN: Milwaukee Co., Milwaukee, Milwaukee Public Museum, F. Knab Collection (1); Milwaukee Co., 20 July 1900, F. R. collector, F. Knab Collection (2)

Calligrapha philadelphica (Linnaeus 1758) (Figure 1k)

Canada: British Columbia (Brown 1945; Robertson 1966; Hatch 1971; Wilcox 1972, 1975; Lawson 1976; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Manitoba (Brown 1945; Robertson 1966; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), New Brunswick (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Nova Scotia (Bousquet 1991; Riley et al. 2003), Ontario (Morris 1914; Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003), Saskatchewan (Bousquet 1991; Riley et al. 2003). U.S.A.: Alabama (Balsbaugh and Hays 1972; Riley et al. 2003), Connecticut (Britton 1920; Riley et al. 2003), District of Columbia (Riley et al. 2003), Georgia (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Idaho (Hatch 1971; Downie and Arnett 1996), Indiana (Blatchley 1910; Leng 1920), Kentucky (Riley et al. 2003), Maine (Downie and Arnett 1996; Riley et al. 2003), Maryland (Schroder et al. 1996; Riley et al. 2003), Massachusetts (Riley et al. 2003), Michigan (Riley et al. 2003), Mississippi (Dozier 1921; Riley et al. 2003), Missouri (Rogers 1856; Riley et al. 2003), Montana (Hatch 1971; Riley et al. 2003), Nebraska (Linell 1896; Leng 1920; Powell 1932; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), New Jersey (Riley et al. 2003), New York (Leonard 1926; Downie and Arnett 1996; Riley et al. 2003), North Carolina (Brimley 1938; Riley et al. 2003), Ohio (Hughes, 1944; Wilcox 1954; Downie and Arnett 1996; Riley et al. 2003), Pennsylvania (Brown 1945; Riley et al. 2003), Rhode Island (Davis 1904; Sikes 1999*; Riley et al. 2003), South Carolina (Kirk 1970; Riley et al. 2003), Virginia (Riley et al. 2003), Washington (Hatch 1971; Downie and Arnett 1996), West Virginia (Clark 2000; Riley et al. 2003). MINNESOTA: Kanabec Co., Mora, 20 June 1907, 27 June 1907, 25 July 1907, 1 August 1907, R. A. Vickery collector (1, 2, 2, 1) NEW HAMPSHIRE: Grafton Co., Woodsville, 31 July 2001, on *Cornus stolonifera*, J. Gómez-Zurita collector (1); Grafton Co., Hanover, K. W. Cooper (6) NORTH DAKOTA: Cass Co., Fargo, 20 July 1918, I. N. Gabrielson collector (1) VERMONT: Bennington Co., East Dorset, 28 June 1957, C. T. Parsons collector (1)

Calligrapha rhoda Knab 1909 (Figure 1l)

Canada: Manitoba (Bousquet 1991; Riley et al. 2003), Ontario (Brown 1945; Bousquet 1991; Riley et al. 2003). U.S.A.: Connecticut (Britton 1920; Riley et al. 2003), Illinois (Knab

1909; Riley et al. 2003), Indiana (Knab 1909; Blatchley 1910; Leng 1920; Wilcox 1972; Riley et al. 2003), Kansas (Knab 1909; Leng 1920; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Maryland (Knab 1909; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Massachusetts (Knab 1909; Downie and Arnett 1996; Riley et al. 2003), Michigan (Knab 1909; Riley et al. 2003), Minnesota (Knab 1909; Riley et al. 2003), Missouri (Knab 1909; Wilcox 1972; Riley et al. 2003), New Hampshire (Knab 1909; Leng 1920; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), New Jersey (Riley et al. 2003), New York (Leonard 1926; Riley et al. 2003), Rhode Island (Sikes 1999*; Riley et al. 2003), West Virginia (Clark 2000; Riley et al. 2003), Wisconsin (Knab 1909; Leng 1920; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003).

IOWA: Johnson Co., Iowa City, May 1923, Wickham collector (1); Muscatine Co., Muscatine, 11 June 1917, C. E. Smith collector (1); Iowa, Van Dyke Collection (1)

LOUISIANA: Louisiana, F. Knab Collection (1)

NEBRASKA: Cuming Co., West Point, June 1888, Koebele Collection (1)

OKLAHOMA: Oklahoma Co., Harrah, 23 May 1916, W. D. Pierce collector (1); Payne Co., 1961, John F. Reinert collector (3)

Calligrapha rowena Knab 1909 (Figure 1l)

Canada: Manitoba (Bousquet 1991; Riley et al. 2003), New Brunswick (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Nova Scotia (Brown 1945; Robertson 1966; Riley et al. 2003), Ontario (Knab 1909; Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Knab 1909; Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003). U.S.A.: Connecticut (Knab 1909; Britton 1920; Riley et al. 2003), Georgia (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Indiana (Blatchley 1910; Leng 1920), Maine (Riley et al. 2003), Massachusetts (Knab 1909; Riley et al. 2003), Michigan (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), New Jersey (Riley et al. 2003), New York (Leonard 1926; Brown 1945; Robertson 1966; Downie and Arnett 1996; Riley et al. 2003), North Carolina (Brimley 1938; Riley et al. 2003), Ohio (Wilcox 1954; Riley et al. 2003), Pennsylvania (Knab 1909; Clark 2000; Riley et al. 2003). IOWA: Johnson Co., Iowa City, 4 July 1918, on *Cornus* sp., L. W. Lindsey collector (1) KENTUCKY: Rockcastle Co., Pine Hill Cave, 27 March 1967, Reddell and Andrews collector (1) MARYLAND: Garret Co., Oakland, 31 May 1942, 2 June 1942, on *Cornus* sp., G. H. Dieke collector (1, 1); Garret Co., Oakland, 6 June 1942, G. H. Dieke collector (1) MINNESOTA: Cedar Creek Natural History Area, 45°40.000'N 93°15.000'W, 16 September 2004, on *Cornus* sp., D. J. Funk collector (1)

Calligrapha scalaris (Le Conte 1824) (Figure 1m)

Canada: Manitoba (Bousquet 1991; Riley et al. 2003), Ontario (Morris 1914; Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Brown 1945; Robertson

- 1966; Wilcox 1972, 1975; Bousquet 1991; Downie and Arnett 1996; Riley et al. 2003). U.S.A.: Alabama (Balsbaugh and Hays 1972; Riley et al. 2003), Arkansas (Riley et al. 2003), Connecticut (Britton 1920; Riley et al. 2003), District of Columbia (Riley et al. 2003), Florida (Le Conte 1824; Leng 1920; Blatchley 1924; reported as dubious by Riley et al. 2003), Georgia (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Indiana (Blatchley 1910; Leng 1920; Powell 1932; Downie and Arnett 1996), Kansas (Douglass 1929; Robertson 1966; Riley et al. 2003), Maine (Riley et al. 2003), Massachusetts (Riley et al. 2003), Michigan (Downie and Arnett 1996), Missouri (Jacoby 1880-1888; Riley and Enns 1979), Nebraska (Rogers 1856; Linell 1896; Leng 1920; Powell 1932; Riley et al. 2003), New Jersey (Riley et al. 2003), New York (Le Conte 1824; Leonard 1926; Downie and Arnett 1996; Riley et al. 2003), North Carolina (Brimley 1938; Riley et al. 2003), Ohio (Hughes 1944; Wilcox 1954; Riley et al. 2003), Oklahoma (Fenton 1944; Shaddy and Drew 1967; Riley et al. 2003), Pennsylvania (Riley et al. 2003), Rhode Island (Davis 1904; Sikes 1999; Riley et al. 2003), South Carolina (Kirk 1969, 1970; Riley et al. 2003), South Dakota (Johnson 1930; Kirk and Balsbaugh 1975; Riley et al. 2003), Texas (Linell 1896; Leng 1920; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), West Virginia (Clark 2000; Riley et al. 2003). Mexico (Jacoby 1880-1888; Blackwelder 1982).
- ILLINOIS: N. Illinois, F. Knab Collection (1)
- LOUISIANA: Franklin Co., Wisner, February 22-23, under bark of elm, R. A. St. George collector (2); Orleans Co., New Orleans, 20 January 1944, E. S. Ross collector (4)
- MINNESOTA: Clay Co., Moorhead, 3 July 1980, on American elm (1)
- MISSISSIPPI: Adams Co., Natchez, 15 June 1909, 17 June 1909, 19 June 1909, 21 June 1909, in Spanish moss, E. S. Tucker collector (2, 1, 1, 5)
- NEW HAMPSHIRE: Carroll Co., Chocorua, altitude 3470 ft., G. H. Dieke Collection (1); Hillsborough Co., Manchester, 18 May, 22 May, 9 June, 15 June, W. S. Abbott 1932 thru Bridwell (1, 1, 1, 1)
- WISCONSIN: Milwaukee Co., 30 July 1900, F. Rautenberg collector (1); Milwaukee Co., F. Knab Collection (1)
- Calligrapha spiraea*** (Say 1826) (Figure 1n)
- Canada: Ontario (Wheeler and Hoebeke 1979; Bousquet 1991; Riley et al. 2003), Quebec (Mullins 1976; reported as dubious by Riley et al. 2003). U.S.A.: Arkansas (Riley et al. 2003), Connecticut (Britton 1920; Leng 1920; Wilcox 1972; Mullins 1976; Downie and Arnett 1996; Riley et al. 2003), District of Columbia (Riley et al. 2003), Kansas (Douglass 1929; Riley et al. 2003), Maine (Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Maryland (Schroder et al. 1996; Riley et al. 2003), Michigan (Brown 1945; Wilcox 1972, 1975; Mullins 1976; Wheeler and Hoebeke 1979; Downie and Arnett 1996; Riley et al. 2003), Missouri (Say 1826; Mullins 1976; Riley and Enns 1979; Riley et al. 2003), New York (Wheeler and Hoebeke 1979; Riley et al. 2003), North Carolina (Brimley 1938; Mullins 1976; Wheeler and Hoebeke 1979; Riley et al. 2003), Ohio (Mullins 1976; Downie and Arnett 1996; Riley et al. 2003), Pennsylvania (Say 1826; Wilcox 1972, 1975; Mullins 1976; Wheeler and Hoebeke 1979; Downie and Arnett 1996; Riley et al. 2003), Rhode Island (Sikes 1999), Virginia (Mullins 1976; Wheeler and Hoebeke 1979; Riley et al. 2003), West Virginia (Clark 2000; Riley et al. 2003).
- ILLINOIS: North Illinois, F. Knab Collection (1)
- IOWA: Johnson Co., Iowa City, Wickham collector (1)
- WISCONSIN: Milwaukee Co., Milwaukee, Milwaukee Public Museum (1); Washburn Co., Spooner, 26 May 1949, S. I. Parfin collector (1); Wisconsin, F. Knab Collection (1)
- Calligrapha suturella*** Schaeffer 1933 (Figure 1o)
- U.S.A.: New Hampshire (Schaeffer 1933). Gómez-Zurita et al. (2004) have used genetic data to support the elevation to specific status of this taxon, originally described as a local variety of *C. multipunctata* (Say 1824). Together with the re-description of the species, a number of new localities and new province and State records were provided which are reproduced below.
- MANITOBA: Franklin, 1649 feet, 17 July 2002, on *Salix bebbiana*, D. J. Funk collector (3)
- QUEBEC: L'Amiante, Saint-Joseph-de-Coleraine, 27 July 2000, on *Salix bebbiana*, D. J. Funk collector (1); Lac-Saint-Charles, 26 July 2000, on *Salix bebbiana*, D. J. Funk collector (1);
- MAINE: Cumberland Co., Portland 18 June 2003, on *Salix bebbiana*, D. J. Funk (2); Kennebec Co., Sidney 6 June 2002, on *Salix bebbiana*, D. J. Funk collector (1); Kennebec Co., Sidney 20 June 2003, on *Salix bebbiana*, D. J. Funk collector (1); Somerset Co., Moose River 25 July 2000, on *Salix bebbiana*, D. J. Funk collector (1)
- MASSACHUSETTS: Berkshire Co., Hinsdale, 21 August 1898 (1); Hampden Co., Ludlow, 22 June 1902 (1); Hampden Co., Wilbraham, J. O. Martin collector (1); Massachusetts (1)
- MICHIGAN: Baraga Co., 10 miles W Three Lakes, 7 June 1982, David R. Smith collector (1); lower peninsula, Ogemaw Co., Rt. I-75, 836 feet, 22 July 2002, on *Salix bebbiana*, D. J. Funk collector (1); Agriculture Collection Michigan, 1891, C. F. B., F. Knab collector 1918 (1)
- MINNESOTA: Aitkin Co., 3 miles S McGrath, 3 July 1984, Downie and Wappes collector (1); Becker Co., Itasca St. Pk. Area, 28-29 June 1984, Downie and Wappes collector (1); Kanabec Co., Mora, 25 August 1907, R. A. Vickery collector (2); St. Anthony Pk., 9 June 1907 (1)
- NEW HAMPSHIRE: Hillborough Co., Manchester, 16 June, 25 June and 5 July 1932, W. S. Abbott collector (4); Strafford Co., Milton, 3 July 1897, F. Knab Collection 1918 (3); Squam Lake, F. Knab Collection 1918 (1)
- NEW YORK: Van Cortland Park, Charles Schaeffer coll. (1)
- VERMONT: Windham Co., Brattleboro, spring 1894, F. Knab Collection 1918 (1)
- WISCONSIN: Wood Co., Cranmoor, 26 August 1909, C. W. Hooker coll. (1)

***Calligrapha sylvia* Stal 1860 (Figure 1o)**

U.S.A.: Arizona (Linell 1896; Wilcox 1972, 1975; Riley et al. 2003), New Mexico (Townsend 1895; Riley et al. 2003), Mexico (Jacoby 1880-1888; Leng 1920; Linell 1896; Wilcox 1972, 1975; Blackwelder 1982).

Note: This new record has to be considered provisional, since it seems to be from an intercepted specimen on the border between Mexico and the US. However, the confirmed presence of the species in neighboring areas suggests that it could be naturally present in Texas too.

TEXAS: El Paso Co., El Paso, 1 July 1942, with mustard greens from Mexico (1)

***Calligrapha verrucosa* (Suffrian 1858) (Figure 1p)**

Canada: Alberta (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), British Columbia (Brown 1945; Robertson 1966; Hatch 1971; Wilcox 1972, 1975; Bousquet 1991; Riley et al. 2003), Manitoba (Brown 1945; Robertson 1966; Wilcox 1972, 1975; Bousquet 1991; Riley et al. 2003), Northwest Territories (Bousquet 1991; Riley et al. 2003), Ontario (Bousquet 1991; Riley et al. 2003), Saskatchewan (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003). U.S.A.: California (Riley et al. 2003), Idaho (Hatch 1971; Riley et al. 2003), Montana (Leng 1920; Hatch 1971; Wilcox 1972, 1975; Riley et al. 2003), Nebraska (Riley et al. 2003), Nevada (Riley et al. 2003), Oregon (Hatch 1971; Wilcox 1972; Riley et al. 2003), Utah (Riley et al. 2003), Washington (Hatch 1971; Riley et al. 2003), Wyoming (Lawson 1976; Riley et al. 2003).

ALASKA: Fairbanks North Star Co., Fairbanks, 16 July 1952 (2); Fairbanks North Star Co., Fairbanks, 23 May 1966, on *Salix spp.*, Joan Foote and Les Viereck collectors (2); Fort Yukon, 3 July 1953, R. I. Sailer (1)

***Calligrapha vicina* Schaeffer 1933 (Figure 1p)**

Canada: New Brunswick (Bousquet 1991; Riley et al. 2003), Ontario (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003), Quebec (Brown 1945; Robertson 1966; Bousquet 1991; Riley et al. 2003). U.S.A.: Maryland (Cavey 1994; Downie and Arnett 1996; Riley et al. 2003), New York (Schaeffer 1933; Brown 1945; Robertson 1966; Wilcox 1972, 1975; Downie and Arnett 1996; Riley et al. 2003), Pennsylvania (Riley et al. 2003).

CONNECTICUT: Connecticut, Blaisdell Collection (2)

MASSACHUSETTS: Hampden Co., Montgomery, 21 August 1897, F. Knab collector (1); Worcester Co., Southbridge, 3 May 1913, S. W. Bromley Collection (1)

OHIO: Ohio, C. F. B. collector (1)

VERMONT: Bennington Co., Roberts Collection (1); Chittenden Co., Burlington, May 1942, U. V. M. collector (1)

Zoogeography of Nearctic *Calligrapha*

The catalogue of *Calligrapha* species in North America north of Mexico currently includes 38 taxa, after establishing the synonymy for several subspecies pairs (Riley et al. 2001, 2003). The largest percentage (86.8%) corresponds to endemic forms for this part

of the world, the only exceptions being species in a group that expands from Central America reaching the southernmost states in the United States (i.e., *C. dislocata*, *C. multiguttata*, *C. serpentina*, *C. sylvia* and *C. fulvipes*). The new distribution data presented here combined with the latest report on the distribution of the species in this genus (Riley et al. 2003) allows updating the data on endemism of *Calligrapha* on a per country basis. The Canadian list of endemic *Calligrapha* includes the species *C. amator*, *C. tiliae*, and *C. virginea*, and the United States list the species *C. amelia*, *C. androwi*, *C. cephalanti*, *C. floridana*, and *C. wickhami*. The remaining species except for the above mentioned group expanding from Central America have been recorded in both countries. The highest diversity of *Calligrapha* can be found in the North-east quadrant of North America, in the area around the Great Lakes (Figure 2).

An analysis of the ranges of distribution of all the North American species of *Calligrapha* helps establishing a tentative separation of groups according to their geographical distribution (Table 1, Figure 2). This separation follows in general terms two gradients: a longitudinal gradient most likely conditioned by the orography of the subcontinent, with the main mountain ranges following a North-South axis, and a latitudinal gradient possibly driven by climatic/ecological conditions. The first zonation distinguishes from west to east (i) a Pacific group limited eastward (less so to the north) by the Rocky Mountains, (ii) an Atlantic group not surpassing this mountain system to the west, and (iii) a Great Plains group distributed mainly in this geographical area, but spreading to the east and limited to the west by the Rockies (Table 1). The second possibly climatic or historical zonation includes (i) a Central American group, present only in the southernmost regions of North America, (ii) the endemic species from Florida, and (iii) a very rich group in the area surrounding the Great Lakes (Table 1). A group of a few trans-Nearctic species widely distributed from coast to coast could be included among these too. Areas where two or more geographical assemblages overlap, on the edges from the centers of maximum diversity of each group, show a corresponding relative increase in species richness. This is well exemplified by the North-South corridor from Manitoba to Texas, where the Atlantic and Pacific groups meet intersecting with the Great Plains group, and showing richer *Calligrapha* faunas than the adjacent regions (Figure 2). The observed distribution pattern of *Calligrapha* and the importance of the Cordilleras (particularly the Rocky Mountains and Sierra Nevada) in separating the two dominant groups, Pacific and Atlantic, is consistent with similar patterns observed for *Onychomys* grasshopper mice, *Gambelia* lizards, *Crotalus* rattlesnakes, *Agelenopsis* spiders, and several plants, among others (e.g., Riddle and Honeycutt 1990; Orange et al. 1999; Pook et al. 2000; Hong, 2001; Ayoub and Riechert 2004). The effective barrier

TABLE 1. Grouping of *Calligrapha* species according to their distribution ranges in North America (north of Mexico).

Longitudinal			Latitudinal			
Pacific	Great Plains	Atlantic	Trans-Nearctic	Great Lakes	Central American	Florida
<i>C. sigmoidea</i>	<i>C. incisa</i>	<i>C. ignota</i>	<i>C. californica</i>	<i>C. alni</i>	<i>C. dislocata</i>	<i>C. cephalanti</i>
<i>C. verrucosa</i>	<i>C. praecelsis</i>	<i>C. knabi</i>	<i>C. multipunctata</i>	<i>C. suturella</i>	<i>C. multiguttata</i>	<i>C. floridana</i>
	<i>C. rhoda</i>	<i>C. rowena</i>	<i>C. philadelphica</i>	<i>C. alnicola</i>	<i>C. serpentina</i>	
		<i>C. scalaris</i>	<i>C. bidenticola</i>	<i>C. tiliae</i>	<i>C. sylvia</i>	
		<i>C. confluens</i>	<i>C. lunata</i>	<i>C. vicina</i>	<i>C. wickhami</i>	
		<i>C. spiraea</i>		<i>C. virginea</i>	<i>C. fulvipes</i>	
		<i>C. amelia</i>		<i>C. amator</i>		
		<i>C. pnirsa</i>		<i>C. apicalis</i>		
		<i>C. androwi</i>		<i>C. dolosa</i>		
				<i>C. ostryae</i>		
				<i>C. pruni</i>		

of the Cordilleras could be not only responsible for the spatial structuring of the group in North America, but for its diversification as well. However, it is important to retain the idea that the effect of geographical barriers in the case of non-generalist phytophagous beetles like *Calligrapha* could be indirect, the primary effect being on the actual host plants of the insects.

Latitudinal faunal structuring in North America, mainly related to climatic and the associated ecological gradients, has been analytically demonstrated for instance in mammals (Badgley and Fox 2000). At a different scale, a similar situation can be described for phytophagous specialist *Calligrapha*, where climate and ecology have a tight link through the distribution of the host plants. However, the observed latitudinal zonation in these beetles could be the effect of historical processes too, something that a phylogenetic analysis of genus can help to discern (Gómez-Zurita and collaborator, in preparation). The endemism area of Florida could be related for instance to the prolonged insularization of this peninsula during the Pliocene, which has been proved effective to trigger the diversification of several animal groups (e.g., Gilbert 1987; Moler and Kezer 1993).

The Great Lakes area is particularly interesting for two reasons: species diversity and species ecology. The highest species diversity of the genus in North America occurs in this region, particularly in the Canadian provinces of Ontario and Quebec, resulting from the overlap of the two richest species groups, the so-called "Great Lakes" and the Atlantic groups, together with the trans-Nearctic species. We believe that the high species diversity in this region is related to climatic and idiosyncratic features of this particular area that provides with a variety of niches for the colonization and possibly diversification of *Calligrapha*. An interesting feature of the North American *Calligrapha sensu stricta* is that they have exploited a trophic niche different from the feeding selection of the other subgenera and the congeneric species in Central and South America. While the latter feed on grasses and herbaceous plants, most North American species feed on

trees and shrubs from different botanical families, but typically found associated to streams and river banks (e.g., *Alnus*, *Betula*, *Cornus*, *Ostrya*, *Physocarpus*, *Salix*, *Tilia*, and *Ulmus*; Brown 1945). Interestingly, these plants are particularly abundant and have the center of their distribution precisely in the Great Lakes area and North Eastern North America (Little 1980; USDA, NRCS 2004*), where most species of *Calligrapha* are also found. This correlation is not surprising and is particularly accurate in some cases. The ninebark, *Physocarpus opulifolius* (Rosaceae), is the sole host-plant of *C. spiraea*, and the beetle has the same as the core distribution of the plant in North America (Figure 1n), which ranges from Quebec west to Michigan and south to Tennessee, although the plant reaches as isolated spots Eastern North Dakota and Kansas to the west and Northern Florida to the north (Wheeler and Hoebeke 1985; USDA, NRCS 2004*). *Tilia americana* var. *americana* (American Basswood; Tiliaceae) is restricted to the Northeastern quadrant of North America (Little 1980; USDA, NRCS 2004*). Three species of *Calligrapha*, including *C. amator* (Figure 1c), feed on this host and are present only in the plant center of distribution (Brown 1945). Similar situations can be described for *C. ignota* and their birch host *Betula lenta* (Betulaceae; possibly *B. papyrifera* too), *C. alni* (Figure 1a), *C. alnicola* (Figure 1b), *C. amelia* (Figure 1c), *C. apicalis* (Figure 1d), and *C. confluens* (Figure 1g) on the alders *Alnus incana americana* and *A. rugosa* (Betulaceae), all living exclusively in North Eastern North America. *C. scalaris* and *Ulmus americana* (American Elm; Ulmaceae), and *C. rhoda* with *Corylus americana* (American Hazelnut; Betulaceae), are all only present in the Eastern half of North America. The trans-Nearctic *Calligrapha (sensu stricta)* species also conform to the expected correlated distribution with the host plant. So, *Cornus sericea* (= *C. stolonifera*; Dogwood; Cornaceae) and *Salix bebbiana* (Bebb's Willow; Salicaceae), the preferred respective host plants of *C. philadelphica* and *C. multipunctata*, are also distributed throughout North America (Brown, 1945; USDA, NRCS 2004*).

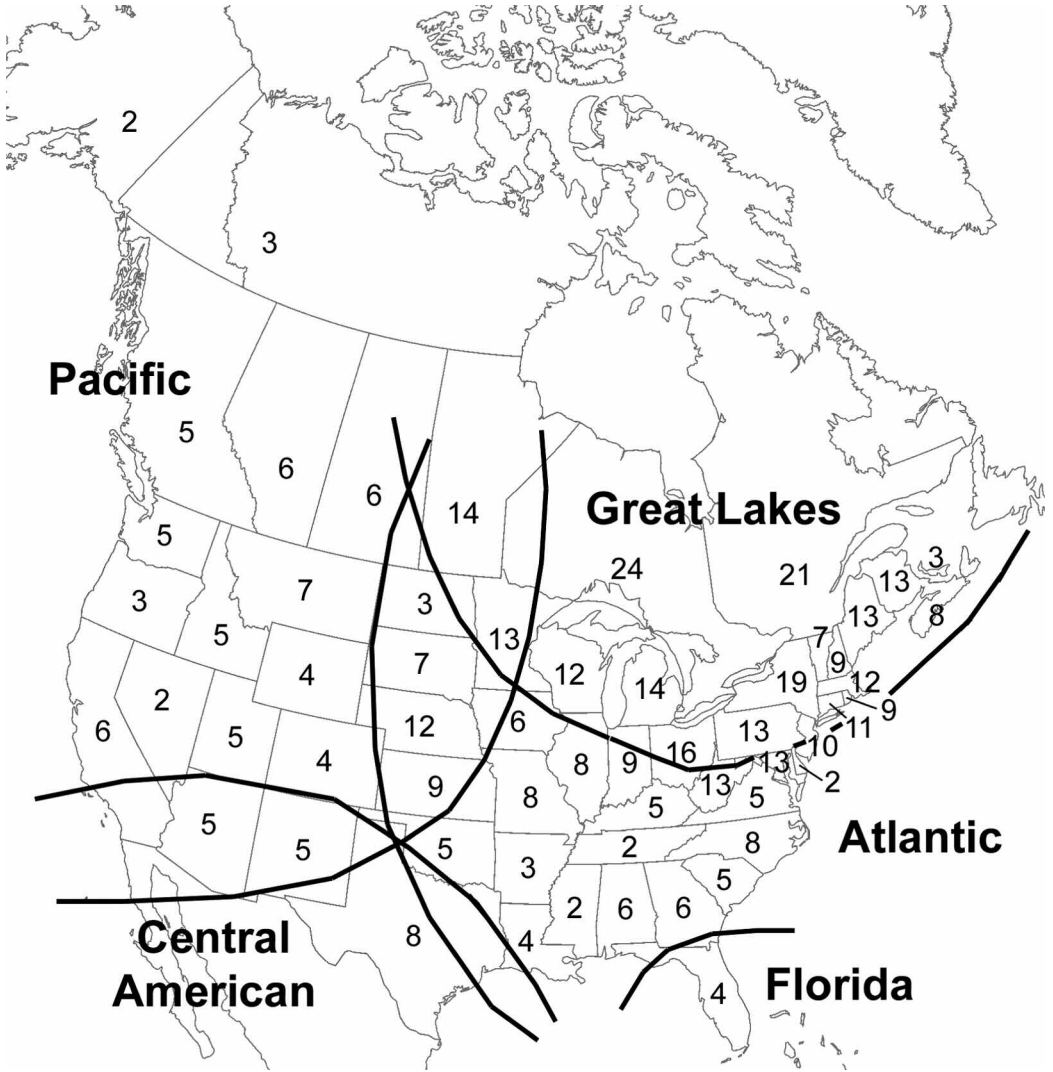


FIGURE 2. *Calligrapha* species numbers in North American provinces and states. Thick lines roughly demarcate faunistic groups in the genus according to their geographic distribution.

Calligrapha stands out among leaf beetles because it includes several parthenogenetic species, otherwise very unusual among the Chrysomelidae (Brown 1945; Robertson 1966; Cox 1996; Gómez-Zurita et al. 2004). It is noteworthy that all asexual species in *Calligrapha* belong to the “Great Lakes” group and have typically restricted ranges (with the possible exceptions of *C. alnicola* and *C. suturella*; Figures 1b and 1o). This example of geographical parthenogenesis is however difficult to reconcile with current hypotheses relating this reproductive mode with better colonizing abilities, highest adaptability through generalist behavior or clonal microadaptation, and/or advantages on environments with reduced biotic (particularly parasitic) inter-

actions (Haag and Ebert 2004, and references therein). The parthenogenetic *Calligrapha* species coexist in close sympatry with several other sexually reproducing taxa (Brown 1945) and moreover we have hypothesized that interspecific hybridization might be the mechanism behind the origin of asexuality in *Calligrapha* (Gómez-Zurita et al. 2004), not existing reasons a priori suggesting interspecific hybridization to occur following any geographical pattern. Again, phylogenetic studies are needed to provide sound answers to these questions relevant for the biogeography, systematics and evolution of such a remarkable genus, *Calligrapha* (Gómez-Zurita and collaborator, in preparation).

Descriptive studies like this paper, aimed to resolve basic questions about the distribution of organisms in a particular geographical region, are critical to formulate meaningful hypotheses to be tested on a phylogenetic or ecological framework. The potential for information held at Museums and research institutions even for regions and taxa relatively well known, as for the leaf beetles from North America, is still enormous. A facilitated access to these resources and ensuring conditions for their preservation prove very important to advance our understanding of the World's biodiversity.

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