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## On the Value and Feasibility of a Plant Distribution Atlas for the States in the Gray's Manual Range<sup>1</sup>

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**ABSTRACT.** The *Gray's Manual* range of plants in the northeastern United States was first defined in 1848. Since the last major realignment of the boundaries in 1889, the roster of states included has been essentially constant. This district has been the subject of many floras, manuals, and field guides. A county dot-distribution atlas of species in the range would be useful to teachers, students, and researchers. A distribution map of *Chelone glabra* provides an example.

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### INTRODUCTION

In the mid 1800s, Asa Gray, Professor of Natural History at Harvard University, published *A Manual of the Botany of the Northern United States* (Gray 1848). His book followed a number of similar but less comprehensive works, chief among them those of A. Eaton and J. Torrey (for a history of these earlier manuals, see Dupree (1959) and Shinnars (1962)). The *Manual* covered the area "from New England to Wisconsin and south to Ohio and Pennsylvania inclusive." The eastern boundary was the Atlantic Ocean, the northern boundary Canada, and the western boundary the Mississippi River. The title was an appropriate one for in 1848, west of the Mississippi River in the northern part of the nation, only the states of Missouri and Iowa had been admitted to the Union, the latter but two years previously in 1846.

In the second edition of the *Manual*, Gray (1856) expanded the range southward and westward to include Maryland, Virginia (including West Virginia), Kentucky, Indiana, and Illinois, making the district a solid block of states east of the Mississippi River and north of 36°30' (approximate) north latitude. Gray defended this latitude not only as a useful political line but also as a meaningful phytogeographic boundary. "This southern boundary coincides better than any other geographical line with the natural division between the cooler-temperate and the warm-temperate vegetation of the United States; very few characteristically Southern plants occurring north of it. . ." (Gray 1856). The range remained unaltered through the 5th edition (Gray 1867), the last to be written by Gray.

The authors of the 6th edition, Watson and Coulter (1889), extended the western border to the 100th meridian, thereby adding all of the states of Minnesota, Iowa, and Missouri, and parts of North Dakota, South Dakota,

Nebraska, and Kansas. In the 7th edition, Robinson and Fernald (1908) reduced the western part of the district, setting the border at "the western boundary of Minnesota and northwestern Iowa, thence southward along the 96th meridian." At the same time, they added parts of adjacent Canada to the range. In the current and 8th edition, Fernald (1950) extended the range even farther into Canada, but left that portion in the United States as it had been redrawn in 1908.

Meanwhile, toward the end of the 19th century, N. L. Britton, Director of The New York Botanical Garden, and A. Brown, President of the Torrey Botanical Club, published the first volume (Britton and Brown 1896) of an illustrated flora covering an area in large part coincident with the *Gray's Manual* range. It extended "from Newfoundland to the Parallel of the southern Boundary of Virginia, and from the Atlantic Ocean westward to the 102d Meridian." In preparing *The New Britton and Brown Illustrated Flora*, Gleason (1952) placed the western border at "the west boundary of Missouri, Iowa, and Minnesota," and reduced the part of Canada covered. In so doing, he brought the range essentially into agreement with that of Fernald (1950) in the 8th edition of *Gray's Manual*.

In a manual (Gleason and Cronquist 1963) based on Gleason's 1952 work, Cronquist reduced slightly the United States portion of the range, omitting "the part of Missouri that lies south of the Missouri River." Cronquist writes (in personal communication) that this same range will be maintained in his revision of the Gleason and Cronquist manual, now in preparation.

The *Gray's Manual* range has also been used for several popular field guides, among them those of Harlow (1954), Muenscher (1950), Peterson and McKenny (1968), Petrides (1972), and Taylor (1955). In addition, Rickett (1966) devoted the first volume of his series of books presenting photographs of American wildflowers to "the northeastern states." The states included were the same as those covered by Gleason (1952).

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It is Fernald's and Gleason's group of 22 states that is considered here. It includes: Connecticut, Delaware, Kentucky, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin, and also the District of Columbia. The western boundary extends to, and overlaps slightly, the eastern boundary of the Great Plains (McGregor and Barkley 1977). Not included here are the small sections of eastern Nebraska and eastern Kansas covered in the 8th edition of *Gray's Manual* (Fernald 1950). The objective of this paper is to show that preparation of a county dot-distribution atlas is practical and timely, and that such an atlas would prove valuable to those interested in the plants of this district.

### COUNTIES AS THE MAPPING UNITS

There are in the 22 states a total of 1,250 counties (1,251 if the District of Columbia is treated as a county), the number ranging from 3 in Delaware to 120 in Kentucky. The counties vary in size of land area from the 22 square miles (57 km<sup>2</sup>) in New York County, New York, to the 6,721 square miles (17,407 km<sup>2</sup>) in Aroostook County Maine. Although difference in size is the greatest disadvantage in use of counties as the basic mapping unit, the extreme sizes above are not typical of the general situation. Of the 1,250 counties, 692 (55%) contain between 300 and 600 square miles (777-1,554 km<sup>2</sup>), and 1,059 (85%) between 200 and 900 square miles (518-2,331 km<sup>2</sup>). Only 14 counties (1%) and the District of Columbia are smaller than

100 square miles (259 km<sup>2</sup>) and only 29 (2%) exceed 1,500 square miles (3,885 km<sup>2</sup>). All data on numbers and sizes of counties are taken from Easton (1986).

There are, on the other hand, advantages to using counties as the mapping units. Historically, in many floristic studies of these 22 states, the county has been used to show distribution. This is also true of floristic studies in many adjacent states, the most notable example being the *Atlas of the Flora of the Great Plains* (McGregor and Barkley 1977) on the western boundary. Use of the county also has the advantage of making available many records from rare, older specimens whose labels bear no location data other than the county name. Perhaps most importantly, the county is a useful unit for stimulating further collecting. Filling gaps in county distribution records often appeals to collectors because of a personal loyalty to the county or state, or merely because of the general pleasure some find in discovering new county records.

### VALUE OF A GRAY'S MANUAL RANGE ATLAS

The author's field work throughout much of the area, especially in Iowa, Virginia, and Ohio, has suggested that many parts are not well known floristically. Whether or not that is the case, it would be of value to assemble the data available at the present time. These data are now scattered through many large and small herbaria.

Such an atlas would prove useful to those engaged in monographic and phytogeographic research, presenting for individual species a full picture of the range and calling to attention records that might not be found in a study of specimens in a limited number of herbaria. It would also be of value to researchers in related disciplines

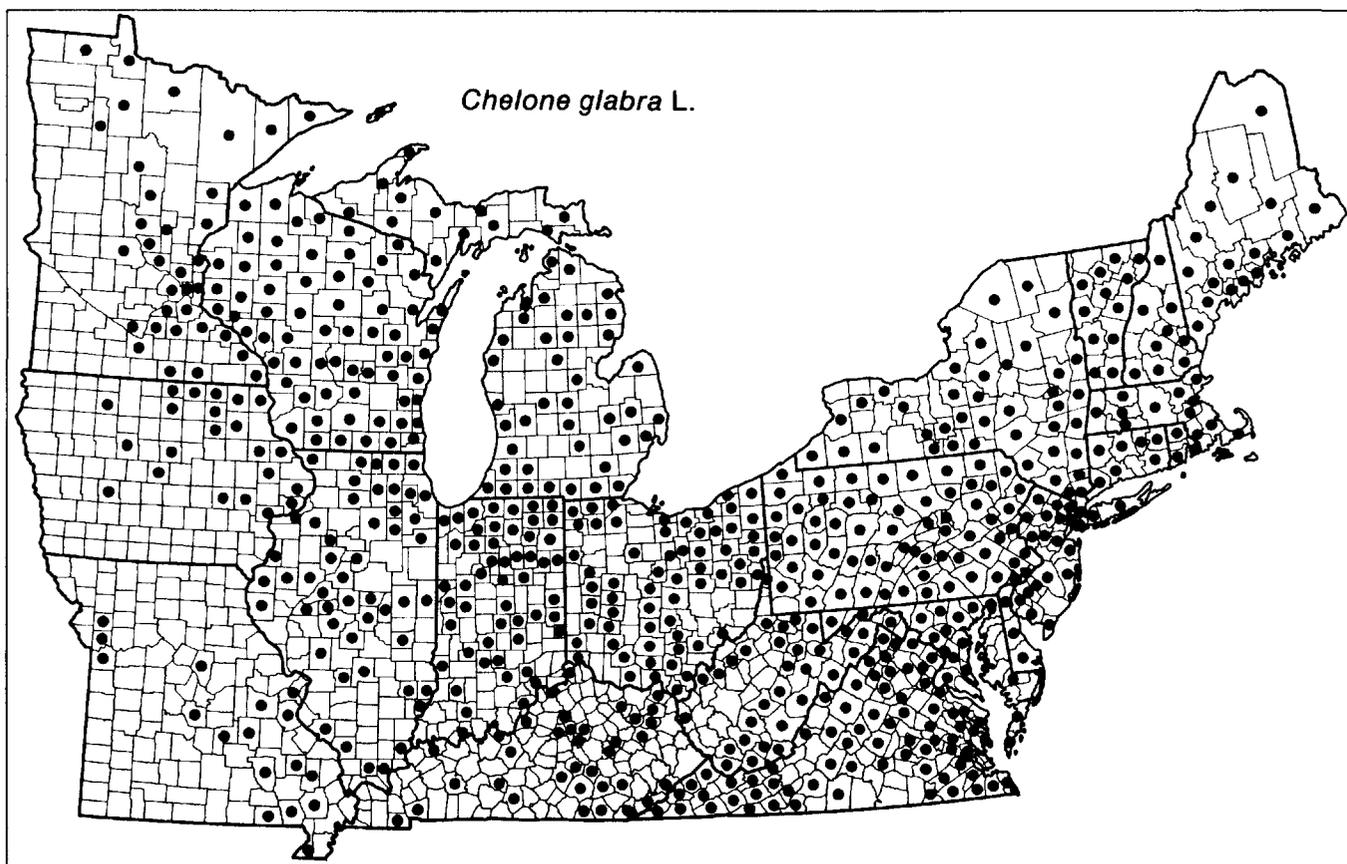


FIGURE 1. Distribution of *Chelone glabra* in the states in the *Gray's Manual* range.

(e.g. entomology and soil science) who need accurate data on plant distribution. For persons studying rare or endangered species, it would provide a complete picture of the known historical distribution. For those studying the introduction and spread of alien species, it would present a guide to the species' current limits. For those interested in nature and wildflowers it would be a useful supplement to the popular works cited above, particularly in determining which species are apt to be encountered in one's home area. Lastly, as noted above, publication of such an atlas would stimulate productive field work by calling attention to those parts of a species' range that have been neglected.

The accompanying map (Fig. 1) of the distribution of *Chelone glabra* L. provides an example of how a page from such an atlas might appear and demonstrates the feasibility of the project. It includes all infraspecific taxa of this species (for a list of varieties in *Chelone glabra*, see Cooperrider and McCready (1970)). The map is based on data from the author's past research and from publications by Beal and Thieret (1986), Crosswhite (1965), Deam (1940), Massey (1961), McCready and Cooperrider (1978), Mohlenbrock and Ladd (1978), Pennell (1935), Seymour (1969), Steyermark (1963), and Wherry et al. (1979). These data are augmented or confirmed by records reported in recent correspondence from the following persons: for Delaware: A. O. Tucker; Indiana: B. J. Hellenthal and L. Johnson; Illinois: A. G. Jones, A. C. Koelling, and D. Ugent; Iowa: R. W. Cruden and D. Q. Lewis; Kentucky: M. Bender, W. S. Davis, R. L. Jones, and J. W. Thieret; Maryland: J. L. Reveal; Michigan: A. A. Reznicek and E. G. Voss; Minnesota: G. B. Ownbey; Missouri: S. Smedley; New Hampshire: G. E. Crow; New York: C. J. Sheviak; Rhode Island: R. L. Hauke; Virginia: D. C. Bliss, O. W. Gupton, A. M. Harvill, M. F. Johnson, L. J. Musselman, G. W. Ramsey, D. M. E. Ware, and T. F. Wieboldt; and West Virginia: L. L. Rader.

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